The Government as a Large Shareholder: Impact on the Voting Premium

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Abstract

The subprime crisis led to a wave of government interventions in the private sector that has been particularly strong in Europe and Latin America, where several governments are large shareholders in a variety of public firms. In a sense, the subprime crisis induced these governments to behave as active large shareholders. This paper uses a sample of public firms in Brazil to show that the government activism lowers the value of the minority shareholders' voting rights. While the corporate governance literature usually associates lower voting premia with stronger protection of minority shareholders, we provide evidence that the government-induced decline in the value of voting rights harmed minority shareholders in Brazil.

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1 Introduction

During economic recessions, policy makers often lower taxes and interest rates in order to boost the economic activity. In this respect, there isn't anything unusual about the subprime crisis. Several countries have adopted expansionary policies since the bankruptcy of Lehman Brothers in 2008. What made the subprime crisis especial was its depth and persistence, which probably explain why government interventions in the private sector have become more pervasive. In 2011, for instance, the Brazilian Government pressured the local banks to unilaterally lower the interest rates of their loans. At that time, Brazilian officials argued that the high lending rates practiced in the banking industry jeopardized the government's efforts to stimulate the economy.

Regardless of the motives for the government interventions, the common wisdom is that they reduce profits, thereby harming shareholders.[1] Accordingly, large U.S. corporations usually oppose interventionist governments, channeling the bulk of their campaign contributions to market-oriented candidates to political jobs.[2] Corporate opposition to government interventions is not always overt, though. La Porta *et al.* (1999) show that, as of 1996, the government was the ultimate controlling shareholder in 18.8% of the firms in their sample of large corporations in 27 wealthy economies.[3] In these firms, government interventions amount to shareholders' activism, that is, a large shareholder's right to fiercely push its own corporate agenda.

What are the corporate governance consequences of the activism of the government as a large shareholder? We will show that the voting premium fell in firms controlled by the Brazilian government, as the subprime crisis induced the government to play a more active role as a shareholder. In the corporate governance literature, lower voting premia are usually associated with stronger protection

[1] Ideally, government interventions are necessary steps to offset corporate decisions that maximize profits but do not internalize social costs. If this rosy view of the interventions is accurate, they should indeed lower profits. Nonetheless, there are examples of interventions that benefit shareholders. In 2009, for instance, the U.S. government purchased US$ 49.5 billion of GM's shares as part of a bailout operation that aimed to avoid massive layoffs in the auto industry. GM's shareholders certainly appreciated the bailout operation.

[2] OpenSecrets.org (`www.opensecrets.org/pres12/`) reports that five large financial institutions were among the top five contributors to the Republican candidate, Mitt Romney, in the 2012 presidential race. In contrast, only two corporations were among the top five contributors of the Democrat candidate, Barack Obama, who was widely perceived as more interventionist than Romney.

[3] The end of history's largest privatization wave did not eliminate the pervasive presence of several governments in the controlling group of public firms. Bortolotti and Faccio (2008) show that, at the end of 2000, OECD countries retained control of 62.4% of privatized firms.

of the minority shareholders' rights. Our empirical analysis suggests, however, that better protection of the minority shareholders was not the reason for the decrease in the voting premium of the firms for which the government was a large shareholder. The value of the voting rights fell because the government's activism weakened the incentives for large shareholders to solve control contests by seeking minority votes.

The reason for minority votes to be valuable is the starting point to understand the corporate governance consequences of the activism of the government as a large shareholder. Minority shareholders typically do not participate in the decision-making process of modern corporations. Still, large shareholders have incentives to seek the votes of the minority shareholders, if these votes may determine the outcome of a control battle. Building on this idea, Rydqvist (1988) and Zingales (1994, 1995) show that a larger probability of a control battle increases the price of voting shares vis-à-vis the price of the non-voting ones. The subsequent literature shows that the average voting premium is higher in less transparent firms and in countries that offer weaker legal protection to minority shareholders.[4] Intuitively, low transparency and weak legal protection make it easier for the controlling shareholders to divert the minority shareholders' cash-flow rights, increasing the value of control. As the value of control goes up, so does the controlling shareholders' willingness to bid for minority votes in a control battle, therefore increasing the voting premium.

Willingness to bid in control battles explains not only the level of the voting premium but also why it varies with the activism of the government as a large shareholder. Once the government gets more involved in corporate decisions, the controlling shareholders' willingness to bid may go down for two reasons. First, the government's representatives in the board may monitor more closely the managers and other large shareholders, preventing undue diversion of corporate assets. As such, the willingness to bid goes down (along with the voting premium), because better protection of minority shareholders makes control less valuable.

The second reason for the government's activism to lower the voting premium is that private investors are arguably reluctant to openly fight a large shareholder — like the government — that has

[4] Using a sample of firms in 21 countries, Nenova (2003) finds that, typically, the highest voting premia are in countries that offer weaker legal protection to minority shareholders. In the same spirit, Mitton (2002) and Johnson *et al.* (2000) show that the 1997-1999 Asian crisis hit more strongly the less transparent firms, whereas Dyck and Zingales (2004) show that the voting premium varies with moral norms and with the importance of the press in the country.

the power to regulate firms and markets. In this case, the lower voting premium follows from the lower probability that the controlling shareholders engage in a control battle that leads to a bidding dispute for the minority votes. We argue that this is the likely outcome of the policy-motivated interventions that have become more pervasive since the outbreak of the subprime crisis. These interventions harm the minority shareholders, because they lower their voting rights without delivering an offsetting improvement of the enforcement of their cash flow rights.

To provide evidence that policy-motivated interventions harm minority shareholders, we develop a very simple voting-premium model that contrasts the two channels through which the activism of the government lowers the voting premium. The model predicts that the voting premium of firms that the government has a larger control stake decreases more steeply with the intensity of the activism if better protection of minority shareholder is the main corporate governance consequence of the intervention. Grossman and Hart (1980) and Shleifer and Vishny (1986) provide the rationale for this prediction: large outside shareholders have stronger incentives to monitor the controlling group than small shareholders. In stark contrast, if the intervention is motivated by economic-policy concerns, the model predicts that the government's control stake does not effect the sensitivity of the voting premium with respect to the intensity of activism.

Testing our model's implications with firm-level data faces some hurdles, though. For one, the intensity of the government's activism in any given firm is not observable by outsiders. We deal with this problem by focusing on the government's overall willingness to intervene in the private sector. The willingness to intervene translates naturally into shareholders' activism in firms that the government belongs to the controlling group, with the aforementioned consequences to the voting premium. In the other firms, the willingness to intervene should affect the voting premium solely through their impact on the investment opportunities and cash-flow generation. With the proper controls for firm characteristics, our model predicts a non-significant effect of the willingness to intervene on the voting premium of the firms that the government is out of the controlling group, with a negative effect in the firms that the government is a controlling shareholder. This predicted negative effect is the estimate of the impact of the activism on the voting premium the government-controlled firms.

The empirical study by Carvalho (2014) is the key to our proxy for the government's willingness

to intervene. Carvalho shows that, from 1995 to 2006, the Brazilian government offered subsidized loans from its development bank (BNDES) to convince firms to shift employment and investment to states and cities where the government candidates faced tough opponents in incoming elections. Since these subsidized loans are costly to the government, its officials would have not offered them unless they believed that the interventions were important for their objectives. It then follows that the outstanding share of loans from government-controlled banks is a (noisy) signal of the government's willingness to intervene in the private sector. As the government's desire to intervene increases, the more it will be willing to increase the supply of subsidized credit.

BNDES has indeed increased significantly its supply of loans since the outbreak of the subprime crisis. In dollar amount, the annual disbursements of BNDES loans raised from US$ 33.3 billion in 2007 to US$ 95.7 billion in 2010.[5] When President Dilma Rousseff took power in 2011, she halted the growth of BNDES loans, but, in exchange, ordered two government-controlled banks (Banco do Brasil and Caixa Econômica Federal) to increase their supply of credit while lowering interest rates. Accordingly, the share of loans from government-controlled banks in Brazil raised from 34.3% in the third quarter of 2008 to 47.3% in the fourth quarter of 2012. The steady growth of the share of loans from government-controlled banks is consistent with several highly-publicized examples of government interventions in Brazil. In May 2011, for instance, the government ousted the CEO of one of the largest mining companies in the world, Vale, after a two-year control battle that started when the company laid off 1,300 employees in the end of 2008.

Given our proxy for the willingness of the government to intervene in the private sector, we estimate its effect on the voting premium of 163 firms with dual-class shares trading on the São Paulo Stock Exchange (BM&FBovespa), between 2008 and 2012. In this sample, the government controlled at least 20% of the votes in 39 firms. As in La Porta *et al.* (1999), we assume that the threshold of the voting shares for the government to belong to the controlling group is 20%.

Between the third quarter of 2008 and the last quarter of 2012, the average voting premium fell from 18.6% to 4.1% in the firms that the government held less than 20% of the voting shares. For these firms, fixed-effect regressions in Section 5 predict that one percent increase of the share of loans from

[5] Data on annual disbursements (in Brazilian reals) are available from the BNDES's website (`www.bndes.gov.br`). We used average exchange rates to report the disbursements in billions of dollars.

government-controlled banks (our proxy of the willingness of the government to intervene) lowers the average voting premium by 0.34%. This effect is not statistically significant at the 10% level. We interpret this result as evidence that there are no corporate governance consequences of interventions in firms that the government isn't in the controlling group. The interventions may alter the values of these firms, but they do not change their voting premia.

In contrast, the government's willingness to intervene is an important determinant of the voting premium of firms that the government controls at least 20% of the voting shares. For these firms, the average voting premium fell from 17.9% in the third quarter of 2008 to 2.3% in the last quarter of 2012. Fixed-effect regressions in Section 5 estimate that one percent increase in the share of loans from government-controlled banks lowers by 0.73% the voting premium of the government-controlled firms. This result is statistically significant at the 10% level, explaining 60.4% of the 15.6% drop of the voting premium in the government-controlled firms. If we consider that the effect of the government's activism is the difference between the average effects on firms that the government is and isn't in the controlling group, then it explains 31.6% of the decrease of the voting premium in the sample period.

Perhaps more importantly, we cannot reject the hypothesis that the willingness to intervene lowers the voting premium of firms that the government is in the control group, independently of its controlling stake. This finding is evidence that the Brazilian government's interventions did not result in better protection of minority shareholders. Instead, they make it less likely that the controlling shareholders engage in a bidding battle for minority votes, harming the minority shareholders accordingly.

The rest of the paper is organized as follows. Section 2 develops the voting premium model that guides the empirical analysis, whereas Sections 3 describes the data and the proxy of the government's willingness to intervene. Section 4 documents the equity holdings of the Brazilian government and Section 5 shows that the government's willingness to intervene lowered the voting premium but didn't offer further protection to minority shareholders. To argue that our findings are not severely biased by sample selection problems or measurement errors, Section 6 conducts robustness checks: alternative criteria for aggregating votes, quantile regressions, placebo tests, and an estimate of the effect of the government's willingness to intervene on the voting premium of a mining company, Vale, whose investment opportunities are arguably easier to control. The last section offers concluding remarks.

2 The voting premium model

We consider a firm with dual-class shares in a risk-neutral economy with three dates ($t = 0, 1, 2$). The non-voting shares are entitled to the firm's verifiable cash flow, but have no voting rights on business decisions. In turn, the voting shares have the same cash-flow rights of the non-voting shares and, in addition, have voting rights: one voting share equals one vote. At $t = 0$, the firm's voting shares are distributed as follows: the government holds a fraction α_0, two private investors hold $\alpha/2$ each, and dispersed minority shareholders hold $\beta = 1 - \alpha_0 - \alpha$. The non-voting shares are in the hands of dispersed investors.

In the benchmark model, the government is not interested in playing an active role in the firm's business decisions, despite being one of the largest shareholders. The two investors with equity stake $\alpha/2$ are the firm's controlling shareholders, while the government and the dispersed shareholders are passive investors.

The total cash flows from the firm's existing assets realize at time $t = 2$, amounting to $y + b$. Left unchecked, the two controlling shareholders can unduly capture the amount b of the cash flows generated by the existing assets. For simplicity, we assume that these private benefits are equally split between the two controlling shareholders, leaving the amount y to be equally divided between the voting and non-voting shares. Both y and b are public information at $t = 0$.

Besides capturing part of the return of the existing assets, the controlling shareholders have to choose which of two mutually exclusive projects, say A and B, to undertake at $t = 1$. We assume that both projects generate cash flow b at $t = 2$, but, in the benchmark model, none of this cash flow goes to either the government or the minority shareholders. If the projects' cash flows are equally split between the two controlling shareholders, then they are indifferent with respect to the projects. Conflicts arise between the controlling shareholders, however, in the states of nature that the private benefits of each project go to one and only one controlling shareholder.[6]

More formally, let b_j^p be the private benefit that the controlling shareholder $j \in \{1, 2\}$ can divert at $t = 2$ from project $p \in \{A, B\}$. As of $t = 0$, the controlling shareholders know that the possible

[6] Private benefits will be unevenly split if the project must be undertaken through a division that is managed as a stand-alone firm by one of the controlling shareholders.

pairs of private benefits from project's A and B are as follows:

$$\left\{(b_1^A, b_2^A), (b_1^B, b_2^B)\right\} = \begin{cases} \left\{(\frac{b}{4}, \frac{b}{4}), (\frac{b}{4}, \frac{b}{4})\right\} & \text{with probability } \frac{1}{2} \\ \left\{(\frac{b}{2}, 0), (0, \frac{b}{2})\right\} & \text{with probability } \frac{1}{4} \\ \left\{(0, \frac{b}{2}), (\frac{b}{2}, 0)\right\} & \text{with probability } \frac{1}{4}. \end{cases} \tag{1}$$

If contracts contingent on private benefits were feasible, then it would be in the controlling shareholders' interest to agree at $t = 0$ to arbitrarily select one of the two projects at $t = 1$, while specifying side payments contingent on the private benefits that the selected project delivers at $t = 2$ to each controlling shareholder. And yet, the shady nature of the private benefits make them not contractible. As such, the controlling shareholders have to bargain about which project to undertake when they learn at $t = 1$ the private benefits that each project yields.

With probability $1/2$, there are no conflicting views at $t = 1$ because the controlling shareholders split evenly any of the projects' private benefits. Conflicts arise when one project delivers all private benefits to one controlling shareholder, while the other project delivers all private benefits to the other controlling shareholder. From equation (1), the probability that the controlling shareholders have conflicting interests at $t = 1$ is $1/2$.

As in Grossman and Hart (1988), we map conflicts of interest into a bidding war for minority votes by ruling out side payments between the controlling shareholders. Under this assumption, each controlling shareholder will bid up to its private benefit $b/2$ from the preferred project, in a competitive battle for the minority votes. Whoever wins this battle selects the favorite project and gets at $t = 2$ its share of the verifiable cash flow y, along with the private benefits from the existing assets and from the project ($b/2 + b/2 = b$). The loser keeps its share $b/2$ of the private benefits from the existing assets, and its fraction of the verifiable cash flow y. It then follows that the competitive bidding equalizes the payoffs of the two controlling shareholders by transferring the project's private benefits to the dispersed investors with voting shares.

Consistent with the evidence in Rydqvist (1988) and Zingales (1994, 1995), we assume that the

market anticipates at $t = 0$ the probability of a control battle, pricing the total amount of voting shares as $P^V = \frac{y}{2} + \frac{1}{2}\frac{b}{2}$. In words, the value of the voting shares is equal to the sum of half of the verifiable cash flow plus the expected revenue due to a control battle (i.e., the probability of a control battle times the equilibrium winning bid). The voting premium at $t = 0$ is the percentage difference between the value of the voting shares, P^V, and the value of the non-voting shares, P^{NV}. The latter is the fraction of the firm's verifiable cash flow that goes to this class of shares, that is, $P^{NV} = \frac{y}{2}$.

$$VP = \frac{P^V - P^{NV}}{P^{NV}} = \frac{\frac{y}{2} + \frac{1}{2}\frac{b}{2} - \frac{y}{2}}{\frac{y}{2}} = \frac{1}{2}\frac{b}{y}. \tag{2}$$

The remainder of this section shows how the government's willingness to intervene in the firm's decisions changes the voting premium. First, we will model the intervention as if the government's goal were to monitor the controlling group in an attempt to prevent it from shifting verifiable cash flows to private benefits. After that, we will introduce interventions in the private sector aimed to support the government's economic policy.[7]

2.1 The intervenor is a monitor

So far, we have assumed that the government is a passive investor who always goes along with the controlling group's decisions. One might argue that government officials should not passively accept the controlling group's unduly diversion of the firm's cash flow. In this section, we allow for a positive probability that the government's representatives in the firm's board will monitor the controlling group on behalf of the minority shareholders. The assumption is that the fraction α_0 of the voting shares in the government's hands is large enough to give access to the firm's board of directors.

In the spirit of Shleifer and Vishny (1986), the government's optimal monitoring effort follows from a trade-off between the costs and benefits of protecting the minority shareholders' cash-flow rights. To model this tradeoff, we index the monitoring level by a parameter $e \in [0, 1]$, which we

[7] A third reason for the government to intervene in the private sector is to capture part of the firms' private benefits of control. As Shleifer and Vishny (1993) point out, these interventions often result in government's officials receiving bribes. Conceivably, if the controlling shareholders can bribe government officials, then they can also devise side payments that rule out the essence of our study, namely, the control battles that give rise to voting premia. As such, we shall ignore interventions that allow government officials to capture private benefits.

interpret as the fraction of the private benefits of control that the monitor brings back to the verifiable cash flow. More precisely, if the absence of monitoring lets the controlling group capture b from the existing assets and $b/2$ from the project selected at $t = 1$, then monitoring at level e shifts $e\,\frac{3b}{2}$ from the private benefits to the verifiable cash flows.

To increase the verifiable cash flow by $e\,\frac{3b}{2}$, the government's representatives in the board must gather information on the firm's operations and investment opportunities. Arguably, large shareholders have easier access to information on the firm's operations than small shareholders. We thus assume that the monitor's cost of increasing the verifiable cash flow by $e\,\frac{3b}{2}$ is $(1-\alpha_0)\Psi(e)$, where $\Psi(e)$ is a twice differentiable convex function, with $\Psi'(0) = \Psi(0) = 0$ and $\lim_{e\to 1}\Psi(e) = \infty$. The monitoring cost, therefore, increases with the fraction of private benefits to be shifted to verifiable cash flows, but this increase in cost decreases with the government's fraction α_0 of the voting shares.

The optimal monitoring follows from a tradeoff between the monitoring costs, $(1-\alpha_0)\Psi(e)$, and the extent $\eta \in \{0, \bar{\eta}\}$ to which the government internalizes the minority shareholders' gains of $e\,\frac{3b}{2}$ from shifting private benefits to the verifiable cash flows. Intuitively, $\eta = 0$ means that the government's political supporters view monitoring as an undue intervention in the private sector. In contrast, the government's supporters care about the end of undue diversions of corporate assets if $\eta = \bar{\eta} > 0$.[8] The government's optimal monitoring at $t = 1$ thus solves

$$\max_{e\in[0,1]} \eta\, e\, \frac{3b}{2} - (1-\alpha_0)\Psi(e). \tag{3}$$

The necessary and sufficient condition of the government's maximization program yields the fraction of the private benefits that the government optimally brings back to the verifiable cash flows: $e^\star = \Psi'^{-1}\left(\frac{3\eta b}{2(1-\alpha_0)}\right)$. Because $\Psi(e)$ is convex, $e^\star$ increases with α_0 and η.

We can thus write the optimal monitoring $e^\star$ as an increasing function $f(\alpha_0, \eta) = \Psi'^{-1}\left(\frac{3\eta b}{2(1-\alpha_0)}\right)$, with $f(\alpha_0, 0) = 0$ for any $\alpha_0 \in (0, 1)$. With this notation, the government's monitoring increases the existing assets' verifiable cash flows from y to $y + f(\alpha_0, \eta)b$, whilst private benefits go down from b to $[1 - f(\alpha_0, \eta)]b$. Likewise, the verifiable cash flows from projects A and B increase from zero to

[8] In a standard monitoring model, the monitor's equity stake α_0 is important for its monitoring decision because it determines the share of the monitoring gains that the monitor captures, that is, $\alpha_0\, e\,\frac{3b}{2}$. If the monitor is the government, though, the share of the monitoring's monetary gains is unlikely to be a relevant determinant of the monitoring decision.

$f(\alpha_0, \eta)b/2$, while their private benefits decline to

$$\left\{(b_1^A, b_2^A), (b_1^A, b_2^A)\right\} = \begin{cases} \left\{\left(\frac{[1-f(\alpha_0,\eta)]b}{4}, \frac{[1-f(\alpha_0,\eta)]b}{4}\right), \left(\frac{[1-f(\alpha_0,\eta)]b}{4}, \frac{[1-f(\alpha_0,\eta)]b}{4}\right)\right\} & \text{with probability } \frac{1}{2} \\ \left\{\left(\frac{[1-f(\alpha_0,\eta)]b}{2}, 0\right), \left(0, \frac{[1-f(\alpha_0,\eta)]b}{2}\right)\right\} & \text{with probability } \frac{1}{4} \\ \left\{\left(0, \frac{[1-f(\alpha_0,\eta)]b}{2}\right), \left(\frac{[1-f(\alpha_0,\eta)]b}{2}, 0\right)\right\} & \text{with probability } \frac{1}{4}. \end{cases} \tag{4}$$

Equation (4) shows that monitoring lowers the project's private benefits without changing the potential for conflicting views on the project selection decision. Whenever these conflicts arise, the private benefits of each project go to a different controlling shareholder, implying a control battle. Each controlling shareholder is still willing to bid up to the project's private benefit of control, which are now smaller at $[1 - f(\alpha_0, \eta)]b/2 < b/2$.

Having established that monitoring lowers the controlling shareholders' willingness to bid in a control battle, our next task is to characterize its effect on the voting premium. In our model, investors do not know at $t = 0$ whether the government's supporters favor monitoring ($\eta = \bar{\eta}$) or not ($\eta = 0$). In the latter case, the government will not intervene in the firm at $t = 1$, keeping a passive behavior as an investor. In the former, the government will monitor the firm on behalf of the minority shareholders. Given the probability π_{will} that $\eta = \bar{\eta}$, the price of the non-voting shares at $t = 0$ is

$$P^{NV} = \frac{y}{2} + \pi_{will}\,\frac{1}{2}\,f(\alpha_0, \bar{\eta})\left(b + \frac{b}{2}\right). \tag{5}$$

The first term in the right-hand side of equation (5) is the amount of verifiable cash flows that goes to the non-voting shares in the absence of monitoring. With probability π_{will}, the government's representatives in the board will monitor the controlling group, increasing the verifiable cash flows by the fraction $f(\alpha_0, \bar{\eta})$ of the private benefits from the existing assets (b) and from the new project ($b/2$). Half of this amount goes to the voting shares and the other half goes to the non-voting shares.

Monitoring also increases the verifiable cash flows of the voting shares by half of the fraction $f(\alpha_0, \bar{\eta})$ of the private benefits from the existing assets and from the project. Nonetheless, the latter transfer just offsets the lower amount that the voting shares get from the bid in the control battle. Instead of selling its voting shares for $b/2$ in the the control battle, the minority investors get only

$[1 - f(\alpha_0, \eta)]b/2$. Monitoring is thus less valuable to the voting shares:

$$P^V = \frac{y}{2} + \pi_{will}\,\frac{1}{2}\left[f(\alpha_0,\bar{\eta})b + f(\alpha_0,\bar{\eta})\frac{b}{2} + \frac{[1-f(\alpha_0,\bar{\eta})]b}{2}\right] + (1-\pi_{will})\frac{1}{2}\frac{b}{2} = \frac{y}{2} + \frac{1}{2}\frac{b}{2} + \pi_{will}\,\frac{1}{2}\,f(\alpha_0,\bar{\eta})b. \quad (6)$$

Taking the percentage difference from equations (6) and (5) yields the voting premium under monitoring:

$$VP^{Mon}(\alpha_0,\eta) = \frac{P^V - P^{NV}}{P^{NV}} = \frac{\frac{b}{4}\left[1 - \pi_{will} f(\alpha_0,\bar{\eta})\right]}{\frac{y}{2} + \pi_{will}\,\frac{3}{4}\,f(\alpha_0,\bar{\eta})b}. \quad (7)$$

Equation (7) unveils the mechanisms through which monitoring lowers the voting premium. It reduces the private benefits that the control battle returns to the voting shares (numerator), while increasing the verifiable cash flow that go to the non-voting shareholders (denominator). Of course, only the latter effect reflects an increase in the welfare of minority shareholders.

More importantly to our empirical analysis, equation (7) establishes that the voting premium decreases with π_{will} (i.e., the willingness to intervene lowers the voting premium) and that this reduction increases with the monitor's voting shares α_0 through $f(\alpha_0, \bar{\eta})$. The next section shows that this latter result does not hold if the government's intervention pushes for a project of "national interest", without major concerns for the welfare of the firm's minority shareholders.

2.2 The intervenor is a policy maker

Government interventions in the private sector have become pervasive since the outbreak of the subprime crisis. In Brazil, for instance, the government has used its control stake at Petrobras to block increases in the price of gas, while engaging in a 2-year control battle at Vale to replace the CEO that laid off 1,300 employees in the end of 2008. Our goal in this section is to understand how these policy-motivated interventions affect the voting premium.

In the previous section, π_{will} was the probability that the government monitors the controlling shareholders on behalf of the minority shareholders. The novelty of this section is that the scope of the intervention is broader. The government not only monitors the controlling shareholders but also intervenes on investment decisions. We thus assume that, with probability π_{will}, government officials believe that project A is of national interest as opposed to project B. Given this assessment, the

government will instruct its representatives in the firm's board to fight for project A at time $t = 1$.

The government's representatives in the board should have no problems to ensure the selection of project A if both controlling shareholders are indifferent with respect to the two projects. This happens with probability $\frac{1}{2}$ and features no control battle. In this first case, the interventionist government monitors the controlling shareholders at the optimal level $e^\star = f(\alpha_0, \eta)$ and, in addition, ensures the investment in its favorite project.

Suppose now that the two controlling shareholders disagree about the project-selection decision. The government's representatives in the board will break the tie in the controlling group by voting for project A. Such a vote suffices to determine which project the firm will select, if the combined votes of the government and its allied controlling shareholder is larger than the sum of the votes in the hands of the minority shareholders and the opposing controlling shareholder. Once again, the firm selects project A and the government's representatives in the board monitor the controlling group at the optimal level $e^\star = f(\alpha_0, \eta)$.

Things are not so easy for the government if its fraction of the firm's voting shares is smaller than the fraction in the hands of minority shareholders. In this case, the opposing controlling shareholder can bid for the minority shareholders' votes, in an attempt to beat the votes for project A. We claim, however, that the government can thwart a control battle by threatening to increase monitoring if the opposing controlling shareholder does not support project A. We will prove this claim by showing that the following strategies form a Nash Equilibrium at $t = 1$: The controlling shareholders vote for project A, and the government votes for project A while threatening to increase the monitoring level by an infinitesimal level $\mathrm{d}e$ if at least one of the the controlling shareholders does not agree with project A. If both controlling shareholders agree with project A, the government monitors at the optimal level $f(\alpha_0, \eta)$.[9]

To see that these strategies form a Nash Equilibrium, note first that the government and its allied controlling shareholder have no incentive to deviate: the firm invests in their preferred project, and the government monitors the control group at the optimal level. As for the other controlling shareholder,

[9] There are multiple Nash equilibria in the bargaining game for the project selection. In particular, any threat from the government of increasing monitoring forms a Nash Equilibrium once we combine it with the controlling shareholders' choice of project A. All these Nash Equilibria are equivalent, in the sense that they yield the same payoffs to the players.

an infinitesimal increase in monitoring suffices to make it unprofitable for him or her to seek minority votes. Such an attempt would trigger a bidding battle for the minority votes, which would wipe out the opposing controlling shareholder's gain from the firm's investing in project B instead of A. In addition to having no profits with project B, the opposing controlling shareholder would lose the amount $\frac{b}{2}\,\mathrm{d}e$ of the private benefits from the existing assets, once the government's representatives in the board start monitoring the firm more intensively. Anticipating such a loss, the opposing controlling shareholder realizes that it is not in its interest to fight the government.

Having characterized the outcome of the government's intervention, we rewind to time $t = 0$ to determine how it affects stock prices. Since the two projects are identical with respect to the verifiable cash flows, the policy-motivated intervention has no impact on the value of the non-voting shares. For these shares, the intervention is relevant only to the extent that it enhances monitoring. This means that equation (5) in Section 2.1 still holds to the value of the non-voting shares. In contrast, the value of the voting shares changes with the intervention in the investment decision. The reason is that the probability of a control battle goes down with the controlling shareholders' fear of openly fighting the government. The value of the voting shares is thus equal to:

$$P^V = \pi_{will}\left(\frac{y}{2}+\frac{1}{2}f(\alpha_0,\bar{\eta})\frac{3}{2}b\right)+(1-\pi_{will})\left(\frac{y}{2}+\frac{1}{2}\frac{b}{2}\right)=\frac{y}{2}+\frac{1}{2}\frac{b}{2}+\pi_{will}\,\frac{1}{2}\frac{b}{2}\Big\{3f(\alpha_0,\bar{\eta})-1\Big\}. \quad (8)$$

Taking the percentage difference from equations (8) and (5) shows that, as in Section 2.1, the equilibrium voting premium falls with the government's willingness to intervene — summarized by π_{will} — and the effectiveness of the monitoring — summarized by $e^\star = f(\alpha_0,\bar{\eta})$:

$$VP^{Policy}(\alpha_0,\eta)=\frac{P^V-P^{NV}}{P^{NV}}=\frac{\frac{b}{4}\,(1-\pi_{will})}{\frac{y}{2}+\pi_{will}\,\frac{3}{4}\,f(\alpha_0,\bar{\eta})b}. \quad (9)$$

More interestingly, policy-oriented interventions lower the voting premium more than interventions whose only purpose is to discipline the control group.[10] The reason for this result is straightforward. The government's intervention in the business decisions make the controlling shareholders less less likely to engage in a control battle to resolve differences of opinion. Still, without further

[10] To prove this claim take the difference between equations (9) and (7) to obtain $VP^{Policy}(\alpha_0,\eta)-VP^{Mon}(\alpha_0,\eta)=\frac{-\frac{b}{4}\,\pi_{will}\,f(\alpha_0,\bar{\eta})}{\frac{y}{2}+\pi_{will}\,\frac{3}{4}\,f(\alpha_0,\bar{\eta})b}<0$.

assumptions we cannot predict that policy-motivated interventions harm minority shareholders. After all, it is possible that the monitoring gains of the intervention offset the loss of the voting premium due to the lower probability of a control battle. Ultimately, whether minority shareholders benefited from the wave of interventions triggered by the subprime crisis is an empirical question.

And yet, our model yields some restrictions that help us test if the recent wave of interventions benefited the minority shareholders. Consider that the government does not internalize any gain from monitoring the controlling group. In this polar case — parameterized by $\bar{\eta} = 0$ —, the sole reason for the government to intervene is to advance its economic policy. In such an intervention, the government may threaten to monitor the firm if the controlling shareholders undertake project B instead of A, but, in equilibrium, there is no monitoring because the government's optimal monitoring is $f(\alpha_0, 0) = 0$.[11] The equilibrium voting premium boils down to

$$VP^{policy}(\alpha_0, 0) = \frac{\frac{b}{4}(1 - \pi_{will})}{\frac{y}{2}} = (1 - \pi_{will})\frac{b}{2y}. \tag{10}$$

Equation (10) is the probability $1 - \pi_{will}$ that the government does not intervene times the voting premium $\frac{b}{2y}$ associated with an unconstrained controlling group product. If monitoring is not a concern of the government, the sole corporate governance consequence of its willingness to intervene is to destroy part of the voting rights' ability to protect minority shareholders. As such, the premium varies negatively with the probability π_{will}, but it doesn't depend on the fraction α_0 of the voting shares that the government owns. The only requirement on α_0 is that it is large enough to let the government's representatives to participate in the firm's decision-making process.

This implication does not hold in government interventions that enhance monitoring. In equation (9), the sensitivity of the voting premium with respect to the government's willingness to intervene, π_{will}, increases with the government's equity stake, α_0, because the optimal monitoring goes up with α_0, thereby strengthening the negative impact on the voting premium due to the lower likelihood of a control battle. Likewise, the sensitivity of the voting premium with respect to π_{will} increases with α_0 in the case that monitoring is the only purpose of the interventions (see equation (6)).

[11] If $\bar{\eta} = 0$, then the optimal monitoring is the corner solution $f(\alpha_0, 0) = 0$. Still, a slight increase in the monitoring effort implies a negligible cost for the government because the marginal cost of monitoring is, by assumption, zero at the zero-monitoring level.

It is thus possible to carry out a test of the nature of government interventions in the private sector. For the interventions to protect minority shareholders, a higher probability of intervention must imply a stronger negative impact on the voting premium of firms that the government's equity holdings are larger. In contrast, government interventions harm minority shareholders, if the voting premium falls with the probability of intervention in firms that the government is in the control group, but the magnitude of the negative effect does not vary with the size of government's control stake. Section 5 uses data on public firms listed on the São Paulo Stock Exchange to test this implication of the model, after we argue in the next section that the share of loans from government-controlled banks is a neat proxy for the Brazilian government's willingness to intervene in the private sector.

3 The data

Our main objective is to shed some light on the corporate governance consequences of the activism of the government as a large shareholder. To achieve this goal, we collect data on ownership structure, voting premia, and financial characteristics of firms with dual-class shares at the São Paulo Stock Exchange, BM&FBovespa.[12] The sample period runs from January 2008 to December 2012, covering the recent wave of Brazil's interventionist policies.

Two main reasons explain the focus on the firms listed at Brazil's stock exchange. In the last three decades, an extensive literature on Corporate Finance has shown that governance practices are relevant for firm value in countries that, like Brazil, offer weak legal protection to minority shareholders.[13] BM&FBovespa's large volume of trading should ensure that stock prices internalize changes in governance practices associated with the activism of the government as a large shareholder. Brazil's legal system and the size of its stock exchange thus comprise the first reason for our sample selection.

To be sure, Brazil is not the only country that has a large stock exchange despite offering poor legal

[12] BM&FBovespa is the largest stock exchange in Latin America and one of the ten largest stock exchanges in the world. As of December 2012, 452 firms were listed on BM&FBovespa and its total market cap amounted to US$ 1.2 trillion.

[13] For instance, Miller (1999) finds positive stock market reactions for firms that issue American Depositary Receipts (ADRs) to commit to stricter governance practices. Reese and Weisbach (2002) show that firms from French-Civil Law countries lower their cost of capital when they issue ADRs.

protection to minority shareholders.[14] Still, we deem that Brazil is a particularly interesting country to study the corporate governance consequences of the government's activism as a large shareholder, because the fraction of loans from government-controlled banks entails a neat proxy for the Brazilian Government's willingness to intervene in the private sector. As we will explain in Section 5, this proxy plays a crucial role in our empirical strategy to investigate the corporate governance consequences of the government's activism. The proxy for the government's willingness to intervene, therefore, is the second and most important reason for our focus on the firms listed at BM&FBovespa.

The rest of this section is in two parts. Section 3.1 provides some background on the Brazilian economy and explains why the share of loans from banks controlled by the Brazilian government is a proxy for its willingness to intervene in the private sector. Section 3.2 discusses the sample selection criteria and data sources, as well as describe the main features of the final sample.

3.1 A proxy for the government's willingness to intervene in Brazil

The Brazilian economy had been growing at more than 6% a year when Lehman Brothers went bankrupt in September 2008. Thanks to this initially favorable scenario, the crisis did not immediately hit the Brazilian economy, which grew 5.17% in 2008. Brazil did not escape the crisis unscathed, though: GDP fell 0.33% in 2009.

At first, the government's response to the slowdown of the Brazilian economy was standard: it reduced interest rates and lowered taxes.[15] Soon, however, the government resorted to less orthodox economic policies. In March 2010, the Minister of Finance announced that Brazil's development bank, BNDES, would play a major role in avoiding a credit crunch.[16] Accordingly, the share of BNDES's loans in the outstanding loans of Brazil's banking sector jumped from 15.9% in August 2008 to 20% in less than two years (see Figure 1).

Brazil's expansionary policies paid off in 2010, with a GDP growth of 7.53%. The recovery of the

[14] La Porta et al. (1988) ranks Brazil below the typical Common-Law country in terms of legal protection to shareholders, rule of law, and, especially, in the efficiency of the judicial system.

[15] The expansionary fiscal policy led to a sharp reduction of Brazil's primary budget surplus (revenues less expenses, excluding interest payments), which fell from BRL 122.4 billion (US$ 66.7 billion) in 2008 to BRL 29.4 billion (US$ 14.7 billion) in 2009.

[16] The March 2010 interview of Brazil's Finance Minister, Mr. Guido Mantega, is available online at www.brasileconomico.com.br/noticias/a-economia-segundo-o-ministro-guido-mantega_79034.html.

economy helped elect in November 2010 the candidate of the incumbent Workers' Party, Ms. Dilma Rousseff, as Brazil's new President. President Rousseff took power in January 2011, keeping the flagship social program of former President Luiz Ignacio Lula da Silva, "Bolsa Familia", along with the basic tenets of his economic policy, namely, a loose fiscal policy and the expansion of subsidized credit to selective segments of the economy. And yet, the Brazilian economy performed poorly in 2011 and 2012. GDP growth fell from 7.53% in 2010 to 2.73% in 2011 and 0.87% in 2012. In the meantime, inflation remained relatively high: 4.31% in 2009, 5.91% in 2010, 6.5% in 2011, and 5.84% in 2012.

Pressured by low growth and high inflation, President Rousseff intervened in the private sector in a variety of ways. Although she halted the growth of BNDES loans after taking power in January 2011, the growth of government-controlled banks persisted so as to boost consumption. President Rousseff ordered two government-controlled commercial banks, Banco do Brasil and Caixa Econômica Federal, to increase the supply of credit at reduced interest rates. As a result, the share of loans from state-owned banks, which includes the BNDES loans, jumped from 41.8% in January 2011 to 47.9% in December 2012. While Caixa Econômica Federal is privately held by the Brazilian government, Banco do Brasil is a public financial institution listed on BM&FBovespa's New Market; a special segment of the São Paulo Stock Exchange that, in principle, is restricted to corporations committed to stricter governance rules.

Forcing a public financial institution to increase the supply of credit at lower interest rates was not the only highly publicized intervention spurred by the subprime crisis. To help fight inflation, President Rousseff forced the government-controlled Petrobras to sell oil and gas in Brazil at prices lower than it imports. And, for the same reason, the has pressured producers and distributors of energy to lower their prices. Finally, in May 2011, the government ousted the CEO of one of the largest mining companies in the world, Vale, after a two-year control battle that started when the company laid off about 1,300 employees in the end of 2008.

To be sure, government interventions in the private sector happened before President Rousseff took power in 2011. Carvalho (2014), for example, shows evidence that, from 1995 to 2006, the Brazilian government used subsidized loans from BNDES to induce firms to shift investment and

employment to cities and states that the government's preferred candidates faced tough opponents in incoming elections. Nonetheless, the 2008-2012 period is unparalleled in Brazil in terms of the magnitude of the rate of growth of subsidized loans from government-controlled banks.

To fund the expansion of subsidized loans, BNDES borrowed massively from the Federal Government. In the end of 2008, the loans from the Federal Government to the BNDES added up to US$ 43.2 billion. In December 2012, the loans from the government to the BNDES totalled US$ 376 billion, amounting to 52.6% of the development bank's liabilities.[17] In 2011, the government's cost of expanding the subsidized loans was partly transferred to the minority shareholders of Banco do Brasil, when the latter took the the lead in the government's quest for growing the supply of subsidized credit in Brazil. Still, the government pays for these loans in terms of foregone dividends.

The costs of the subsidized credit thus make the share of loans from government-controlled banks a (noisy) signal of the government's willingness to intervene in the private sector. As the government's desire to intervene increases, the more it will be willing to pay the cost of increasing the supply of subsidized credit. As Figure 2 shows, this proxy suggests a steady increase in the government's willingness to intervene since the onset of the subprime crisis, with the share of loans from government-controlled banks jumping from 34.5% in June 2008 to 47.9% in December 2012.

3.2 Sample selection and characteristics

Dual-class shares are pervasive at BMF&FBovespa.[18] From January 2008 to December 2012, voting and non-voting shares of 168 firms traded simultaneously at BM&FBovespa, in at least one day.[19] For the 168 firms in this initial sample, we gauge voting premia by means of the percentage differences between the prices of voting and non-voting shares in the days that both share classes traded.

[17] Data from the government's loans are from the BNDES's annual reports. The interest rate in these loans is the TJLP, which is the interest rate in place on virtually all loans from the Brazilian government to cities and states. The TJLP is a highly subsidized interest rate.

[18] In Brazil, common and preferred stocks trade at BM&FBovespa. With one exception, preferred shares listed on BM&FBovespa have no voting rights whatsoever. The exception is Vale S.A., whose preferred shares have voting rights in the shareholders' meetings, but, unlike Vale's common shares, have no voting rights in elections for board members. Vale is also the exception of the one-share-one-vote rule in Brazil. Golden shares in the hands of the Federal Government give veto power on decisions to change the location of Vale's headquarters.

[19] Corporate Law in Brazil requires that voting shares of public firms account for at least 50% of the issued shares. Still, the trading volume of non-voting shares at BM&FBovespa is typically larger than the volume of trading of the voting shares.

In our study, the voting premium is the observable variable that captures the corporate governance consequences of the activism of the government as a large shareholder.

Bloomberg and Economatica are the primary sources of data for our study.[20] In particular, we relied on Bloomberg to collect daily prices (adjusted for splits and ex-dividend days) of the voting and non-voting shares of all firms with dual class-shares that traded at BM&FBovespa in any point of time from January 2008 to December 2012. In the days that both voting and non-voting shares of a given firm traded, we computed the percentage differences of their prices, averaging them out to obtain quarterly voting premia.

The initial sample comprises 168 firms and 2,214 quarterly observations of voting premia. The smallest voting premium is -85.5%, whereas we observe 136 voting premia of at least 150%. Differences in dividend rights explain most (if not all) of the negative voting premia. The bylaws of 67 of the 168 firms in the initial sample stipulate that non-voting shares receive 110% of the dividends paid to the voting shares. In two firms, the non-voting shares receive 120% of the dividends paid to the voting shares.[21] Since we do not adjust the voting premia for differences in dividend rights, it is not surprising to find that, in some firms, prices of non-voting shares may be higher than the prices of the voting shares.

While there are economic reasons for negative voting premia in our sample, failure of Bloomberg to timely adjust stock prices for dividend payments and splits is a main reason for voting premia larger than 1,000%. Another reason for extremely large voting premia in our sample is lack of liquidity of some low-priced voting shares. The voting premium associated with these firms' shares are very sensitive to news on the firms' fundamentals. While the arrival of these news should affect both classes of shares, we may not observe changes in the prices of the voting share for lack of trading in the day. In the final sample, we exclude all voting premia larger than or equal to 150%, ending with an unbalanced panel of 163 firms and 2,078 quarterly observations of voting premia.

Table 1 reports summary statistics for the final sample. The typical firm is large (median quarterly sales of US$ 248.4 millions), profitable (median operating margin of 10.70%), and mildly leveraged

[20] Economatica is the main provider of financial and ownership information on firms listed on BM&FBovespa.

[21] A few firms have three classes of shares: voting shares, non-voting shares that pay 110% of the dividends paid by the voting shares, and non-voting shares that pay 120%. In these instances, we computed the voting premium between the voting shares and the non-voting shares with the largest average volume of trading in the sample period.

(median debt over total assets equal to 24.15%). Although the median firm is profitable, the average operating margin is highly negative for every year in the sample period, reflecting the economic consequences to the Brazilian economy of the subprime crisis. As often happens in French-Civil law countries, the typical firm has a concentrated ownership structure. The median share of voting stocks in the hands of the largest shareholder is 61.8%.

Rydqvist (1988) and Zingales (1994) provide evidence that the likelihood of a control battle is an important determinant of a firm's voting premium. Presumably, control battles are less likely in firms with a majority shareholder. Consistent with this hypothesis, Figure 3 shows that the average voting premium of firms with a majority shareholder is usually far below the average voting premium of firms whose largest shareholder holds less than 20% of the voting shares.

More to the point of our paper, Table 1 shows that the median voting premium declined from 7.7% in 2008 to 3.4% in 2009, going up to 6.8% when Brazil's GDP grew 7.53% in 2010. The hike of the voting premium proved to be as short-lived as the economy's recovery, though. The median voting premium declined to 3.1% in 2011, nearly vanishing in 2012. Interestingly, relative liquidity of the voting and non-voting shares do not seem to explain the trajectory of the voting premium. The median ratio of the number of traded voting shares over the number of traded non-voting shares increases monotonically over the years, contrary to the idea that the voting premium goes up because transaction costs in the trading of voting shares fall. The trajectory of the average voting premium decreases monotonically over the sample period, with steeper declines in the first year of the crisis (2008 to 2009) and when President Dilma Rousseff took power (2011-2012).

The last column of Table 1 reports summary statistics for the 136 firm-quarter observations that we excluded from the sample because their voting premia exceeded 150%. These firms are smaller, more leveraged, more profitable, and the gap between the mean and median relative liquidity of their voting shares is much wider. The huge average voting premium of the excluded firms (3,410.1%) partly explains why our average voting premium in 2008 is smaller than the values of 23.2% and 65% that Nenova (2003) and Dyck and Zingales (2004) respectively report in their cross-country analyses. In section 6, we will vary the threshold for excluding observations of voting premium from the sample, showing that including larger voting premia strengthens our results.

4 The Brazilian Government as a large shareholder

Brazil is a Federation with 26 States and the Federal District of Brasilia. Its federative principles suggest that the three autonomous layers of government — federal, state and municipal levels — share the responsibilities for running the country's public sector. In reality, an extremely centralized tax system gives a lot of power to the Federal Government, making it easy for the country's President to obtain support from state governors and mayors for interventions in the private sector that seek to avoid layoffs, price increases or cuts in investment.[22] Accordingly, we shall compute the government's voting shares as the sum of the voting shares of the three layers of government: federal, state, and municipal.[23]

A more sensitive step in the documentation of the government's equity holdings is the aggregation of shares in firms with pyramidal ownership structures. Following La Porta *et al.* (1999), we say that a shareholder has a controlling stake in a firm if he/she owns at least 20% of the voting shares. Such a firm has a pyramidal ownership structure if the control stake is indirect, that is, the shareholder controls 20% of the firm's voting shares by combining the shares in his/her name with the shares owned by another firm that is under his/her control. In our sample, the government has voting shares in 30 firms with pyramidal ownership structures.

An example may help understand how we compute the government's equity holdings in firms with pyramidal ownership structures. From January 1, 2007 to September 29, 2009, Brasil Telecom Participações held 99.1% of the voting shares of Oi, a major telecommunications company in Brazil. In that period, none of the three layers of the government held equity stakes at Oi, but the Federal Government owned some of Brasil Telecom's voting shares. These equity holdings did not however meet the 20% threshold for control, and hence our aggregation criterion stipulates that, from January 1, 2007 to September 29, 2009, the government had no equity holdings at Oi, ignoring the Federal Government's shares at Brasil Telecom.

[22] In January 2013, for example, the Federal Government convinced the mayors of Rio de Janeiro and São Paulo to postpone increases in the tariffs of municipal buses for six month. Brazil's Finance Minister apparently wanted to gain some time to reduce inflation before facing increases in the prices of transportation and other regulated businesses.

[23] Aggregating the three layers of government does not have a significant impact on our results, because São Paulo is the only city in our sample with voting shares in a public firm — São Paulo Turismo — and just eight firms have shares in the hands of State Governments: five financial institutions and three public utilities.

From September 30, 2009 to October 4, 2012, Telemar Norte Leste owned 99.9% of the voting shares of Coari Participações, which held 79.6% of Oi's voting shares. The government enjoyed indirect control over Oi because BNDESPAR (the subsidiary of BNDES for joint ventures with the private sector) and three pension funds sponsored by firms controlled by the Federal Government (Previ from Banco do Brasil, Funcef from Caixa Econômica, and Petros from Petrobras) had in hand 33.7% of the voting shares of Telemar Participações. The latter company owned 52.4% of the voting shares of Telemar Norte Leste Participações, which sat on 97.4% of the voting shares of Telemar Norte Leste. We thus count Coari Participações' equity holdings in Oi as the voting shares in the hands of the government given that every equity stake in the control chain exceeds our cutoff of 20%. In other words, we set the government's share at Oi's voting stock as 0% from January 1, 2008 to September 29, 2009, and then as 79.6% from September 30, 2009 to October 4, 2012.[24]

In summary, the government controls a firm if it holds (directly or indirectly) at least 20% of its voting shares.[25] To implement this rule, we consider that the fraction of voting shares in the government's hands includes: i) voting shares owned by Federal, State and Municipal Governments, ii) voting shares in the hands of BNDESPAR (the subsidiary of BNDES for joint ventures with the private sector), iii) voting shares of firms controlled (directly or indirectly) by Federal, State or Municipal Governments, iv) voting shares of pension funds sponsored by companies controlled (directly or indirectly) by Federal, State or Municipal Governments.

Economatica is the main source of information on the government's voting shares in public firms. In the event we find a private (unlisted) company in the control chain of a pyramid, we look for the firms' ownership structure at the firm's own website as well as at gatekeeping websites that provide such information about Brazilian firms. If we do not find any ownership information, we count the government's fraction of voting shares in the original public firm as missing.

Table 1 shows that the government's median equity stake is 0% in all years. And yet, the government's mean equity holding is relatively large, at 20.4% of the voting shares in the full sample, with

[24] If the government's fraction of a firm's voting shares changes during a quarter, we take the simple average of the values to obtain the quarterly value of the government's participation.

[25] The 20% cutoff for control is certainly arbitrary. Section 6 shows, nonetheless, that our results do not alter significantly, if we change the cut-off for control to 10%. We don't find major changes either, if we use the weakest link criterion to determine the government's equity holdings. Under this criterion, the government's equity holdings in a firm is the smallest equity holdings under its control in any layer of the firm's pyramid.

a minimum value of 18.96% in 2008 and a maximum of 22.25% in 2012. More importantly, Figure 4 shows that, in some firms, the government's equity holdings is high enough to make it a relevant shareholder, but not so large to rule out control battles.[26] Finally, the last column of Table 1 shows that the sample of excluded observations due to the 150% cap in the voting premium has, on average, firms with a relatively small fraction of voting shares in the government's hands.

Table 2 shows summary statistics for government-controlled firms and firms controlled by private investors.[27] The government-controlled firms are larger and more profitable, exhibiting lower leverage. More interestingly, the voting premia of both groups of firms fell significantly from 2008 to 2012. This downward trend is consistent with theories of capital structure that suggest that controlling shareholders focus on the firm's survival at times of financial crises.[28] These theories do not explain, however, why the average voting premium of the government-controlled firms fell more than the voting premium of the privately-controlled firms that, at the time, were typically less profitable.

Table 3 provides more detailed information on the cross-sectional variation in the government's voting shares with corresponding changes in the voting premium. The first three columns show that the government has no voting shares in most firms in the sample (117 out of 181 firms and 1,341 out of 2,078 quarterly observations of voting premia). In these firms, the average voting premium in the third quarter of 2008 (i.e., shortly before the outbreak of the crisis) amounted to 18.89%. In 2012, the average voting premium of these firms fell to 5.66%. In turn, the government is a majority shareholder in 40 of the 64 firms that it owns a positive number of voting shares. There is notwithstanding a significant cross-sectional variation in the fraction of voting shares under the government's control. In particular, the largest decrease of the average voting premium in the sample, 40.14%, happens in the firms that the government isn't a majority shareholder but belongs to the controlling group (i.e., voting shares in the interval $[20, 50)$).

[26] The criterion we use to aggregate shares in firms under pyramidal ownership structures explains why, in some quarters, three public firms arise as 100% owned by the government. These firms are: Companhia Catarinense de Saneamento e Águas (CASAN), Banco do Nordeste do Brasil, and Telemar Norte Leste.

[27] The total number of firms in Table 2 is larger than the number of firms in Table 1 in 2008 and 2011 because, in these years, the government's voting shares of some firms are larger than 20% in a quarter and smaller than 20% in another. This happens for three firms, namely, Contax Participações, Coteminas and Brasken. In 2012, the number of firms in Table 2 is smaller than the number in Table 1 because the latter does not ignore firms with missing values in the government's equity holdings.

[28] See, for instance, Grossmann and Hart (1982), Jensen (1986), and Hart and Moore (1995).

The next section explores the cross-sectional variation in the government's voting shares and the proxy for the Brazilian Government's willingness to intervene in the private sector to examine the corporate governance consequences of the activism of the government as a large shareholder.

5 Government's activism implications to corporate governance

This section is in three parts. The first describes the identification strategy we use to estimate the corporate governance consequences of the activism of the government as a large shareholder. The second discusses the main findings, whereas the third part conducts some robustness checks.

5.1 The empirical strategy

What are the corporate governance consequences of the activism of the government as a large shareholder? The voting premium model of Section 2 provides us a road map to answer this question, once we take into account that the share of loans from government-controlled banks is a proxy for the willingness of the Brazilian Government to intervene in business decisions.

There isn't much that the government can do to intervene in the governance structure of firms if it doesn't control a fraction of voting shares that is sufficiently high to win a seat in the Board of Directors. Accordingly, the government's willingness to intervene in the private sector should have no effect on the governance of firms that the government controls less than the 20% of the voting shares as in the cutoff we consider. In contrast, the willingness to intervene should translate into activism in firms that the government is in the controlling group.

A straightforward test of the relevance of the government's activism for corporate governance is then to regress the voting premium on the interaction of the willingness to intervene with dummy variables relating to the government's equity stake. In particular, we initially entertain two dummy variables. The first takes value one if the government controls less than 20% of the voting shares, whereas the second takes value one if the government controls at least 20% of the voting shares. We expect a statistically insignificant coefficient for the interaction of the willingness to intervene with the first dummy, but a significant interaction with the second dummy.

While simple and intuitive, such a regression does not exploit all implications of the voting premium model of Section 2. In particular, it does not take into account that the voting premium model yields a test of whether the corporate governance consequences of the government's activism benefits or harms the minority shareholders. The government's willingness to intervene may indeed have two opposing effects on corporate governance. Although it may induce the board to monitor more tightly the controlling group, policy-motivated interventions may also restrain the controlling shareholders from seeking the minority votes to solve their differences of opinion. While the first effect benefits the minority shareholders, the second one harms them.

Conceivably, the larger the fraction of voting shares under the government's control, the greater is its ability to convince the board to monitor more closely the controlling group. Taking into account that tighter monitoring lowers the voting premium, the hypothesis that the government's activism benefits the minority shareholders implies: i) The voting premium should decrease with the government's activism, and ii) the reduction of the voting premium should be stronger in firms that the government controls a larger fraction of voting shares.

As in the monitoring hypothesis, the voting premium goes down under a policy-oriented activism of the government as a large shareholder. Nonetheless, the model of Section 2 shows that the reduction in the voting premium is independent of the government's fraction of voting shares, as long as they are large enough to give a control position. This implication allows us to test whether the corporate governance consequences of the government's activism benefit the minority shareholders or not.

To this end, we write the effect on voting premium of our proxy of the government's willingness to intervene in corporate decisions as

$$\frac{P_{it}^{V}-P_{it}^{NV}}{P_{it}^{NV}} = \delta_0 + \delta_1 \frac{\text{gov loans}}{\text{total loans}_t}\,\text{GOV[0,20)}_{it} + \delta_2 \frac{\text{gov loans}}{\text{total loans}_t}\,\text{GOV[20,50)}_{it} + \delta_3 \frac{\text{gov loans}}{\text{total loans}_t}\,\text{GOV[50,100]}_{it} + \epsilon_{it}, \tag{11}$$

where GOV[a,b)$_{it}$ is a dummy variable that takes value one if, at quarter t, the government controls at least $a\%$ and less than $b\%$ of the voting shares of firm i, ϵ_{it} is the error term of firm i at quarter t, and $\frac{P_{it}^{V}-P_{it}^{NV}}{P_{it}^{NV}}$ is the voting premium of firm i at quarter t as measured by the percentage difference of firm i's prices of voting (V) and non-voting (NV) shares at quarter t. In equation (11), the voting premium of firms controlled by private investors raises by δ_1 upon an increase in the share of loans

from government-controlled banks (our proxy of the government's willingness to intervene). We do not expect δ_1 to be significantly different from zero, because the government lacks legal instruments to translate its intentions into actions in firms that it does not have a controlling equity stake.

In contrast, we expect a negative impact of the government's willingness to intervene in firms that it belongs to the controlling group, whether the government is a majority shareholder or not. If stricter monitoring is the main consequence of the increased willingness to intervene, then the coefficients δ_2 and δ_3 are negative, and the effect on the voting premium of firms that the government is a majority shareholder should be the largest (in absolute value): $|\delta_3| > |\delta_2|$. If the willingness to intervene is motivated by policy concerns unrelated to the monitoring decisions, then the coefficients are negative, without statistically significant differences: $|\delta_3| = |\delta_2|$.

OLS estimates of δ_1, δ_2, and δ_3 are consistent provided that the government randomly selects its equity holdings. However, there are many reasons to believe that the Brazilian government does not select its equity holdings randomly. In particular, the existing concentration of government-controlled firms in public utilities would imply a downward bias in the OLS estimation of δ_2 and δ_3, if controlling groups have fewer opportunities to capture private benefits in regulated industries.[29] In this alternative story, the voting premium of government-controlled firms could well be smaller simply because their private benefits of control are less valuable.

Individual fixed effects control for differences in unobserved characteristics of firms, provided that these characteristics are time invariant, as it is likely the case of the concentration of government-controlled firms in public utilities. Accordingly, our benchmark model adds firm fixed effects to equation (11). The fixed effects control not only for differences in the industry concentration but also for differences in governance mechanisms, in the composition of the controlling groups, cross-listing in foreign firms, and statutory features of the non-voting shares.

The firm fixed effects do not control for unobserved changes in the firms' financing constraints and investment opportunities, though. Such changes would bias downwards the fixed-effects estimation of δ_2 and δ_3, if concerns with the fiscal deficit forced the government to lower investments

[29] Inoue, Lazzarini and Musacchio (2011) argue that Brazil's state-owned firms invested heavily in infrastructure and public utilities after the second world war to eliminate bottlenecks in the economy. These investments explain why the government's equity holdings are currently concentrated on public utilities.

in areas that are more important to the profitability of the firms that have the government as a large shareholder. Jensen (1986) and Hart and Moore (1995) predict in this case that the voting premium of firms controlled by the government goes down vis-à-vis the voting premium of firms controlled by private investors, reducing the estimate of δ_2 for reasons unrelated to the substitution of political pressure for minority votes in control battles.[30]

To control for changes in investment opportunities and in other sources of cash-flow generation, we include in equation (11) year dummies, the market volatility index of the Chicago Board Options Exchange (VIX), the firms' operating margins (sales minus variable cost over sales), and other time-varying characteristics of firms that the corporate finance literature often associates with the agency costs that underly the voting premium. The resulting voting premium model is

$$\begin{aligned}\frac{P_{it}^V - P_{it}^{NV}}{P_{it}^V} &= \alpha_1\, D2009_t + \alpha_2\, D2010_t + \alpha_3\, D2011_t + \alpha_4\, D2012_t + \alpha_5\, VIX_t \\ &+\beta_1\, \text{First Shareholder}_{it} + \beta_2\, \text{Second Shareholder}_{it} + \beta_3\, \text{Third Shareholder}_{it} \\ &+\gamma_1 \frac{\text{fixed assets}}{\text{total assets}}_{it} + \gamma_2 \frac{\text{total volume}^V}{\text{total volume}^{NV}}_{it} + \gamma_3\, \text{Operating Margin}_{it} + \gamma_4\, \ln(\text{MarketCap})_{it} \\ &+\delta_1 \frac{\text{gov loans}}{\text{total loans}}_t \text{GOV[0,20)}_{it} + \delta_2 \frac{\text{gov loans}}{\text{total loans}}_t \text{GOV[20,50)}_{it} + \delta_3 \frac{\text{gov loans}}{\text{total loans}}_t \text{GOV[50,100]}_{it} + \nu_i + \epsilon_{it},\end{aligned} \tag{12}$$

where $D2009$, $D2010$, $D2011$, and $D2011$ are year dummies; ν_i corresponds to firm-specific fixed effects; and ϵ_{it} is the error term.

We have no prior about the year dummy coefficients $(\alpha_1, \alpha_2, \alpha_3, \alpha_4)$ given that they essentially capture the average effect of unobservable variables that depend only on time, such as changes in the economy's growth opportunities. Likewise, it is not obvious how the volatility of the market index interacts with the voting premium. On the one hand, the voting premium decreases with the index because uncertainty probably increases the cost of raiders buying block positions in a control battle. On the other hand, uncertainty may increase the conflicts of interests among controlling shareholders, raising the voting premium accordingly. We thus have no prior about the VIX coefficient α_5.

As in Zingales (1994), we use quarterly averages of the proportions of voting shares in the hands of the three largest shareholders to control for time-varying changes in the ownership structure that

[30] Large shareholders may also have stronger incentives to extract private benefits if they do not expect the company to survive. Consistent with this hypothesis, Lemmon and Lins (2003) show that the 1997-99 Asian crisis hit more severely the firms that are more prone to conflicts of interest between the controlling group and the minority shareholders.

may alter the probability of a control battle. We expect a significantly negative estimate for β_1 given that vote disputes become less likely as the equity holdings of the largest shareholder increase. In contrast, the signs of β_2 and β_3 are ambiguous. An increase in the equity holdings of the second and third largest shareholders may improve their chances of confronting the largest shareholder, but such an increase may also help the formation of a coalition in the controlling group against threats from external investors.

The empirical literature on capital structure (see, among others, Rajan and Zingales, 1995) suggests that firms with substantial fixed assets have a greater debt capacity, because they are less vulnerable to agency costs of debt. Grossman and Hart (1982) and Jensen (1986) argue that financial slack gives more room for the conflicts of interests among shareholders that underly the voting premium. If so, an increase in the fixed asset ratio should increase the voting premium, implying a positive sign for γ_1. We also expect a positive sign for the coefficient γ_2 of the relative liquidity of the common shares. Investors require a compensation to hold the least liquid between voting and non-voting shares, whose price will then be relatively lower. Our measure of relative liquidity is the ratio between the average numbers of voting and non-voting shares traded at the BM&FBovespa and the New York Stock Exchange.

We control for the net operating margin in order to account for the impact of the subprime crisis on the profitability of the firms. Jensen (1986) and Hart and Moore (1995) argue that the controlling groups of the most profitable firms presumably have more room to extract private benefits. This makes the voting premium higher and hence we expect a positive estimate for γ_3. Finally, Zingales (1995) argues that it is more costly to carry out a hostile takeover if the target company is large. The voting premium, therefore, should decrease with the size of the firm. We employ the logarithm of the firm's market capitalization to measure firm size and, as such, we expect a negative estimate for γ_4.

In the next section, we report the coefficient estimates of equation (12) and their heteroskedasticity-and-autocorrelation-robust standard errors.

5.2 Main findings

Model 1 in Table 4 focuses on the average effect on the voting premium of our proxy for the government's willingness to intervene (the share of loans from government-controlled). The remaining independent variables are identical to the ones in equation (12). In the OLS regression, the share of loans from government-controlled banks does not have a statistically significant effect on the voting premium. The coefficients of the log of the market cap and of the equity stakes of the second largest shareholder are statistically significant at 1%, with negative signs. These effects are also economically relevant. The coefficient of the relative liquidity of the voting shares is also significant, but, contrary to expected, with a negative sign. The results change considerably, once we control for time-invariant firm-specific characteristics. In the fixed-effect regression, the equity holdings of the second largest shareholder is the only variable that is statistically significant at the 10% level.

Model 2 in Table 4 breaks down the average effect of the share of loans from government-controlled banks across three groups: firms that the government isn't in a control position (fraction of voting shares smaller than 20%), firms that the government is a large shareholder but not a majority one (fraction of voting shares at least 20% but less than 50%), and firms that the government is a majority shareholder (fraction of voting shares at least 50%). The average effect of the share of loans from government-controlled banks should be negative and statistically significant in the second and third groups of firms, if it captures the government's willingness to intervene in corporate decisions.

Nothing relevant changes in the OLS regression when we allow for the effect of the share of loans from government-controlled banks to vary with the government's voting shares. In particular, the estimated coefficients of the interactions of the dummies of the government's equity holdings with the share of loans from government controlled banks are all close to zero and statistically insignificant. A more interesting picture arises in the fixed-effects regression, though.

Once we control for unobserved firm-characteristics, we find that the effect of the share of loans from government-controlled banks on the privately-controlled firms is small and statistically insignificant at 10%. In contrast, the effects on firms that the government is in the controlling group are much larger, even if only significant at the 10% level for the firms that the government is a large, but not a majority, shareholder. A Wald test rejects the hypothesis, with a p-value of 0.067, that the effect

of the share of loans from government-controlled banks on the privately-controlled firms is larger in magnitude than or equal to the effect on the firms that the government is in the controlling group but it isn't a majority shareholder.[31]

From the third quarter of 2008 to the last quarter of 2012, the proportion of loans from government-controlled banks increased from 34.3% to 47.3%. Bearing this variation of 13% in mind, the fixed-effect estimate of Model 2 implies a reduction of 9.2% of the average voting premium of firms that the government controls between 20% and 50% of the voting shares. The predicted change explains 30.7% of the actual 29.8% reduction of the voting premium of these firms. If we consider that the effect of the government's activism is the difference between the coefficient estimates of the interaction terms, regardless of whether they are significant or not, then the fixed-effect regression of Model 2 explains 15.4% of the actual reduction of the voting premium.

The fixed-effect regressions in Models 2 and 3, therefore, strongly indicate that the activism of the government as a large shareholder lowers the voting premium. Does this reduction benefit the minority shareholders?

An F-Test does not reject the hypothesis that an increase in the share of loans from government-controlled banks lowers the voting premium of firms that the government is a majority shareholder by the same magnitude that it lowers the voting premium of firms that the government is in the control group but isn't a majority shareholder. As the voting premium model of Section 2 shows, this finding does not support the hypothesis that the government's activism induces the board to monitor the controlling group more tightly. It does support, however, the hypothesis that the government's activism lowers the probability that the controlling shareholders seek minority votes in a control battle. This means that the policy-oriented activism of the Brazilian government did harm minority shareholders.

[31] The findings are qualitatively the same if we also include in Model 2 of Table 4 the GOV$[a, b)$ dummy variables as controls on their own. Although this reduces the significance of the impact of the government's activism as a large shareholder, the one-sided Wald test still rejects at the 10% level of significance, with a p-value of 0.0906. The coefficient estimates of the GOV$[a, b)$ dummy variables are not significant at the usual confidence levels.

6 Robustness checks

6.1 The thresholds for control

In the benchmark model, we allow for the effect of the government's willingness to intervene on the voting premium to vary across three groups: i) firms that the government controls less than 20% of the voting shares, ii) firms that the government controls at least 20% but less than 50%, and iii) firms that the government controls at least 50% of the voting shares. These thresholds are widely used in the corporate governance literature to define who is in the controlling group (20% threshold) and who has unilateral control over business decisions (50% threshold). Nonetheless, it is easy to think of examples in which these thresholds do not determine whether there is unilateral control or if an investor belongs to the control group.

Shareholders' agreements, for instance, may require supermajority in merger decisions, preventing majority shareholders from controlling the firm unilaterally. In the other extreme, 10% of the voting shares may suffice to give an investor a control position in firms with very dispersed ownership structures. The measurement error in the thresholds of the benchmark model may therefore bias the estimation of the effects of the government's willingness to intervene. To address this concern, we extend model (12) to allow for heterogenous effects on different intervals of the government's equity holdings: 0% to 10%, 10% to 20%, 20% to 50%, 50% to 60%, and 60% to 100%.

Model 4 in Table 5 reports the coefficient estimates of fixed-effect regressions of the extended model, with their robust standard errors. As in the benchmark model, the strongest impact of the share of loans from state-owned banks is on the voting premium of firms with government's equity holdings between 20% and 50%. With a significant coefficient estimate of -0.7769, the effect on this group of firms is basically the same as in the benchmark model. An F-test does not reject the hypothesis that the effects of the willingness to intervene on firms with government's voting shares in the $[0, 10)$ and $[10, 20)$ intervals are equal, as well as the equality of the effects on firms with government's voting shares in the $[50, 60)$ and $[60, 100]$ intervals. As before, a Wald test rejects the hypothesis that the effect on firms with government's voting shares in the $[10, 20)$ interval is larger (in absolute value) than the effect on firms with government's voting shares in the $[20, 50)$ interval.

Models 5 to 7 in Table 5 focus on the threshold for control. Lowering the 20% threshold of the benchmark model to 10% apparently pools in the controlling group firms that the government's fraction of voting shares is not large enough to let it translate the willingness to intervene into shareholders' activism. In turn, raising the threshold to 30% apparently mistakenly classify as privately controlled firms a large number of firms in which the government belongs to the controlling group. In all these models, we do not find statistically significant differences between the effects of the willingness to intervene (measured by the share of loans from government controlled firms). We interpret these findings as evidence that the 20% cutoff that the literature usually employs is the relevant threshold to identify whether the government is large enough to belong to the controlling group.

6.2 The aggregation of voting shares

Errors in the measurement of the voting shares under the government's control is another potential source of bias in our estimates, especially in firms with pyramidal ownership structures. In these firms, the benchmark criterion to compute the voting shares under the government's control adds the voting shares in the government's name to the voting shares owned by the firm in the next layer of the control chain, provided that the government owns (directly or indirectly) at least 20% of this firm's voting shares. The next firm's voting shares are ignored, if the 20% threshold is not met. This aggregation criterion assigns a misleading majority position for the government in some firms and underestimates the government's equity holdings in others.[32]

To address this issue, we re-estimate equation (12) as well as Models 2 and 3 in Table 4, under two alternative aggregation criteria for the voting shares in the government's control. The first criterion is identical to the one we have used so far, except that it lowers the threshold for adding a firm's voting shares to the government's equity holdings from 20% to 10%. This increases the average equity holdings of the government in the full sample from 20.4% to 21.0%. We call this aggregation

[32] The ownership structure of Oi S.A., discussed in Section 4, is a good example of how the benchmark aggregation criterion may bias the government's equity holdings in both directions. The criterion assigns no voting shares for the government from January 1, 2008 to September 29, 2009, even if, in that period, the government owned up to 10% of the voting shares of Oi's largest shareholder. In contrast, the criterion assigns to the government 79.6% of Oi's voting shares from September 30, 2009 to October 4, 2012, because the government owned 33.7% of Telemar Participações, which, indirectly, owned 79.6% of Oi's voting shares.

criterion *last link* $\geq 10\%$.[33]

In Table 6, Model 2 under the column *last link* $\geq 10\%$ shows that cutting in half the threshold for aggregating voting shares slightly increases the effects of the share of loans from government-controlled banks on the voting premium of firms with majority control and also on the premium of firms that the government's voting shares lie between 20% and 50%. As expected, the minor increase in the effects of firms in the controlling group decreases a little bit the effect on the premium of the privately controlled firms. More importantly, the main message of the one-sided Wald tests remain the same. There is no statistically significant difference between the effects of the share of loans from government-controlled banks in the two groups of firms in which the government is in the controlling group, whereas the effect on the group of firms that the government control at least 20% of the voting shares is larger in magnitude than the effect on privately controlled firms.

Lowering the 20-% threshold to 10% also entails costs, though. It increases the number of firms that seem to be majority owned by the government, when they aren't. This cost of the new threshold shows up in the coefficient of the interaction of the share of loans from government-controlled banks with the firms that the government is a majority shareholder. The new coefficient is bigger (in absolute value) and marginally statistically significant at 10% (9.2%). The results of Model 3 under the column *last link* $\geq 10\%$ also shows no relevant difference with respect to the regression results of Model 3 with the benchmark aggregation criterion.

The column *weakest link* contemplates a criterion for aggregating voting shares that reduces the chances of misclassifying firms as majority-owned by the government, without necessarily increasing the odds of incorrectly excluding the government from the controlling group. Using this criterion, the average equity holdings of the government decreases (vis-à-vis the 20% criterion) from 20.4% to 18.1% in the full sample.[34]

To illustrate the weakest link criterion, consider the ownership structure of Oi in the period ranging from September 30, 2009 to October 4, 2012. The benchmark criterion assigns no votes for the government at Oi, despite the fact that, in the time period in question, the government owned between

[33] It is quite common in the ownership structure literature to present the main results assuming a 20% threshold for control, showing the results under the 10% threshold as a robustness check. See, for example, La Porta *et al.* (1999).

[34] Faccio and Lang (2002) and Claessens, Djankov, and Lang (2000) apply the weakest link criterion to aggregate votes in pyramids.

5.3% and 6.2% of a firm, Brasil Telecom, that owned 99.1% of Oi's voting shares. The weakest link considers that the government's share of Oi's voting stocks is equal to its share of Brasil Telecom's voting stock, which is smaller than the share of Oi's voting stock in the hands of Brasil Telecom.

Model 2 under *weakest link* shows that the strongest effect of the share of loans from government-controlled banks is once more on the voting premium of firms that the government is in the controlling group but not a majority shareholder. Unlike in the previous criterion, the weakest link lowers the effect on the voting premium of firms that the government controls more than 50% of the voting shares, making it statistically insignificant at 10%. The tests that compare the coefficients now reject the hypothesis that the effects do not vary between the firms that the government has majority control and the firms that the government is in the controlling group but isn't a majority shareholder. Note, however, that the test does not support the hypothesis that the decrease in the voting premium is due to stricter monitoring. Unlike this hypothesis, the effect of the willingness to intervene is weaker in the firms that the government has more voting shares.

Last but not least, substituting the *weakest link* criterion for the *last link* $\geq 10\%$ in Model 3 does not alter qualitatively the results.

6.3 Trimming and quantile effects

In the sample of firms that we used in our empirical analysis, we excluded any average quarterly voting premium larger than 150%. While there are good reasons to exclude at least some of these observations (e.g., problems in the adjustment for dividends and splits), it is sometimes difficult to determine whether other observations are indeed outliers or part of the distribution of the voting premium in a country plagued by agency problems. To address this concern, Table 7 reports the fixed-effect coefficient estimates and their standard errors for Models 2 and 3 under alternative exclusion criteria: 180%, 160%, 140%, and 120%.

Once we move from a threshold of 150% to 160%, the sample size slightly increases from 1,810 to 1,817 observations. In the process, the effects of the share of loans from government-controlled banks increase (in absolute value) for all three groups of firms, but the main qualitative results remain unchanged. In particular, the effect on the voting premium of the privately controlled firm is nearly

half of the effect of the firms that the government is a large shareholder. A Wald test rejects the hypothesis that the effect on the voting premium of privately controlled firms is larger or equal (in absolute value) than the effect on the firms that the government controls between 20% and 50% of the voting shares. A test of equality of means cannot reject the hypothesis the equality of the effects on the voting premium of the two groups of firms that have the government in the controlling group.

The pattern is identical if we set the maximum voting premium at 180%; just stronger! But it changes symmetrically if we reduce the threshold to either 140% or 120%, in that the effects of the share of loans from government-controlled banks decrease in all groups of firms. Still, we can always reject the hypothesis that the effect on the privately-controlled firms is at least equal to the effect on the firms for which the government is a large, but not a majority, shareholder. Moreover, we cannot reject that the effects are the same for firms that the government's voting shares lie in the $[20, 50)$ and $[50, 100)$ intervals.

In a study of the voting premium in the U.S., Zingales (1995) exclude two observations of voting premium corresponding to the trading of the superior voting class near a takeover (918%) and just before insolvency (-9,424%). In his final sample, the maximum voting premium reaches 221.83%, which is well above the 150% cutoff we consider. Given the well known differences between the legal protection of the shareholders' rights in the U.S. and Brazil, it is not surprising that there are many firms for which the voting premium exceeds the 150% threshold. By comparing the last column of Table 1 with Table 2, it is possible to appreciate that these 34 excluded firms are actually the most profitable among the privately-controlled firms. They are also smaller in terms of market capitalization, but with higher leverage.

Another way of investigating the weigh of outliers in our results is to estimate the regression parameters using a least absolute deviation criterion (rather than least squares). This is the essence of quantile regressions as developed in Koenker and Bassett (1978). Intuitively, their approach allows the model's coefficients to vary across across quantiles of the voting premium, while taking into account that all these coefficients should be jointly estimated. As in Koenker (2004), we introduce fixed-effects in the quantile regressions and bootstrap the standard errors using 500 artificial samples.[35]

[35] It is worth stressing the role that fixed effects play in quantile regression. Ideally, they should capture some firm-specific source of variability that implies a distributional shift. However, there are not enough degrees of freedom to make

Table 8 reports the results of the quantile regressions. The baseline sample for these regressions exclude voting premia observations larger than or equal to 300%, which is slightly larger than the 221.8% cutoff set by Zingales (1995) in his study of the voting premium in the U.S. Given the well known differences between the legal protection of the shareholders' rights in the U.S. and Brazil, we don't treat a voting premium between 221.8% and 300% as outliers. The table reports estimates of the coefficients for Model 2 in three quartiles: $Q_1 = 25\%$, median (50%), and $Q_2 = 75\%$, in the sample that excludes voting premia of at least 300% and, for the sake of comparison, also for the baseline sample that excludes voting premia larger than or equal to 150%.[36]

To provide some point of reference for each conditional quartile, Table 8 reports the minimum, mean and maximum values of the voting premia in three intervals. These intervals are formed so that their median values are equal to the corresponding conditional quartile of the quantile regression. For instance, the interval of the $Q_1 = 25\%$ quantile regression in the baseline sample starts at the smallest voting premium (-85.55%) and ends in the median voting premium, 5.15% (4.28% in the original sample that excludes voting premia larger or equal to 300%). To some extent, we may interpret the conditional first quartile regression as more relevant for firms with good enough corporate governance practice to warrant relatively lower voting premia.

In contrast, the neighboring observations for the conditional third quartile regression ($Q_3 = 75\%$) range from 5.16% (4.31% in the original sample) to 296.92% (149.63% in the original sample), and hence the corresponding results are more informative for firms with lower corporate governance standards. The interval of the median quantile regression starts at -0.21% (-7.1% in the original sample) and ends in the third quartile, 26.74% (23.47% in the original sample).

Table 8 shows that the coefficient estimates for the interaction between our proxy for the government's willing to intervene and GOV$[a, b)$ follow different patterns across quantiles (though similar across samples). The coefficient estimates for the first conditional quartile are actually very similar across the baseline sample (cutoff of 300%) and the original one (cutoff of 150%). As expected, the

this shift depend on the quantile and hence we consider a constant fixed effect across quantiles as in Koenker (2004). In this formulation, the fixed effects have a pure location shift effect on the conditional quantiles of the voting premium, unlike the controls that may affect each quantile in a different manner.

[36] We first estimate the quantile regression for the original sample that excludes voting premia larger than or equal to 150%, using a random set of initial values. We then use the resulting coefficient estimates as initial values for the quantile regression in the alternative sample that uses a cutoff of 300%.

focus on the smallest voting premia lowers the impact of our proxy the government's willingness to intervene (i.e., the share of loans from government-controlled firms) on the voting firms that have the government in the control group. Still, we find no evidence of statistical difference between the GOV$[20, 50)$ and GOV$[50, 100)$ interaction coefficients, and we reject that they are smaller or equal in magnitude to the GOV$[0, 20)$ interaction coefficient. Here, the main novelty of the quantile regressions is that the statistically significant effect of the willing to intervene lies on firms in which the government is a majority shareholder.

For the conditional median, the point estimate of interaction coefficients seems to increase with the government's equity stake. In particular, the estimates of the GOV$[50, 100]$ interaction coefficient are much larger than those of the GOV$[0, 20)$ interaction: -0.4906 against -0.1602 in the original sample, and -0.6167 against -0.1747 for the exclusion criterion of 300%. These discrepancies are statistically significant at the 5% level in both instances. As for the GOV$[0, 20)$ and GOV$[20, 50)$ interactions, their differences are only borderline significant in that the corresponding p-values of the one-sided Wald tests are around 11%.

Finally, the interaction coefficients increase in magnitude for the conditional third quartile, though we are able to reject equality of the coefficients only for the larger sample that excludes voting premia over 300%. All in all, it seems that the government's activism is less damaging for firms whose standards of corporate governance are low enough to allow for very large voting premia.

6.4 Placebo

Our identification strategy relies heavily on the proxies in the interaction between the government's willingness and capacity to intervene, namely, the proportion of loans coming from government-controlled banks and the government's equity participation in the firm, respectively. As Figure 2 shows, our proxy for the government's willingness to intervene has a steep trend. One may wonder, therefore, whether some non-stationary variable is the main driving force of our result.

Despite its trend, Model 1 in Table 4 shows that the share of loans from government-controlled banks does not have a statistically significant impact on the voting premium. Still, we challenge our favorite interpretation of the results in Table 4 in three robustness tests. We play with the proxy for

the government's capacity to intervene, replacing the dummy variables GOV$[a, b)$ in the interaction terms with two alternative variables relating to the equity stakes of the largest shareholders. Next, we fix GOV$[a, b)$ to their initial values in January 2008. Table 9 documents the corresponding results.

The second column (Placebo 1) of Table 9 reports the interaction coefficient estimates when we replace GOV$[a, b)$ with the dummy variables $S_1[a, b)$, which take value 1 if the equity stake of the largest shareholder lies between $a\%$ and $b\%$, zero otherwise. Note that we do not control for whether the government is the largest shareholder. Like a placebo test, this interaction should not result significant if our story about the government's capacity to intervene holds water. Indeed, we find no significant estimates for the interaction coefficients, even if the one-sided Wald test rejects that the interaction coefficient for $S_1[0, 20)$ is lesser or equal than $S_1[20, 50)$.

The third column (Placebo 2) displays the coefficient estimates for our second placebo interactions. This time, we replace GOV$[a, b)$ with the product between GOV$[0]$ and S_i, with $i = 1, 2, 3$. These placebo interactions are equal to the equity stakes of the largest shareholders (first, second or third) if the government's equity participation is exactly zero, but zero otherwise. This placebo test is stronger than the first because the interaction now takes value zero if the government has *any* stake at the firm and hence not so able to intervene in the firm. The interaction coefficient estimates are very close to zero and, as before, not statistically different (from each other and from zero) at the usual significance levels.

Finally, if the government wishes to intervene in a firm, it might also think about increasing its equity participation in that firm. Ruling out the endogeneity of the government's equity holdings weakens a potentially important mechanism that is available for the government to intervene in business decisions, biasing downwards the impact on the voting premium of the government's willingness to intervene. The last column (Placebo 3) of Table 9 reports the interaction coefficient estimates for a variation of the benchmark model in which we fix GOV$[a, b)_{i,t}$ to their initial values in January 2008. As expected, the GOV$[a, b)_i$ interaction coefficients are never statistically significant.[37]

[37] The only sizeable point estimate is in the coefficient of the interaction of the government's willingness to intervene with GOV$[20, 50)_i$. Not surprisingly, this estimate is very imprecise because there are not many firms in January 2008 for which the government's equity participation was between 20% and 50%.

6.5 Government's activism or sample selection bias?

The main result of our paper is that the share of loans from government-controlled banks is negatively correlated with the voting premium of firms in which the government belongs to the controlling group, regardless of the size of its control stake. We interpret this findings as evidence that the activism of the government harms the minority shareholders: it lowers the probability that the controlling shareholders bid for minority votes in a control battle, without disciplining the controlling group.

And yet, there is an alternative interpretation for the main result of paper. The increase in the proportion of loans from government-controlled banks was followed by a deterioration in the government's fiscal situation, which led to a reduction in public investments. If these cuts were concentrated in industries built around firms that have the government as a large shareholder (energy, telecom, public utilities etc.), then they would suffer a decline in profits vis-à-vis the firms in other industries. In the spirit of Jensen (1986) and Hart and Moore (1995), the decline in profitability could coordinate the controlling shareholders around the firm's survival, lowering the chances of conflicts of interest in the controlling group. The weaker conflicts would lower the voting premium. Altogether, this means that sample selection could well explain the negative coefficients we find for the interaction terms in the regressions we have so far run.

To avoid sample selection biases associated with changes in profitability, the baseline regression (12) adds the firms' operating margins among the independent variables. It is known, however, that accounting measures of profitability are imperfect proxies for the firms' economic profits and cash-flow generation (see, for example, Gomes 2001). To address this concern, we estimate the our proxy for the government's willingness to intervene on the voting premium of Vale; the Brazilian mining giant whose voting and non-voting shares trade at the São Paulo, New York, Paris, Madrid, and Hong Kong stock exchanges.[38] Vale's economic profitability and investment opportunities are closely linked to the price of iron ore, which can be considered an exogenous variable.

Vale is perhaps the neatest example of the increased interventionism of the Brazilian Government following the outbreak of the subprime crisis. Since 1997, about 54% of Vale's voting shares are in the hands of Valepar, a consortium of firms whose main shareholder is Previ, the pension fund of

[38] Both classes of Vale's shares have the same dividend rights.

employees of Banco do Brasil.[39] Previ offers defined pension benefits, which are widely perceived in Brazil as guaranteed by the government. In exchange for this implicit guarantee, the Brazilian government has considerable influence over Previ and, consequently, over Valepar's board of directors. Using the benchmark measure (see Section 5) to gauge direct and indirect participation, the Brazilian government detains about 60% of the votes of Vale since 2008.

By the end of 2008, Vale's CEO, Mr. Roger Agnelli, closed down some plants in the South of Brazil, laying off about 1,300 workers. In response to the layoffs, the Brazilian government started negotiating a change of command in Vale with the other members of the Valepar consortium. Mr. Agnelli was replaced in May 2011 after a series of meetings between the Minister of Finance, Mr. Guido Mantega, and the president of Bradespar, the largest private shareholder of Valepar.[40]

Figure 5 plots the trajectory of Vale's daily voting premium from January 2008 to December 2012 at the BM&FBovespa as well as at the New York Stock Exchange (NYSE). In the whole period, the premium averaged 11.76% at BM&FBovespa and 11.84% at NYSE. These means are far from negligible. But, more impressive than the means, is the premia's downward trend in both stock exchanges. The voting premium at BM&FBovespa fell from 25.1% on May 16, 2008 to 3.6% on December 28, 2012. The trajectory of Vale's voting premium at the NYSE is almost identical.

The subprime crisis is the natural candidate to explain the downfall of Vale's voting premium between June 30, 2008 and December 5, 2008. In this period, the price of Vale's main product, iron ore, fell 61.5%, implying a significant decrease in the company's ability to generate cash flows. And yet, Figure 6 shows that there is no evidence that the price of iron ore co-moves with Vale's voting premium between April 2010 and December 2012. In this period, the price of iron ore floated without a clear trend, while the Brazilian government responded to the deepening of the subprime crisis by strengthening its interventions in the private sector. In particular, the replacement of Vale's CEO on May 2011 puts an end to his 2.5 year control battle against the government.

The question, then, is whether the government's activism as a large shareholder explains a significant part of Vale's downward trajectory of the voting premium, after controlling for the price of iron

[39] In the sample period, Previ and BNDESPAR owned 60.51% of Valepar's voting shares.

[40] See http://colunistas.ig.com.br/guilhermebarros/2011/03/25/agnelli-chegou-a-recorrer-a-lula-para-tentar-ficar-na-vale/.

ore. If we are able to reproduce the average effect of government' interventionism with Vale's data, then it is unlikely that the evidence in Section 5 is an artifact of the sample selection bias. Accordingly, we estimate the coefficients of the following regression:

$$\begin{aligned}\frac{P_t^V - P_t^{NV}}{P_t^{NV}} &= \delta_0 + \alpha_1\, D2009_t + \alpha_2\, D2010_t + \alpha_3\, D2011_t + \alpha_4\, D2012_t + \alpha_5\, VIX_t \\ &+\beta_1 \text{ First Shareholder}_t + \beta_2 \text{ Second Shareholder}_t + \beta_3 \text{ Third Shareholder}_t \\ &+\gamma_1 \frac{\text{total volume}^V}{\text{total volume}^{NV}}_t + \gamma_2\, P_t^{\text{iron}} + \delta_1 \frac{\text{gov loans}}{\text{total loans}}_t + \delta_2 \text{ Agnelli}_t + \epsilon_t.\end{aligned} \tag{13}$$

There are two main novelties in the regression (13). While the share of loans from government-controlled banks is still interpreted as the proxy for the government's willingness to intervene in corporate decisions, the number of Agnelli searches at Google captures the level of pressure the government was exerting specifically on Vale. Two effects make ambiguous the sign of δ_2. On the one hand, the interest in Mr. Agnelli, as measured by Google trends, may reflect a rise in the political pressure for a change in Vale's command and hence a higher likelihood of political resolution rather than a vote dispute. On the other hand, it may also mirror Mr. Roger Agnelli's readiness to fight for his job, increasing the chances for a voting dispute. Figure 7 shows that the peak in "Agnelli" searches is in March 2011, two months before Mr. Roger Agnelli's exit from Vale.

The other novelty in the voting-premium regression is the monthly average price in US dollars of iron ore in the Chinese spot market. The price of iron ore, P_t^{iron}, substitutes for the operating margin as the proxy for Vale's profitability and investment opportunities. Its coefficient is positive ($\hat{\gamma}_2 > 0$), if an increase of profitability gives room for the control group to extract more private benefits of control.

To increase the number of observations, we will estimate equation (13) using monthly data. For this, we cannot include in the regression the fixed-asset ratio, which is available at a quarterly frequency only. In the benchmark model (12), the fixed-asset ratio is not a statistically significant determinant of the voting premium. Another variable in the benchmark model that we exclude from equation (13) is the log of the market cap. Zingales (1994) includes the market cap in the voting premium regression because the difficulty of mounting a hostile takeover increases with the firm's market

cap. Nonetheless, it is unlikely that the time-series variation of the market cap captures changes in the difficulty for a raider to take over a big firm like Vale. The exclusion of this variable avoids multicollinearity problems, given that it moves in tandem with the iron ore price.

Model 8 in Table 10 reports the coefficient estimates and robust standard errors of equation (13), ignoring the "Roger Agnelli"citations on Google Trends. This model explains 90.6% of the time series variation in Vale's voting premium. We do not attach much importance to goodness of fit because we are not able to reject the presence of unit roots in the voting premium and in the price of iron ore. Still, the coefficient estimates are not spurious because Vale's voting premium cointegrates with the iron ore price index.

A comparison between the fixed-effect Model 3 in Table 4 and Model 8 in Table 10 reveals that the impact of government interventionism on Vale's voting premium is remarkably similar to the average effect on the voting premia of firms for which the government is a large shareholder. From June 30, 2008 to December 31, 2012, the share of loans from government-controlled banks raised from 34.5% to 47.9%. Multiplying this increase by the estimate of $\hat{\delta}_1$ in Model 8, -0.637, yields a negative (absolute) effect of 8.5%, which corresponds to 45.2% of the decline in Vale's voting premium in this period. Model 3 in Table 4, in turn, estimates that the share of loans from government-controlled banks explains 60.4% of the average reduction in the voting premium of firms that have the government in the controlling group.

The price of iron ore is the only other regressor with a significant coefficient estimate The price of iron ore declined US$ 108 between June 30 and November 28, 2008. Given the coefficient estimate of price of iron ore, 0.0004, the model implies a reduction of 4.32 percentage points in Vale's voting premium or, equivalently, 51.4% of the voting premium fall in the period. However, changes in the iron ore price explain only 8.4% of the the variation in Vale's voting premium between June 30, 2008 and December 31, 2012. Model 9 in Table 10 adds the Google searches on Vale's CEO to the mix, without qualitative changes in the results. The positive coefficient estimate of the Agnelli variable suggests that the former CEO's to remain at the company's helm raised the likelihood of a dispute for the minority shareholders' votes, increasing the voting premium.

7 Conclusion

Since the outbreak of the subprime crisis, there has been a wave of government interventions in the private sector. In particular, several governments in Europe and Latin America could block massive layoffs simply because they have large equity stakes in some corporations. In a sense, the subprime crisis induced these governments to play a more active role as large shareholders.

In this paper, we show that the outbreak of the subprime crisis led the Brazilian government to an interventionist frenzy that explains 60.4% of a massive drop of 15.6 percentage points in the voting premium of firms that have the government as a controlling shareholder. In principle, one might think that the voting premium went down in these firms because the interventions induced the boards to monitor more tightly the managers and controlling shareholders. And yet, we reject the hypothesis that the reduction of the voting premium increases with the size of the government's control equity stake; as it should happen if the interventions induce the board to monitor more tightly managers and controlling shareholders. In contrast, the model in Section 2 predicts that reductions of the voting premium do not increase with the size of the government's control stake, if the lower voting premium is due to to the controlling shareholders' reluctance to seek minority votes to fight an increasingly interventionist government in a control battle.

We interpret these findings as evidence that government's activism may indeed harm the minority votes if its main purpose is to advance broader economic policies. From the perspective of the minority shareholders, the interventionist-led decline of the voting premium is a cost of the government's activism that adds to any loss of profits that the interventions may cause. Of course, our paper does not address several important dimensions of the corporate governance consequences of having the government as a large shareholder. It would be interesting to know, for instance, whether regulatory agencies magnify agency problems by acting more leniently when they face complaints by minority shareholders against government-controlled companies.

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Figure 1: Share of BNDES Loans (% of Total Loans)

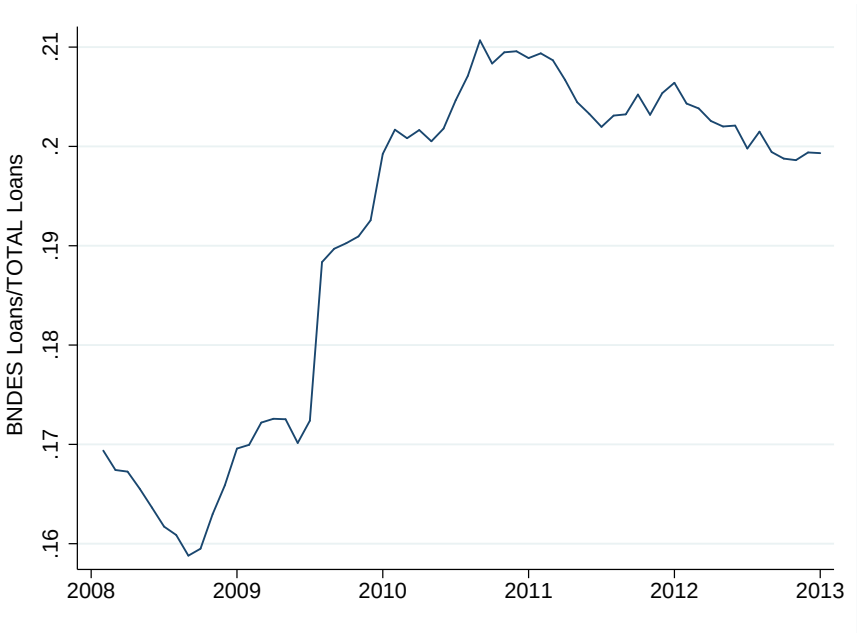

Figure 2: Share of Loans of Government-Controlled Banks (% of Total Loans)

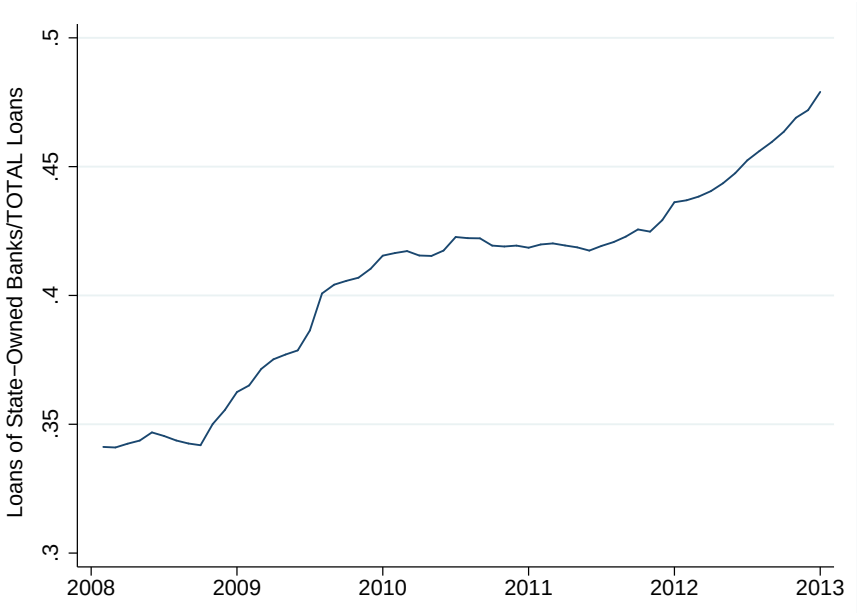

Figure 3: Average Voting Premium as per the % Shares of Main Shareholder

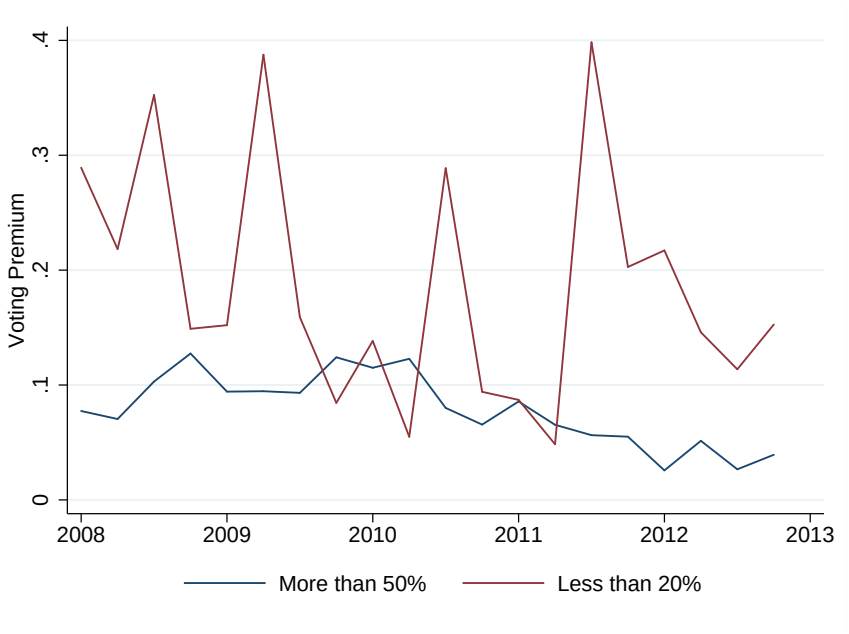

Figure 4: Histogram of Fraction of Government Votes (%)

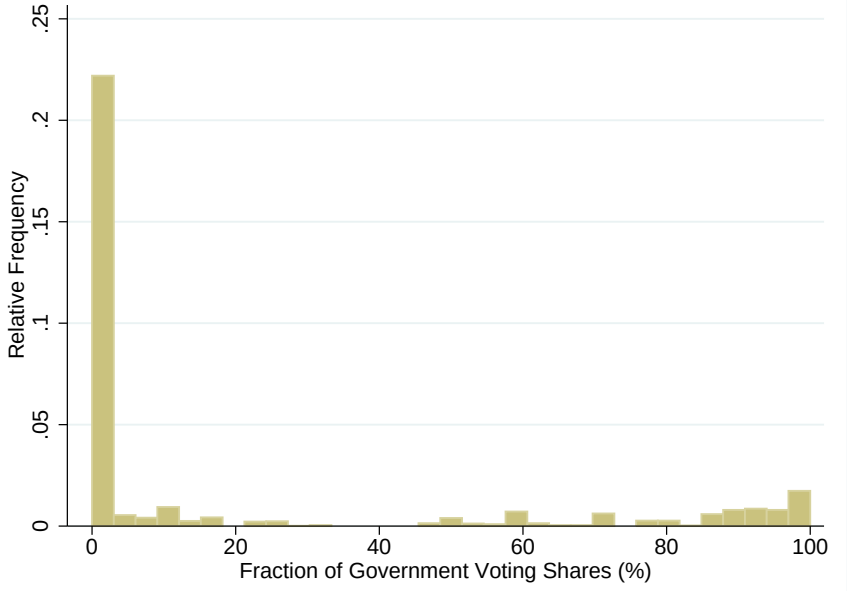

Figure 5: Vale's Voting Premium (%) at NYSE and BM&FBovespa

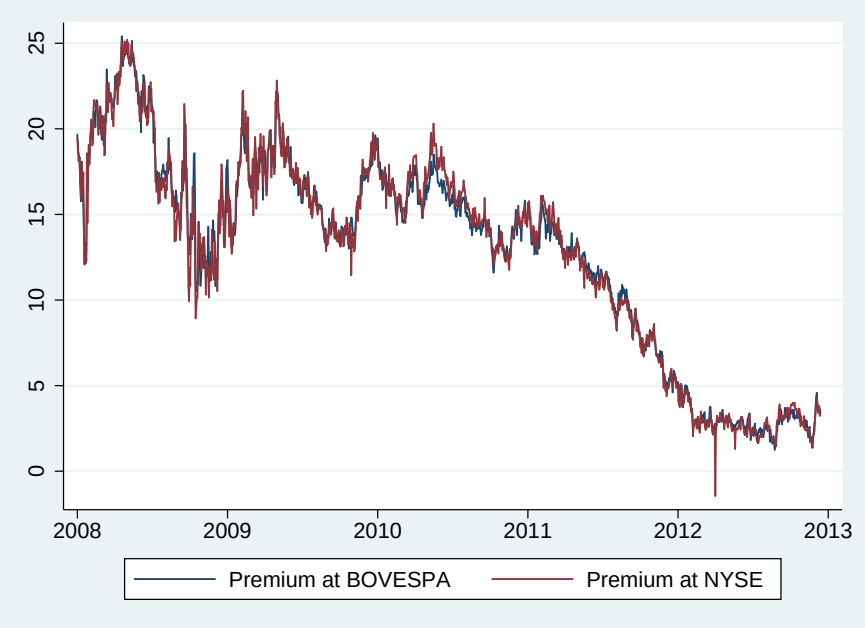

Figure 6: Vale's Voting Premium (%) at NYSE and the Price of Ore (US$)

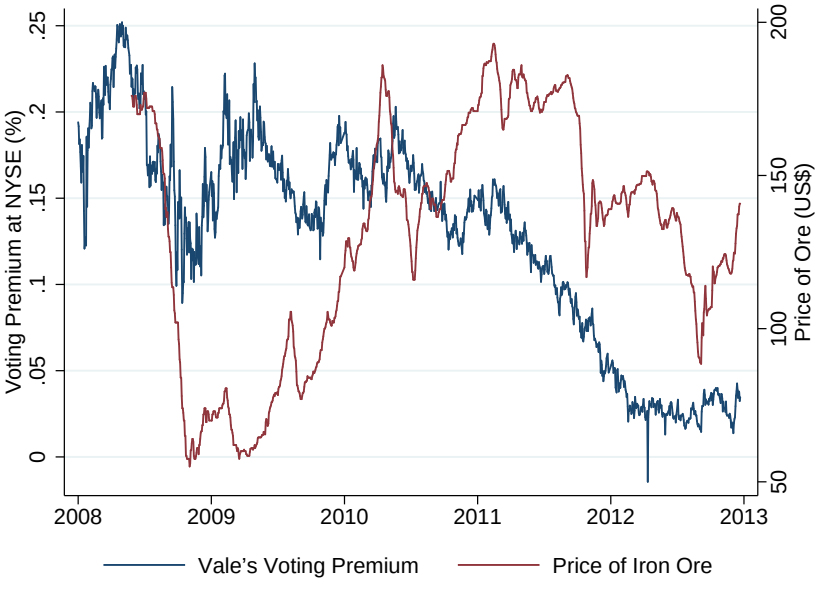

Figure 7: Voting Premium at Vale and Loans of State-Owned Banks

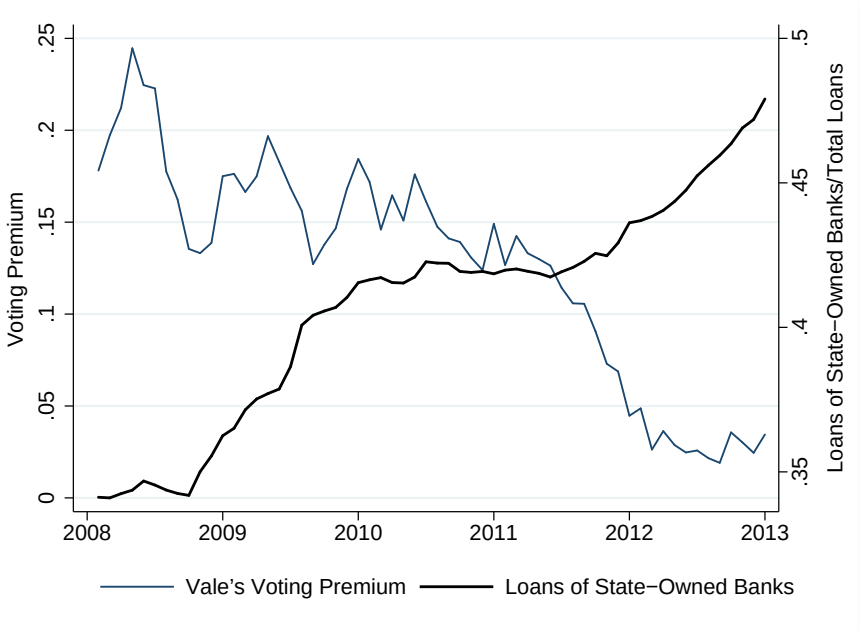

Figure 8: Citations of Roger Agnelli at Google Trends

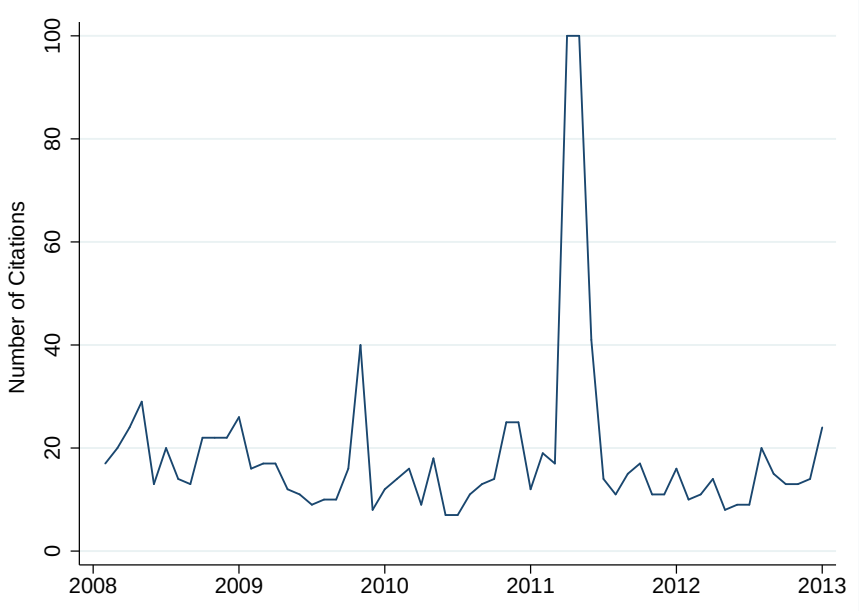

Table 1. Sample characteristics

The initial sample comprises all firms with dual class shares at BM&FBovespa, from January 2008 to December 2012. For each firm, we compute the percentage differences of the daily prices of voting and non-voting shares. We average out these percentage differences in quarterly *Voting Premia*, excluding observations larger than or equal to 150%. We report the number of firms in the final sample and in the set of *Excluded* observations, along with mean and median values (in parentheses) of firm characteristics. *Relative Liquidity* is the ratio of the number of traded voting shares over the number of traded non-voting shares. *First Shareholder* is the percentage of voting shares that the largest shareholder owns, with analogous definitions for *Second Shareholder* and *Third Shareholder*. *Sales* is quarterly revenues in US$ million. *Fixed Asset Ratio* is the percentage of fixed assets relative to total assets. *Leverage* is the percentage of debt relative to total assets. *Operating Margin* is in %. *Government* is the percentage of voting shares that the government controls (directly or indirectly).

	2008	2009	2010	2011	2012	2008–2012	Excluded
Number of Firms	143	132	130	118	106	163	34
Firm-Quarters	466	442	418	399	353	2,078	136
Voting Premium	15.9	11.3	10.9	10.5	4.6	10.9	3,410.1
	(7.7)	(3.4)	(6.8)	(3.1)	(0.5)	(3.8)	(331.4)
Relative Liquidity	9.56	14.89	18.02	16.44	18.05	15.16	54.19
	(0.065)	(0.067)	(0.076)	(0.078)	(0.107)	(0.077)	(0.003)
First Shareholder	63.91	64.28	63.17	62.74	62.45	63.36	64.73
	(60.8)	(63.1)	(61.8)	(61.4)	(60.7)	(61.8)	(72.95)
Second Shareholder	14.22	13.60	13.59	14.41	14.55	14.05	12.38
	(12.75)	(11.8)	(11.8)	(13.1)	(12.2)	(12.0)	(10.5)
Third Shareholder	5.30	4.80	4.78	4.76	4.82	4.90	5.06
	(3.00)	(2.32)	(2.20)	(2.10)	(3.00)	(2.50)	(0.2)
Sales	1,210.2	1,173.0	1,496.1	1,867.7	1,778.1	1,505.0	376.8
	(215.7)	(210.2)	(247.5)	(307.3)	(261.5)	(248.4)	(71.8)
Fixed Asset Ratio	33.02	32.39	29.34	24.60	25.63	29.25	33.49
	(32.08)	(33.34)	(30.62)	(22.02)	(22.40)	(29.61)	(35.29)
Leverage	29.94	25.81	26.67	29.14	27.11	27.80	53.52
	(24.39)	(23.75)	(23.26)	(23.43)	(26.69)	(24.15)	(30.34)
Operating Margin	−816.56	−17.71	−91.11	−8.96	−178.62	−240.00	421.02
	(10.26)	(9.72)	(11.82)	(11.51)	(9.98)	(10.70)	(9.84)
Government	18.96	19.24	20.49	21.81	22.25	20.44	8.65
	(0)	(0)	(0)	(0)	(0)	(0)	(0)

Table 2. Sample characteristics by control

We breakdown the sample of firms in two groups. *G* is the set of firms that the government controls (directly or indirectly) at least 20% of the voting shares. We refer to these firms as under the government's control. *P* comprises firms that the government controls less than 20% of the voting shares. We refer to these firms as under private control. The sum of firms under government and private control is larger than the number of firms in Table 1 in 2008 and 2011 because, in these years, the government's voting shares of some firms are larger than 20% in a quarter and smaller than 20% in another. This happens with three firms: Contax Participações, Coteminas and Brasken. In 2012, the number of firms in Table 2 is smaller than the number in Table 1 because the latter table does not ignore firms with missing values in the government's equity holdings. We report the number of firms in each group, along mean and median values (in parentheses) of firm characteristics. See description of the variables in Table 1.

	2008		2009		2010		2011		2012	
	G	*P*	*G*	*P*	*G*	*P*	*G*	*P*	*G*	*P*
Number of Firms	35	109	29	103	31	99	29	90	30	75
Voting Premium	15.7	16.2	8.4	12.1	7.3	12.1	6.7	11.8	3.0	5.2
	(5.9)	(8.8)	(2.9)	(3.3)	(1.8)	(7.5)	(2.3)	(3.1)	(0)	(0.8)
Relative Liquidity	30.78	2.893	40.52	7.09	58.06	4.43	59.81	1.35	15.10	19.12
	(0.126)	(0.060)	(0.13)	(0.050)	(0.092)	(0.073)	(0.063)	(0.083)	(0.158)	(0.100)
First Shareholder	69.13	62.28	70.66	62.32	72.35	60.04	73.41	59.02	73.03	58.62
	(67.0)	(60.2)	(71.3)	(60.8)	(77.8)	(59.1)	(79.6)	(58.8)	(77.8)	(57.3)
Second Shareholder	12.45	14.77	11.90	14.12	10.46	14.66	11.29	15.49	12.76	15.19
	(7.8)	(14.1)	(6.7)	(11.9)	(5.8)	(13.0)	(6.4)	(15.0)	(6.7)	(14.7)
Third Shareholder	3.44	5.88	2.69	5.45	2.65	5.51	2.41	5.57	2.29	5.73
	(0)	(5.0)	(0)	(5.1)	(0)	(5.0)	(0)	(4.9)	(0)	(5.1)
Sales	2,083.6	925.1	1,976.0	912.4	2,812.8	1,064.4	3,351.7	1,359.2	3,158.8	1,268.8
	(428.2)	(148.1)	(480.1)	(136.8)	(762.5)	(145.7)	(786.8)	(147.5)	(682.5)	(141.7)
Fixed Asset Ratio	37.61	30.58	37.87	30.58	35.97	27.14	29.03	23.15	30.59	23.92
	(40.97)	(30.83)	(42.57)	(30.83)	(36.65)	(28.05)	(24.18)	(21.19)	(23.17)	(22.15)
Leverage	21.98	29.57	21.49	27.28	22.35	28.17	20.64	32.02	23.37	28.47
	(18.96)	(26.66)	(18.99)	(25.37)	(20.02)	(24.51)	(20.23)	(25.87)	(23.06)	(27.93)
Operating Margin	17.80	$-1,094.4$	26.19	-32.29	21.62	-129.34	21.84	-19.63	-164.25	-184.19
	(15.27)	(8.73)	(18.28)	(7.95)	(18.31)	(10.04)	(18.05)	(8.87)	(15.98)	(9.03)
Government	75.68	1.29	78.57	1.05	78.34	0.77	81.67	0.98	80.01	1.28
	(85.2)	(0)	(89.2)	(0)	(88.85)	(0)	(89.40)	(0)	(89.30)	(0)

Table 3. Voting premium and proportion of voting shares under the government's control

We breakdown the mean and median voting premia by the proportion of voting shares controlled by the government. As before, the median values are in parentheses. Apart from the full sample, we consider two subsamples: third quarter of 2008 and the year of 2012. The column GOV refers to the proportion of voting shares under the government's control, whereas 'premium' corresponds to the voting premium (in %). The columns 'firms' and 'firm-quarters'count the number of firms for which the government controls the given fraction of voting shares and the corresponding number of observations in the sample, respectively.

	full sample			2008:3		2012			change in
GOV	premium	firms	firm-quarters	premium	firms	premium	firms	firm-quarters	premium
0	12.70	117	1,341	18.89	72	5.66	67	220	-13.23
	(5.11)			(9.00)		(0.77)			(-8.23)
$(0, 100]$	7.76	64	737	17.13	42	2.96	41	133	-14.17
	(1.45)			(6.66)		(0)			(-6.66)
$(0, 10)$	9.02	20	128	22.33	9	-1.38	6	20	-23.71
	(3.06)			(21.50)		(3.49)			(-18.01)
$[10, 20)$	2.31	12	86	4.99	4	7.21	5	19	2.22
	(-2.90)			(-2.90)		(-0.07)			(2.83)
$[20, 50)$	22.29	7	44	44.71	4	4.58	3	7	-40.14
	(6.29)			(29.43)		(4.03)			(-25.40)
$[50, 60)$	4.59	8	81	7.10	5	2.68	5	14	-4.43
	(13.29)			(17.03)		(2.83)			(-14.20)
$[60, 100]$	7.63	32	391	15.17	19	2.93	26	73	-12.23
	(0.00)			(5.29)		(-0.20)			(-5.44)

Table 4. Voting premium and the government's activism

In all regressions, the quarterly average of the voting premium, $(p_{it}^V - p_{it}^{NV})/p_{it}^{NV}$, is the dependent variable. In Model 1, the independent variable of interest is the fraction of loans from government-controlled banks, $\frac{\text{gov loans}}{\text{total loans}}$. The other regressors include the CBOE's options-implied market volatility index, *VIX*, the relative liquidity of the shares with voting rights, the proportion of fixed assets, the operating margin, the log of the market capitalization, and the fractions of voting shares held by the three largest shareholders. Model 2 interacts the fraction of loans from government-controlled banks with dummy variables, $GOV[a,b)$, which take value one if, at quarter t, firm i's voting shares under the government's control lie in the interval $[a,b)$. Model 3 pools the dummies $GOV[20,50)$ and $GOV[50,100]$ in a single dummy, $GOV[20,100]$. $\star\star\star$, $\star\star$, and $\star$ denote statistical significance at one, five and ten percent, respectively. Robust standard-errors are in parentheses. We also report the p-values of the Wald tests for restrictions on the coefficients of the interaction terms involving the dummy variables $GOV[a,b)$. The alternative hypotheses are the negation of the null hypotheses we state in the first column.

	Model 1		Model 2		Model 3
	OLS	Fixed Effects	OLS	Fixed Effects	Fixed Effects
$\frac{\text{gov loans}}{\text{total loans}}$	-0.0492 (0.7394)	-0.4433 (0.3888)			
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,20)$			-0.0723 (0.7382)	-0.3493 (0.4188)	-0.3449 (0.4129)
$\frac{\text{gov loans}}{\text{total loans}} GOV[20,100]$					$-0.7228^{\star}$ (0.4221)
$\frac{\text{gov loans}}{\text{total loans}} GOV[20,50)$			0.2384 (0.7543)	$-0.7681^{\star}$ (0.4216)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[50,100]$			-0.0595 (0.7398)	-0.7015 (0.4556)	
VIX	-0.0005 (0.0011)	0.0002 (0.0009)	-0.0005 (0.0010)	0.0003 (0.0009)	0.0003 (0.00009)
$\frac{\text{total volume}^V}{\text{total volume}^{NV}}$	$-0.0002^{\star\star\star}$ (0.0001)	0.00003 (0.00002)	$-0.0002^{\star\star\star}$ (0.00005)	0.00003 (0.00002)	0.000003 (0.00002)
$\frac{\text{fixed assets}}{\text{total assets}}$	-0.0005 (0.0003)	0.0010 (0.0007)	$-0.0006^{\star}$ (0.0003)	0.0011 (0.0007)	0.0011 (0.0007)
Operating Margin	-2.16×10^{-7} (2.77×10^{-7})	-4.58×10^{-8} (2.17×10^{-7})	-2.71×10^{-7} (2.79×10^{-7})	-6.38×10^{-8} (2.15×10^{-7})	-6.69×10^{-8} (2.15×10^{-7})
ln(MarketCap)	$-0.0273^{\star\star\star}$ (0.0034)	-0.0551 (0.0415)	$-0.0274^{\star\star\star}$ (0.0036)	-0.0528 (0.0411)	-0.0527 (0.0410)
First Shareholder	-0.0006 (0.0004)	0.0031 (0.0024)	-0.0005 (0.0004)	0.0029 (0.0021)	0.0029 (0.0021)
Second Shareholder	$-0.0038^{\star\star\star}$ (0.0007)	$0.0051^{\star}$ (0.0030)	$-0.0039^{\star\star\star}$ (0.0007)	$0.0050^{\star}$ (0.0029)	$0.0049^{\star}$ (0.0029)
Third Shareholder	0.0018 (0.0014)	0.0028 (0.0037)	0.0015 (0.0015)	0.0026 (0.0036)	0.0024 (0.0035)
Year Dummies	included	included	included	included	included
sample size	1,810	1,810	1,810	1,810	1,810
R^2, within		0.0734		0.0784	0.0783
R^2, between		0.0320		0.0331	0.0321
R^2	0.0923	0.0340	0.0956	0.0339	0.0315
hypothesis testing					
$\mathbb{H}_0\colon\ [0,20) \leq [20,100]$					0.1312
$\mathbb{H}_0\colon\ [0,20) \leq [20,50]$				0.0670	
$\mathbb{H}_0\colon\ [20,50) = [50,100]$				0.8222	

Table 5. Varying the intervals of the government's equity holdings

In every specification, the voting premium is the dependent variable and the independent variables of interest are the interactions of the fraction of loans from government-controlled banks, $\frac{\text{gov loans}}{\text{total loans}}$, with dummy variables, $GOV[a,b)$, which take value one if, at quarter t, firm i's voting shares under the government's control lie in the interval $[a,b)$. We also include fixed effects and year dummies, as well as the other controls in Table 4. $\star\star\star$, $\star\star$, and $\star$ denote statistical significance at one, five and ten percent, respectively. Robust standard-errors are in parentheses. We also report the p-values of the Wald tests for restrictions on the coefficients of the interaction terms involving the dummy variables $GOV[a,b)$. The alternative hypotheses are just the negation of the null hypotheses we state in the first column.

	Model 4	Model 5	Model 6	Model 7
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,10)$	-0.3371 (0.4332)			
$\frac{\text{gov loans}}{\text{total loans}} GOV[10,20)$	-0.4125 (0.3746)			
$\frac{\text{gov loans}}{\text{total loans}} GOV[20,50)$	$-0.7769^{\star}$ (0.4182)			
$\frac{\text{gov loans}}{\text{total loans}} GOV[50,60)$	-0.7148 (0.4643)			
$\frac{\text{gov loans}}{\text{total loans}} GOV[60,100]$	-0.7144 (0.4499)			
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,10)$		-0.3582 (0.4209)		
$\frac{\text{gov loans}}{\text{total loans}} GOV[10,100]$		-0.6110 (0.3734)		
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,30)$			-0.3405 (0.4284)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[30,100]$			-0.7209 (0.4814)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,40)$				-0.3364 (0.4273)
$\frac{\text{gov loans}}{\text{total loans}} GOV[40,100]$				-0.6870 (0.4497)
sample size	1,810	1,810	1,810	1,810
R^2, within	0.0785	0.0762	0.0767	0.0767
R^2, between	0.0337	0.0364	0.0326	0.0319
R^2	0.0313	0.0353	0.0340	0.0338
hypothesis testing				
$\mathbb{H}_0\colon\ [0,10) = [10,20)$	0.6089			
$\mathbb{H}_0\colon\ [20,50) = [50,60)$	0.8469			
$\mathbb{H}_0\colon\ [50,60) = [60,100]$	0.9967			
$\mathbb{H}_0\colon\ [10,20) \leq [20,50)$	0.0840			
$\mathbb{H}_0\colon\ [0,10) \leq [10,100]$		0.1497		
$\mathbb{H}_0\colon\ [0,30) \leq [30,100]$			0.2162	
$\mathbb{H}_0\colon\ [0,40) \leq [40,100]$				0.2036

Table 6. Varying the computation of the voting shares under the government's control

In the benchmark criterion for computing the government's fraction of voting shares, we sum the voting shares of the government with the voting shares of the firm in the next layer of the pyramid, provided that the government controls (directly or indirectly) at least 20% of the voting shares of the latter firm. In this table we report the results of Fixed Effect regressions, considering two alternative criteria for computing the government's fraction of voting shares. The criterion *last link* ≥ 10 is equal to the benchmark one, except that the threshold for considering the next firm's voting shares is 10%. In the *weakest link* criterion, the voting shares under the government's control is the sum of its voting shares in the firm with the minimum fraction of voting shares it owns in any layer of the pyramid. In every regression, the voting premium is the dependent variable and the independent variables of interest are the interactions of the fraction of loans from government-controlled banks, $\frac{\text{gov loans}}{\text{total loans}}$, with dummy variables, $GOV[a,b)$, which take value one if, at quarter t, firm i's voting shares under the government's control lie in the interval $[a,b)$. We also include fixed effects and year dummies as well as the other controls in Table 4. $\star\star\star$, $\star\star$, and $\star$ denote statistical significance at one, five and ten percent, respectively. Robust standard-errors are in parentheses. We also report the p-values of the Wald tests for restrictions on the coefficients of the interaction terms involving the dummy variables $GOV[a,b)$. The alternative hypotheses are just the negation of the null hypotheses we state in the first column.

	last link $\geq 10\%$		weakest link	
	Model 2	Model 3	Model 2	Model 3
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,20)$	-0.3097 (0.4211)		-0.4823 (0.4075)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[20,50)$	$-0.7811^{\star}$ (0.4305)		$-1.1227^{\star\star}$ (0.5295)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[50,100]$	$-0.7784^{\star}$ (0.4624)		-0.2091 (0.4478)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,20)$		-0.3095 (0.4153)		-0.3449 (0.4221)
$\frac{\text{gov loans}}{\text{total loans}} GOV[20,100]$		$-0.7792^{\star}$ (0.4284)		$-0.7228^{\star}$ (0.4221)
sample size	1,810	1,810	1,810	1,810
R^2, within	0.0806	0.0806	0.0851	0.0783
R^2, between	0.0316	0.0316	0.0112	0.0332
R^2	0.0286	0.0286	0.0073	0.0315
hypothesis testing				
$\mathbb{H}_0$: $[0,20) \leq [20,100]$		0.0922		0.1312
$\mathbb{H}_0$: $[0,20) \leq [20,50]$	0.0601		0.0729	
$\mathbb{H}_0$: $[20,50) = [50,100]$	0.9931		0.0946	

Table 7. Varying the maximum voting premium

In this table, we estimate the voting premium models 2 and 3 considering four alternative cutoffs for excluding quarterly observations of the voting premium from the final sample: 180%, 160%, 140%, and 120%. In every regression, the voting premium is the dependent variable and the independent variables of interest are the interactions of the fraction of loans from government-controlled banks, $\frac{\text{gov loans}}{\text{total loans}}$, with dummy variables, $GOV[a,b)$, which take value one if, at quarter t, firm i's voting shares under the government's control lie in the interval $[a,b)$. We also include fixed effects and year dummies as well as the other controls in Table 4. $\star\star\star$, $\star\star$, and $\star$ denote statistical significance at one, five and ten percent, respectively. Robust standard-errors are in parentheses. We also report the p-values of the Wald tests for restrictions on the coefficients of the interaction terms involving the dummy variables $GOV[a,b)$. The alternative hypotheses are the negation of the null hypotheses we state in the first column.

Exclusions	Premium $\geq 180\%$		Premium $\geq 160\%$		Premium $\geq 140\%$		Premium $\geq 120\%$	
	Model 2	Model 3	Model 2	Model 3	Model 2	Model 3	Model 2	Model 3
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,20)$	-0.6652		-0.5499		-0.3667		-0.3883	
	(0.4983)		(0.4817)		(0.4271)		(0.3815)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[20,50)$	$-1.2280^{\star\star}$		$-1.0545^{\star\star}$		$-0.6792^{\star}$		-0.5247	
	(0.5450)		(0.5258)		(0.4067)		(0.3751)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[50,100]$	$-1.2618^{\star\star}$		$-1.0186^{\star}$		-0.5494		-0.3113	
	(0.5452)		(0.5440)		(0.4145)		(0.3805)	
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,20)$		-0.6571		-0.5478		-0.3581		-0.3701
		(0.4925)		(0.4747)		(0.4215)		(0.3783)
$\frac{\text{gov loans}}{\text{total loans}} GOV[20,100]$		$-1.2519^{\star\star}$		$-1.02797^{\star\star}$		-0.5939		-0.38801
		(0.5183)		(0.5116)		(0.3987)		(0.3759)
sample size	1,827	1,827	1,817	1,817	1,804	1,804	1,783	1,783
R^2, within	0.0775	0.0774	0.0833	0.0833	0.0731	0.0750	0.0588	0.0577
R^2, between	0.0402	0.0401	0.0312	0.0313	0.0254	0.0257	0.0228	0.0253
R^2	0.0340	0.0338	0.0294	0.0297	0.0349	0.0361	0.0265	0.0321
hypothesis testing								
$\mathbb{H}_0\colon\ [0,20) \leq [20,100]$		0.0801		0.1190		0.1669		0.4509
$\mathbb{H}_0\colon\ [0,20) \leq [20,50]$	0.0592		0.0693		0.0590		0.0929	
$\mathbb{H}_0\colon\ [20,50) = [50,100]$	0.9283		0.9203		0.5609		0.1916	

Table 8. Quantile effects

We report the quantile regression results for the first, second, and third quartiles in the columns 'Q1', 'median', and 'Q3', respectively. We estimate the voting premium model 2 for two alternative cutoffs for excluding quarterly observations of the voting premium, namely, 150% and 300%. In every regression, the voting premium is the dependent variable and the independent variables of interest are the interactions of the fraction of loans from government-controlled banks, $\frac{\text{gov loans}}{\text{total loans}}$, with dummy variables, $GOV[a,b)$, which take value one if, at quarter t, firm i's voting shares under the government's control lie in the interval $[a,b)$. We also include fixed effects and year dummies as well as the other controls in Table 4. $\star\star\star$, $\star\star$, and $\star$ denote statistical significance at one, five and ten percent, respectively. Figures in parentheses are bootstrap-based standard errors using 500 artificial samples. We display the minimum, mean and maximum values for the subsamples that restrict attention to the first and second quartiles under 'Q1', to the second and third quartiles under 'median', and to the third and fourth quartiles under 'Q3'. Finally, we report the p-values of the Wald tests for restrictions on the interaction coefficients. The alternative hypotheses are just the negation of the respective null hypotheses we state in the first column.

Exclusions		Premium $\geq 150\%$			Premium $\geq 300\%$		
		Q1	median	Q3	Q1	median	Q3
$\frac{\text{gov loans}}{\text{total loans}} GOV[0,20)$		-0.1831 (0.2468)	-0.1602 (0.2522)	-0.4676 (0.3588)	-0.1431 (0.2423)	-0.1747 (0.2806)	$-0.6823^{\star}$ (0.3765)
$\frac{\text{gov loans}}{\text{total loans}} GOV[20,50)$		-0.4004 (0.2576)	-0.2962 (0.2778)	-0.5110 (0.4015)	-0.3654 (0.2722)	-0.3932 (0.3084)	$-0.9598^{\star\star}$ (0.4235)
$\frac{\text{gov loans}}{\text{total loans}} GOV[50,100]$		$-0.4737^{\star}$ (0.2631)	$-0.4906^{\star}$ (0.2895)	$-0.5486^{\star}$ (0.3969)	$-0.4822^{\star}$ (0.2698)	$-0.6167^{\star}$ (0.3280)	$-1.1267^{\star\star}$ (0.4408)
voting premium values	minimum	-0.8555	-0.0707	0.0431	-0.8555	-0.0021	0.0516
	mean	-0.0999	0.0595	0.3271	-0.0950	0.0702	0.4434
	maximum	0.0428	0.2347	1.4963	0.0515	0.2674	2.9692
sample size		1,810	1,810	1,810	1,861	1,861	1,861
pseudo R^2		0.5012	0.4982	0.5505	0.4803	0.4931	0.5681
hypothesis testing							
$\mathbb{H}_0\colon\ [0,20) \leq [20,50]$		0.0010	0.1092	0.4090	0.0621	0.1141	0.1468
$\mathbb{H}_0\colon\ [0,20) \leq [50,100]$		0.0181	0.0122	0.3471	0.0058	0.0209	0.0836
$\mathbb{H}_0\colon\ [20,50) = [50,100]$		0.6034	0.1845	0.8446	0.5092	0.1758	0.1673

Table 9. Placebo regressions

We estimate three placebo regressions using the voting premium model 2 for the sample that excludes voting premia above 150%. Placebo 1 replaces the dummy variables $GOV[a,b)$ in the interaction terms with similar variables based on the equity stake of the largest shareholder $S1[a,b)$. Placebo 2 uses the equity stakes of the three largest shareholders in privately controlled firms (i.e., government has no equity participation) instead of $GOV[a,b)$ in the interaction terms. Placebo 3 fixes the dummy variables $GOV[a,b)$ to their initial values in January 2008. In every regression for the voting premium, we include fixed effects and year dummies as well as the other controls in Table 4. $\star\star\star$, $\star\star$, and $\star$ denote statistical significance at one, five and ten percent, respectively. Figures within parentheses refer to robust standard errors. We also report the p-values of the Wald tests for restrictions on the interaction coefficients. The alternative hypotheses are the negation of the null hypotheses we state in the first column.

	Placebo 1	Placebo 2	Placebo 3
$\frac{\text{gov loans}}{\text{total loans}}\, S_1[0,20)$	0.0378 (0.3951)		
$\frac{\text{gov loans}}{\text{total loans}}\, S_1[20,50)$	-0.4460 (0.3910)		
$\frac{\text{gov loans}}{\text{total loans}}\, S_1[50,100]$	-0.4810 (0.3977)		
$\frac{\text{gov loans}}{\text{total loans}}\, GOV[0]S_1$		-0.0007 (0.0014)	
$\frac{\text{gov loans}}{\text{total loans}}\, GOV[0]S_2$		0.0044 (0.0067)	
$\frac{\text{gov loans}}{\text{total loans}}\, GOV[0]S_3$		-0.0070 (0.0103)	
$\frac{\text{gov loans}}{\text{total loans}}\, GOV[0,20)$			-0.398 (0.4472)
$\frac{\text{gov loans}}{\text{total loans}}\, GOV[20,50)$			-3.113 (2.6607)
$\frac{\text{gov loans}}{\text{total loans}}\, GOV[50,100]$			-0.194 (0.5706)
sample size	1,810	1,810	1,810
R^2, within	0.0769	0.0735	0.0809
R^2, between	0.0301	0.0360	0.0130
R^2	0.0374	0.0322	0.0400
hypothesis testing			
$\mathbb{H}_0\colon\ [0,20) \leq [20,50]$	0.0000		0.1611
$\mathbb{H}_0\colon\ [20,50) = [50,100]$	0.8456		0.2911
$\mathbb{H}_0\colon\ GOV[0]S_1 = GOV[0]S_2 = GOV[0]S_3$		0.7469	

Table 10. Vale's voting premium and the government's activism

We report the coefficient estimates and their robust standard errors in parentheses for the regression (13). Vale's voting premium is the dependent variable in every specification. Apart from year dummies, we control for the frequency of searches featuring 'Roger Agnelli' on Google trends, the VIX index, the relative liquidity of common shares, the price of iron ore in China, GDP growth (in %), and the proportion of voting shares that each of the three largest shareholders detains. We also tabulate the results of the Engle-Granger residual cointegration tests for each model. $\star\star\star$, $\star\star$, and $\star$ denote statistical significance at one, five and ten percent, respectively.

	Model 8	Model 9
$\frac{\text{gov loans}}{\text{total loans}}$	$-0.6373^{\star\star}$ (0.2476)	$-0.6286^{\star\star}$ (0.2481)
Agnelli		$0.0002^{\star}$ (0.0001)
VIX	-0.0005 (0.0003)	-0.0004 (0.0004)
$\frac{\text{total volume}^{V}}{\text{total volume}^{NV}}$	-0.0838 (0.0936)	-0.0638 (0.517)
price of iron ore	$0.0004^{\star\star}$ (0.0002)	$0.0004^{\star\star}$ (0.0002)
First Shareholder	0.0290 (0.0367)	0.0293 (0.0362)
Second Shareholder	dropped	dropped
Third Shareholder	dropped	dropped
D2009	$0.0290^{\star}$ (0.0152)	$0.0309^{\star\star}$ (0.0151)
D2010	0.0015 (0.0213)	0.0033 (0.0217)
D2011	$-0.0477^{\star\star}$ (0.0215)	$-0.0498^{\star\star}$ (0.0216)
D2012	$-0.0904^{\star\star\star}$ (0.0273)	$-0.0881^{\star\star\star}$ (0.0273)
constant	-1.1163 (1.9193)	-1.1507 (1.8959)
sample size	60	60
R^2	0.9064	0.9092
Engle-Granger residual cointegration test	$-4.141^{\star\star\star}$	$-4.322^{\star\star\star}$