Bailout of Strategic Industry Firms: Government Target Selection Decisions and their Consequences

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Abstract

This paper investigates the rationale and impact of the government debt subsidization program implemented in Russia after the 2008 financial crisis. Using a sample of 372 strategic industry firms that were eligible for government assistance, we study the factors that influenced the allocation of subsidies. Our results show that the likelihood of a firm being subsidized is positively related to poor financial and operating performance in the pre-crisis period. We also find that strategic industry firms located in small cities with low alternative employment opportunities and firms based in regions where the federal government-appointed governors were fired after the crisis apparently over poor economic results were more likely to receive subsidies. Taken together, these results suggest that the implementation of the debt subsidization program was largely motivated by political considerations and aimed at preventing bankruptcies of strategic firms and potential social unrest that may result from such bankruptcies above all in the most economically vulnerable parts of the country. We also examine whether the government assistance enhanced the performance of recipient-firms in the post-crisis period. Using propensity score matching and a difference-in-difference framework, we do not find strong evidence that the subsidy recipients significantly increased their investments relative to matched non-recipients.

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Introduction

During severe shocks to a country's financial system, governments often subsidize firms that are dependent on external financing and that are considered crucial to national economy. Both policy-makers and academics have raised concerns about the desirability and consequences of such government-managed capital reallocations, which benefit a particular group of firms. The objective of this paper is to contribute to a better understanding of the effectiveness and impact of government subsidy programs by examining two questions: a) what financial and socioeconomic factors determine the choice of firms to which government funding is allocated; and b) whether the government aid enhances the performance of firms. We address these questions by taking advantage of a unique dataset on the outcomes of the subsidization program that was implemented by the Russian government during the 2009 crisis period. The program used resources accumulated in the National Reserve Fund and allocated assistance to non-bank firms in the form of *interest payment subsidies* on existing private bank loans or *loan guarantees* on new loans in state banks. Given the exogenous nature of the 2009 crisis, which was set off by the collapse of the Lehman Brothers, it presents an ideal experimental setting for examining the implementation of a government initiated subsidization program to firms experiencing an adverse credit supply shock.

When studying the government's agenda for providing assistance to firms we narrow down the focus to strategic industries. As demonstrated by Boubakri et al. (2005, 2009) state ownership in strategic industries tends to be high in non-developed countries, and this is the case with respect to the sample of firms used in our study[1]. This is helpful for the purposes of our study since it has been argued that the selection of private firms for government subsidies could be influenced by firms' political connections with state bureaucrats responsible for the distribution of funds (Faccio et al. (2006)). Focusing on strategic firms with a significant government ownership and with equally high socio-economic value allows us to control for this variable. Our data set presents a good opportunity to exploit variation across subsidy recipients that operate within the same legal and institutional environment and are at the same stage of

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[1] The median firm in our sample has 100% government ownership.

the business cycle and to isolate firm-specific characteristics that could affect government's agenda for allocating subsidies.

What drives government assistance to the private sector? According to Frye and Shleifer (1997), a common mode of government interaction with firms in emerging market economies can be described as the "helping-hand" model in which the government uses its power to promote private economic activity. Within the "helping-hand" model, one can distinguish between cases when government interventions are designed to address market failures following unforeseen external negative shock and cases when the "helping-hand" is extended to *a priori* troubled firms that have experienced financial difficulties before the shock. In our study, we examine the applicability of these two sub-models. We find that the allocation of government subsidies was significantly affected by the average pre-crisis financial performance of the firm-recipients: low interest rate coverage and high leverage in the pre-crisis period are significantly associated with the probability of receiving government assistance and with the size of the assistance received.

In an environment where the distribution of government subsidies is implemented through a top-down policy, as was the case in Russia, the desire of high-level political executives to retain popular support and be re-elected could be a significant factor influencing such programs. By helping financially constrained strategic firms to stay afloat, politicians may seek to prevent the possibility of social unrest caused by massive bankruptcies (Shleifer and Vishny 1994)). The political cost of the bankruptcy of a strategic firm should to depend on the firm's location and the size of the city where it is based. The direction of this relationship is likely to be non-linear. On the one hand, as small cities have lower alternative employment opportunities and a higher potential for social discontent in the case of the bankruptcy of a strategic firm, it can be expected that firms located in such cities are likely to benefit from government subsidies[2]. One the other hand, as argued by Agrawal and Knoeber (2001), as well as Boubakri et al. (2008), a firm located in a major regional-level city is likely to be considered more politically connected and can

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[2] The phenomenon of "one-company towns" is particularly pervasive in Russia due to the Soviet command economy legacy (Commander et al. (2011)). For example a May 2009 protest in the small town of Pikalevo against the shutdown of a local factory received a lot of media coverage and resulted in the direct involvement of the prime minister (See Galpin 2009, BBC News).

therefore be expected to be likely to receive government subsidies. In order to examine this non-linear relationship, we create dummy variables for different city size brackets. Consistent with both predictions, we find that firms from small towns and firms from major regional cities were more likely to be government aid recipients than firms located in Moscow or St. Petersburg.

Another factor that ties the political value of firms to their location is related to the appointment of regional governors. In 2004 a scheme was introduced in Russia whereby regional governors are appointed by the president and act like regional chief executives (Fry et al. (2011)). The firing of governors is usually associated with poor regional economic performance, which is an issue that gets special attention prior to parliamentary or presidential elections. Nye and Vasilieva (2012) demonstrate that appointments of new governors are associated with higher government spending for those regions. We create dummy variables for the regions where new governors were appointed before the crisis and for the regions where new governors were appointed in the post-crisis period. We find that firms located in regions with post-crisis governor appointments are more likely than others to be the recipients of subsides during the crisis. This suggests that the government allocated subsidies to firms from economically troubled regions where the governors were later fired for poor performance on economic issues.

When addressing the second question of the study concerning the consequences of the government assistance, we take our starting point in the predictions of Rajan and Subramanian (2007), who argue that external aid may have a contradictory impact on aid-recipients. On the one hand, aid can mechanically increase output. On the other hand, aid can damage corporate governance and, thereby, eventually negatively affect output. The task of empirically determining the impact of bailout funding on the post-crisis performance of firms may be complicated by endogeneity problems. In order to mitigate such concerns, we apply the difference-in-difference method and compare strategic firms-recipients (the treated group) with a matched set of strategic non-recipients (the control group). In order to form a proper set of control firms, we employ the propensity score matching estimator (Zhao (2004); Roberts and Whited (2011)) and observable pre-crisis characteristics of the subsidy recipients such as their size, leverage, industry affiliation and regional location. We find that the firms belonging to the treated group significantly decreased their construction-in-progress relative to the control firms

in the post-crisis period. At the same time, the firms in the control group significantly increased their cash holding relative to the treated group. These findings indicate that while the subsidization program did not have a strong positive effect on investments of the recipient-firms, firms without access to government funding had to increase their precautionary cash holdings possibly to buffer further adverse shocks.

Our study contributes to several strands of academic literature. First, we contribute to studies that explore the economic rationale of government involvement in private economy (Shleifer and Vishny 1994); Frye and Shleifer (1997); Lerner (1999)). In particular, our work is related to studies that examine state involvement in strategic industries during privatization (Boubakri et al. (2009)) and during nationalizations (Chernykh (2011)). We contribute to this literature by conducting a direct testing of the "helping-hand" hypothesis and by looking into factors that characterize strategic firms in terms of their pre-crisis financial performance and in terms of their social regional importance.

Second, our work complements the literature which studies how the political economy of firms with a significant state ownership affects firms' performance (Boubakri et al. (2008); Boubakri et al. (2011)). We demonstrate that firms located in regions with higher political costs of social unrest are more likely to be government subsidy recipients.

Finally, our work is related to studies that explore the impact of government implemented bailout programs during the recent financial crisis (e.g., Duchin and Sosyura (2011, 2012); Black and Hazelwood (2013); Brunnermeier et al. (2011); Igan et al. (2012)). All previous studies, however, explore government crisis assistance allocated to the banking sector, which was the principal recipient of such assistance in developed countries.[3] This highlights the uniqueness of our dataset, which provides information on direct assistance to non-banking companies through interest payments subsidies or loans guarantees.

The remainder of the paper is organized as follows: section 2 describes the background of the subsidization program benefiting Russian strategic firms; section 3 describes the data set and

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[3] A notable exception was the $25 billion Advanced Technology Vehicles Manufacturing (ATVM) Loan Program approved by the US Congress in 2008, with the purpose of supporting vehicle manufacturing in the U.S. However, the small number of auto firms that benefited from this program precludes a substantive econometric study.

provides summary statistics; section 4 reports main empirical results; and section 5 provides conclusions.

2. Background of the Russian government firm subsidization program

After the collapse of the Lehman Brothers, the CDS spreads on Russian debt skyrocketed. This resulted in a sudden stop of foreign borrowing, which up to that point had been a significant source of funding for the domestic banking system. Capital misallocations in the financial system led to a precipitous fall in the manufacturing sector. As can be seen from Figure 1 in the Appendix, in the last quarter of 2008, the seasonally adjusted aggregate manufacturing index fell by 15%. Following these developments, the Russian government initiated an anti-crisis program by using resources accumulated in the National Reserve Fund in 2006-2008. The anti-crisis program was implemented over the course of 2009 and allocated assistance to financial institutions, regions and non-bank firms. The government aid to non-bank firms was provided in the form of *loan guarantees through state banks* and *interest payment subsidies*. Information about the identity of recipients, and the size and type of aid can be found in a report on "Anti-crisis Measures for 2009" that was published by the Ministry of Economic Development in 2010.

- *Loan guarantees* were given on new loans taken by firms in the largest state-owned banks, including Sberbank, VTB, VEB, Gazprombank and Rosselhozbank. In accordance with Federal Law № 204 adopted on November 24, 2008, loan guarantees were given for the purpose of "general production activities, investments or repayment of previously taken credit".

- Under a program launched by the Ministry of Industry and Trade as of December 31, 2008, *interest payment subsidies* were made for the purpose of reducing the financing costs of loans taken by targeted companies over 2005-2010. The government allocated funds equivalent to 300 mln. USD (the amount was increased twice in 2009) for subsidizing part of the interest costs on such loans taken by manufacturing firms in Russian and foreign banks to invest into new equipment. In accordance with the conditions of the program, the subsidies could not exceed two third of the firm's interest rate costs during the period for which subsidy was provided. Both old and new loans could be subsidized. Another eligibility requirement was absence of federal tax delinquencies.

3. Summary statistics and data description

Presidential Decree № 1009 adopted on August 4, 2004 assigned a special "strategic" status to 1063 firms. According to the decree, the firms benefiting from this status are those that "produce goods and services of first national priority". All these strategic firms are registered as either joint stock companies (JSCs) where government ownership varies from 26 % to 100% or as federal government unitary enterprises (FGUEs) with 100% government ownership.

Over the period 2004-2008, the government repeatedly added and excluded firms from this list. We use the 2008 update of the official strategic firms list and match it with firm level data obtained from the Ruslana database provided by the Bureau van Dijk. The data includes annual unconsolidated accounting data of firms registered in Russia for the 2006-2011 period. As outlined above, in accordance with the criteria for the distribution of government subsidies, only manufacturing firms were eligible for government aid. According to this criterion we exclude strategic firms that according to ISIC Rev.4 codes do not belong to the manufacturing sector[4].

Being left with a list of 372 strategic firms eligible for government aid, we match it with the list of aid recipients published in the government report on "Anti-crisis Measures for 2009" and obtain 71 firms that received interest rate subsides and 11 firms that received loan guarantees at state banks. Because all strategic firms were assigned special status long before the crisis, the sample-selection bias concerns are reduced. This setting allows us to test how the pre-crisis financial and operating performance of strategic firms affected the government's choice of subsidy recipients during the crisis.

3.1 Industry representation of strategic firms in the debt subsidization program

The summary statistic of strategic firms' industry affiliation according to the 3 digits ISIC primary industry codes is reported in Table A1 in the appendix. The table includes numbers of strategic firms belonging to each industry and the number of aid-recipients during the subsidization program. As can be seen from the third and fifth columns of the table, industries

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[4] We exclude firms belonging to the following industrial sectors: agricultural and food products (011-031); production of electricity, gas and oil (351-353); construction (410-439); transportation and storage (491-532); media and entertainment (900-932).

which were strongly represented in the program were: defense, manufacture of air and spacecraft, and manufacture of ships and boats industries. Columns four and six report average industry-specific help to pre-crisis assets ratios. As can be seen from the bottom of the table, the average *loan guarantees* received in 2009 accounted for 26.05% of the firm-recipients pre-crisis assets, while average *interest payment subsides* accounted for 19.51% of the firm-recipients the pre-crisis assets. This means that government help was quite sizable and is likely to substantially have relieved the financial constraints of firms.

One can see that while the *interest payment subsidy* recipients come from all eligible industries *loan guarantees* recipients were chosen from firms operating in defense, manufacture of air and spacecraft, and manufacture of ships industries. This suggests that in a formal regression analysis for loan guarantee recipients we should use only firms from these industries as a reference category.

3.2 Univariate analysis of the strategic firms' pre-crisis financials

Table A3 reports univariate results for a wide selection of financial ratios that characterize firms' performance during the pre-crisis period. We use the following firm-specific indicators which are: 1) *Firms size* measured by total assets; 2) *Total Debt-to-assets ratio* = Total debt/Assets; 3) *Interest coverage* =EBIT/ Interest paid. This indicator determines the number of times a firm can make its interest payments with its earnings before interest and taxes; 4) *Return-on-assets*= EBIT/ Assets (ROA); 5) *Asset turnover* = Total revenue/Assets. This indicator measures a firm's efficiency at using its assets in generating revenue; 6) Cash-to-assets ratios=Cash/Assets; 7) Tangibility=Total Fixed Assets/Assets; 8) Construction-In-Progress / Assets; 9) Inventory-to-revenue ratio; 10) Government ownership stake.

All firm characteristics are calculated as averages over 2006-2008 annual values of corresponding ratios. Mean difference t-test (median difference z-test) for recipients – non-recipients comparison uniformly suggest that the Russian government choice of picking the potential interest subsidies and loan guarantee recipients during the 2009 crisis was dictated by the pre-determined financial and operating performance of strategic firms.

4. Empirical Strategy

4.1. Pre-crisis performance of firms and government subsidies selection process

As the non-parametric analysis above suggests, one can expect the financial performance across firms to be a significant criterion for choosing aid recipients among strategic firms. We employ standard LOGIT and TOBIT specifications for studying the determinants of the subsidies allocation decisions. LOGIT specification captures incidence of strategic firm-recipients of government aid, while TOBIT specification uses Help-to-assets ratio as a dependent variable. Help-to-assets ratio stands either for *Loan guarantee/Assets*, *Interest payment subsidy/Assets* where for each firm we take the amount of help received in 2009 with respect to average 2006-2008 assets*.*

Table 1 reports LOGIT and TOBIT specifications that include financial, environment/political variables and industry dummies. Duchin et al. (2010) argue that firms' pre-crisis decisions on the structure of the balance sheet are uncorrelated with the crisis-period demand shocks. This logic implies that the identification strategy free of the endogeneity bias. In our case all independent variables (except dummies) are calculated as firm specific averages over 2006-2008 annual values of corresponding ratios. This specification allows us to test the hypothesis if the government aid was distributed to firms that experienced negative shock during the crisis or to *a priori* troubled firms.

We run separate cross-section regressions for the sample of firms eligible for interest rate subsidies and firms eligible for loan guarantees. The left panel of the table presents results for the entire sample of strategic firms eligible for the interest rate subsidies. The right panel presents results for the sample of firms that belong to defense, manufacture of air and spacecraft and manufacture of ships industries that were recipients of the loan guarantees. For robustness we repeat our analysis on sub-samples that excludes Moscow-based strategic firms.

Figures 3 and 4 in the appendix illustrate the geographical distribution of strategic firms and government aid recipients across Russian regions. This graphical analysis suggests that firms are randomly scattered across the regions. Nevertheless, in order to avoid the within-regional correlation we cluster standard errors at the regional level.

Pre-crisis performance of firms

Our estimates for the characteristics of the firms' indebtedness yield interesting results. Estimates on both *Debt-to-asset* and *Interest coverage* suggest that firms with that relied on external financing by raising new debt in a pre-crisis period and firms facing higher interest payments are more likely to be the government aid recipients. However, the debt-to-asset variable is uniformly significant across different specifications for the loan guarantee recipients while the interest rate coverage ratio is uniformly significant for the interest rate subsidy recipients. These results are consistent with the announced type of provided government help.

We have experimented with two measures of operating performance of the firm: *Return on assets = EBIT/Total Assets* and *Assets turnover growth = Revenue/Total Assets*. Both measures yield similar results and we report only estimates for *Assets turnover*.

[Table 1 about here]

As can be seen from left panel of Table 1 the greater the *Assets turnover* in a pre-crisis period, the lower probability to obtain interest rate subsidies in 2009, that is, firms that exhibited inferior operating performance in a pre-crisis period were more likely to get help, other things equal. For loan guarantee recipients the variable is not significant.

Both firm's Size and Tangibility are positively significantly associated with the probability of being a subsidy or loan guarantee recipient. For interest rate subsidy recipients Tangibility matters only for a sub-sample of regional firms.

The share of the state ownership is positively related to the likelihood of being an interest rate subsidy recipient and negatively with the likelihood of being a loan guarantee recipient. We interpret these results as follows: interest rate subsidies are provided on loans in commercial banks that could be private or foreign owned. Given negative credit supply shocks private banks would have an incentive to cut lending to all firms. In such environment firms with higher government ownership stake would be more likely to be selected by the government for subsidization. On the other hand loan guarantees are provided by the state banks at a cost below the market. In this case it is likely that private shareholders of strategic firms would have a strong incentive to obtain such loans, hence the higher the private ownership stake in strategic firms

the higher is the likelihood of a firm being a recipient of the loan guarantee from a state-owned bank.

Political/environment variables

As argued in the introduction an important factor that might affect the government's agenda in distributing aid to strategic firms is related to the desire to keep these firms afloat in order to prevent social unrest in case of massive bankruptcies.

In order to address this issue we create several dummy variables that capture possible political costs of such bankruptcies. First, we collect the data from Rosstat on the size of the cities where strategic firms are located. We create dummy variables for different city size brackets. As expected firms located in small town with low alternative employment opportunities are more likely to be interest rate subsidies and loan guarantee recipients relative to the reference group which includes firms located in Moscow or St. Petersburg. We also find that firms located in large regional cities are also more likely to be the interest rate subsidy recipients possibly because of the better political connections. The results are economically significant. For example for the entire sample of interest rate subsidy recipient's the average marginal effect for the small town dummy suggests that probability of firms located in small town to be the subsidy recipients is 8.1% higher than for firms located in the reference group. If a firm is located in a major regional city probability to be the interest rate subsidy recipient is 9.5% higher relative to firm from a reference group.

Secondly, we collect the data on all incidents of the regional governors firing and new governors' appointments in a pre-crisis and a post crisis period. We create a dummy which equals one if the firm is located in a region where the new governor was appointed during the pre-crisis 2006-2007 and another dummy variable if the firm is located in a region where the new governor was appointed in the post-crisis 2010-2011 period. We find that the post-crisis governor new appointment dummy is positively related to the likelihood of the firms being a loan guarantee recipient during the crisis. Since governors in Russia act as regional chief executives and are fired by the president for poor performance we interpret our coefficient estimates as an indicator of the fact that loan guarantee recipients were located in the troubled

regions where regional executives were later replaced. Average marginal effect estimate for the entire sample of the loan guarantee recipients suggests that if a firm is located in a region where the old governor was fired in the post-crisis period the probability to be a loan guarantee recipients is 6.5% higher relative to a firm from a reference group.

4.2 Post-crisis performance of strategic firms

Propensity score matching

In this part we address the second issue raised in the introduction whether the government aid enhances the performance of firms. In order to form a control group of firms out of a non-recipients sample we use a propensity score matching estimator (Zhao (2004); Roberts and Whited (2011); Almeida et al. (2012)) and firms' observable characteristics. We pursue an identification strategy used by Duchin et al. (2010) which relies on an assumption that pre-bailout decisions made by firms with respect to their capital ratios are not positively correlated with unobserved firm-specific demand shocks during the post-crisis period. Using a sample of 301 eligible strategic firms that did not receive interest rate subsidies, we form a subsample of 71 control firms that match observable characteristics of 71 strategic firms that received government subsidies in 2009. We employ logit single nearest-neighbor specification without replacement and take average pre-crisis 2006-2008 values of the following variables: Log of total asset, Return on assets, Total Debt/Assets, Industry dummies and regional location dummies.

[Table 2 about here]

Table 2 reports mean-comparison t-test for difference between "treated" and "control" samples before and after matching. As can be seen from the last column after matching the difference between treated and control groups is statistically insignificant for all variables.

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Difference-in-difference estimation results

Using the difference-in-difference (D-in-D) estimator, we investigate if firms belonging to the "treated" group behaved differently from those in the "control" over the post-crisis 2010-2011 period. The specification of the D-in-D method can be found in Bertrand et al. (2004).

$$Y_{i\tau} = \alpha + \beta_1 TREAT + \beta_2 \tau + \beta_3 (\tau \times TREAT) + \beta_4 X_{i\tau} + \varepsilon_{i\tau} \tag{1}$$

where indictor variable TREAT takes value 1 if a firm belongs to a "treated" group and 0 if "control". This variable captures possible differences between the two groups prior to the subsidization program. The indicator variable τ takes value 1 if observations belong to the post-crisis 2010-2011 period and 0 if they belong to the pre-crisis 2006-2008. This variable captures aggregate factors that would change in *Y* even in the absence of a bailout. The main coefficient of interest is on the interaction term β_3. It captures all variation in outcome variables specific to the treatments (relative to controls) in the period after the subsidization program (relative to the period before).

$Y_{i\tau}$ - represents outcome variables, which measure firms' performance. $X_{i\tau}$ - represents a set of variables, which control for unobserved variation in investment opportunities across treated and control groups of firms. At this stage we include firms' size, Industry dummies, Geographic region dummies and the size of the government ownership.

The estimation results of difference-in-difference tests are reported in Table 3. Columns (1) and (2) report key pre-crisis financial ratios for firms recipients (treated) and matched non-recipients (control). As one can see from column (3) treated and control firms were not significantly different from each other during the pre-bailout period along all variables.

[Table 3 about here]

The most interesting results could be found in columns (6)–(9) which cover the difference between the treated and control groups in a post-crisis period. As can be seen from column (6) firm that received interest rate subsides exhibited inferior financial performance relative to control firms during the post-crisis period. However, as can be seen from columns (7) and (9)

only construction-in-progress and cash-to-assets are statistically significant for difference-in-difference interaction term.

The reduction of the construction-in progress without a significant increase in fixed assets could be interpreted differently. On the one hand it could suggest that firms that received government subsidies were able to finish up their unfinished construction projects. On the other hand the decline in *Construction-in-progress/Assets* ratio in a post-crisis period could suggest that firms-recipients did not start new construction.

A strong result on cash-to-assets indicates that firms that did not receive government subsides significantly increased their cash holdings, possibly for precautionary reasons.

We repeat our analysis for the loan guarantee recipients sub-sample and report the results in table 4. Consistent with the results for interest rate subsidies we do not find strong empirical evidence that strategic firms that received government aid significantly increased their investment into fixed assets as was announced under the eligibility criteria of the government subsidization program.

[Table 4 about here]

5. Conclusions

Our results can be summed up as follows. The first question of our study dealt with investigating what financial and socioeconomic factors matter for the government when it chooses the subsidy recipients. We find that the government first took into account, the industrial background and performance of firm – the worse was the firm's pre-crisis performance, the higher were the chances for a firm to be chosen. For example lower assets turnover and higher leverage of the strategic firms in a 2006-2008 pre-crisis period, are positively associated with the probability of receiving government aid in 2009. We also find that strategic industry firms located in small cities with low alternative employment opportunities and firms based in regions where the federal government-appointed governors were fired after the crisis apparently over poor economic results were more likely to receive government aid. Taken together, these results suggest that the implementation of the debt subsidization program was largely motivated by political considerations and aimed at preventing bankruptcies of strategic firms and potential

social unrest that may result from such bankruptcies above all in the most economically vulnerable parts of the country.

The second set of tests investigated the post-crisis performance of recipients versus non-recipients. The control sample of non-recipients was formed by the propensity score matching estimator from a broad sample of non-recipients with the objective to match the observable characteristics of treated and control groups. In a difference-in-difference framework we find that consistent with a subsidization program structure, which subsidized firms' interest payments and guaranteed new loans, the aid recipients significantly increased their debt in a post-crisis period. Contrary to what one could expect following the subsidization program the recipient firms did not increase investment into tangible fixed assets. The further research will be directed at investigating what factors drive these results.

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6. Appendix A

Figure 1. Dynamics of the seasonally adjusted manufacturing index
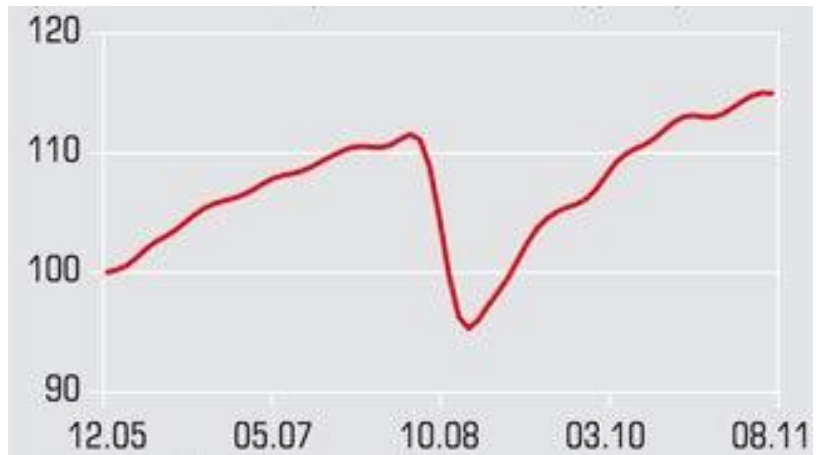
Source: Rosstat

Figure 2. Dynamics of the National Reserve Fund
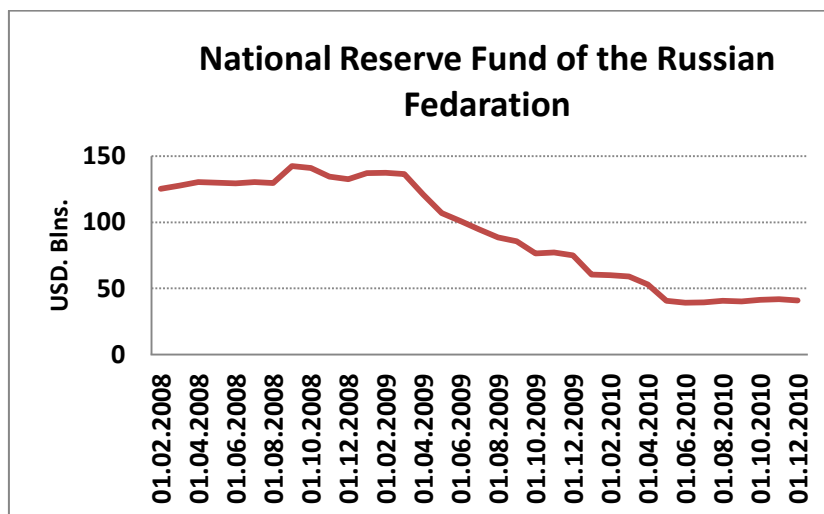
Source: Ministry of Finance of the Russian Federation

Figure 3. Distribution of strategic companies across Russian regions

This map shows the distribution of the strategic companies by quartiles. The darkest color represents the upper quartile (6-127 strategic firms per region), the lightest color represents the first quartile (1-2 strategic firms per region).

Figure 4. Distribution of strategic bailout recipients across Russian regions

This map shows the distribution of the strategic companies that received any form of government assistance by terciles. The darkest color represents the upper tercile (2-20 bailout recipients per region), the lightest color represents the first tercile (1 bailout recipient per region).
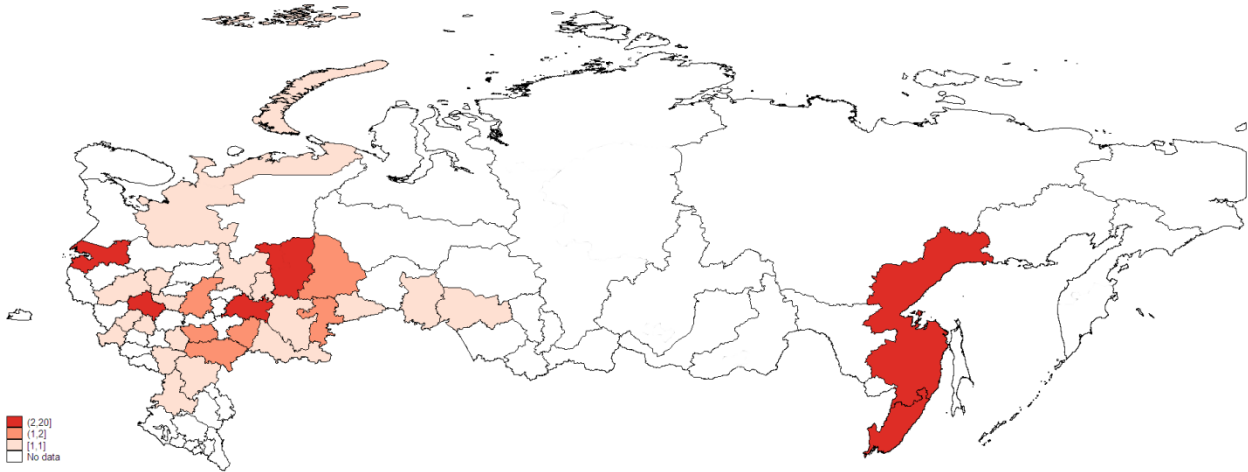
Table A1. Distribution of strategic companies and subsidy recipients across industries

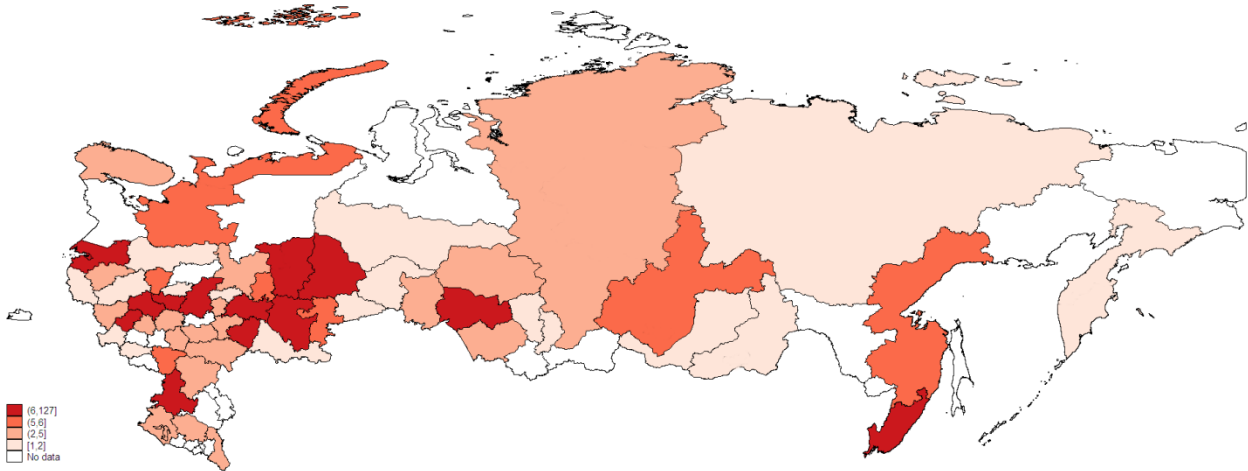| Industrial sector	ISIC Rev. 4 codes	Total number of firms	Number of firms receiving interest payment subsidies	Interest payment subsidies/ Pre-crisis Assets (%)	Number of firms receiving loan guarantees	Loan guarantees/Pre-crisis Assets (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Chemicals; rubber and plastic; Basic and fabricated metals	201-203; 221-222; 241-259	32	5	26.06	0	
Manufacture of communication equipment	263; 273	33	2	10.05	0	
Manufacture of measuring, testing equipment	265	45	6	21.97	0	
Manufacture of electric motors, generators, transformers	271	32	1	0.07	0	
Manufacture of machinery and motor vehicles	281-282; 291-293	16	4	10.60	0	
Manufacture of ships and boats	301	9	8	13.65	2	15.79
Manufacture of railway locomotives	302	3	1	0.05	0	
Manufacture of air and spacecraft	303	44	13	2.58	4	49.18
Scientific research and development	721	77	4	5.53	0	
Defense	202; 261-263; 301; 304; 721	81	27	33.16	5	9.49
		372	71	19.51	11	25.07

Notes: The third column reports a number of strategic firms that belong to each industry. Columns (4) and (6) report a number of subsidy and loan guarantee recipients within each industry respectively. Industries are assigned by the ISIC primary codes. The Defense industry has been manually assigned by checking companies' web-sites and official filings. Columns (5) and (7) report averages of help size-to-assets across the firms recipients of a given industry. Size of interest payment subsidies, loan guarantees for each strategic firm are taken from the "Government Report on Anti-crisis Measures for 2009" published by the Ministry of Economic Development. Government aid was distributed in 2009. Pre-crisis assets are determined as follows: Pre-crisis Assets= (Assets2006+Assets2007 +Assets2008)/3.

Table A2. Descriptive statistics of the pre-crisis strategic firms' characteristics

	Mean	Sd. Dev.	Min	Median	Max	N. obs.
Interest payment subsidies/ Assets	0.195	0.610	0.001	0.020	0.659	71
Loan guarantees/ Assets	0.251	0.265	0.021	0.168	0.780	11
Total assets, mln. RUB	4525.6	21536.5	52.8	599.1	266448.5	372
Total fixed assets/ Assets	0.272	0.172	0	0.239	0.777	372
Construction-In- Progress / Assets	0.045	0.075	0	0.019	0.459	372
Total debt/ Assets	0.144	0.178	0	0.067	0.781	372
Long term debt/Assets	0.065	0.113	0	0.021	0.703	372
Short term debt/Assets	0.078	0.118	0	0.021	0.602	372
Interest coverage	40.155	122.154	-55.164	2.490	942.90	372
ROA	0.077	0.080	-0.141	0.064	0.367	372
Assets turnover	1.052	0.713	0.080	0.886	4.292	372
Cash/Assets	0.084	0.101	0	0.046	0.467	372
Inventory/Revenue	0.515	0.617	0.003	0.344	3.941	372
State ownership share	0.733	0.315	0.255	1	1	372
City population, thousand	4080.77	4428.97	7.50	1280.40	10509.00	372
Post-crisis regional governor appointment	0.161	0.368	0	0	1	372
Pre-crisis regional governor appointment	0.078	0.268	0	0	1	372

Note: The table reports summary statistics for the variables that characterize strategic firms eligible for the government subsidization program. For each firm we first calculate the average over 2006-2008 period and then take the cross-section pre-crisis average. Help-to-Assets variables are calculated for recipients only, where for each firm we take the amount of help received in 2009 with respect to average 2006-2008 assets.

Table A3. Univariate tests for pre-crisis firms' characteristics between government subsidies recipients and non-recipients

	Subsidy non-recipients (301 firms)		Subsidy recipients (71 firms)		Difference tests (Non-recip.-Recip.)		Guarantee non-recipients (117 firms)		Guarantee recipients (11 firms)		Difference tests (Non-recip.-Recip.)	
	Mean	Median	Mean	Median	t-test	Wilcoxon z-test	Mean	Median	Mean	Median	t-test	Wilcoxon z-test
Total assets, mln. RUB	3335.16	489.21	9572.40	3155.95	-2.21**	-6.46***	4902.74	1050.73	19075.19	8382.77	-3.31***	-4.24***
Total fixed assets/ Assets	0.28	0.27	0.23	0.19	2.26**	2.54**	0.19	0.16	0.15	0.17	0.84	0.46
Construction-In-Progress / Assets	0.05	0.02	0.04	0.03	0.36	-2.64**	0.03	0.02	0.03	0.03	0.30	-1.07
Total debt/ Assets	0.12	0.05	0.26	0.21	-6.25***	-6.18***	0.18	0.13	0.51	0.48	-6.19***	-4.55***
Interest coverage	49.59	3.76	1.88	0.86	2.98***	3.93***	22.83	2.55	0.57	0.65	0.98	2.68**
ROA	0.09	0.07	0.03	0.03	5.91***	5.71***	0.07	0.06	0.01	0.02	3.03***	3.47***
Assets turnover	1.15	0.99	0.64	0.58	5.57***	7.15***	0.92	0.80	0.46	0.37	2.22**	2.98***
Cash/Assets	0.09	0.05	0.04	0.02	3.84***	4.39***	0.08	0.05	0.03	0.02	1.75*	2.20**
Inventory/Revenue	0.42	0.31	0.92	0.68	-6.52***	-7.11***	0.71	0.45	1.34	1.31	-2.47**	-2.80***
State ownership share	0.73	1.00	0.74	1.00	-0.30	-0.09	0.68	0.70	0.54	0.45	1.35	1.49
Post-crisis regional governor appointment	0.15	0.00	0.23	0.00	-1.63*	-1.63*	0.18	0.00	0.36	0.00	-1.86*	-1.85*
Pre-crisis regional governor appointment	0.07	0.00	0.10	0.00	-0.72	-0.72	0.09	0.00	0.09	0.00	-0.16	-0.16

Notes: Interest rate subsidy non-recipients are defined as all strategic firms eligible for government aid that did not receive the interest rate subsidies. Loan guarantee non-recipients are firms that belong to Defense, Manufacture of air and spacecraft and Manufacture of ships industries that did not receive loan guarantees in state banks. All firm characteristics are calculated as an average over 2006, 2007, 2008 annual values of corresponding ratios. *, **, and *** denote significance at the 10%, 5% and 1% respectively. The difference tests report t-test (Wilcoxon rank sum z tests) values for the difference in means (medians) between non-recipients and recipients

Empirical Results

Table 1. Firm characteristics and the strategic firms' debt subsidization program

The left panel of the table presents results for the entire sample of strategic firms eligible for the interest rate subsidies. The right panel presents results for the sample of firms that belong to Defense, Manufacture of air and spacecraft and Manufacture of ships industries that were recipients of the loan guarantees. All independent variables (except dummies) are calculated as an average over 2006, 2007, 2008 annual values of corresponding ratios. In order to control for the intra-regional correlation we cluster standard errors at the regional level.

	Interest rate subsidy recipients				Loan guarantee recipients			
	Entire sample		Excluding Moscow		Entire sample		Excluding Moscow	
	LOGIT[a]	TOBIT[b]	LOGIT	TOBIT	LOGIT	TOBIT	LOGIT	TOBIT
Firm variables								
Firm size (log assets)	0.302***	0.027	0.351**	-0.019	1.297***	0.179**	0.898*	0.147
	(0.068)	(0.028)	(0.146)	(0.053)	(0.431)	(0.072)	(0.460)	(0.110)
Total debt/ Assets	1.765***	0.813	1.788	1.153	12.698***	1.937***	12.929***	2.163***
	(0.622)	(0.679)	(1.184)	(0.979)	(4.416)	(0.465)	(4.168)	(0.655)
Interest Converge	-0.024***	-0.008**	-0.029**	-0.010***	-0.102*	-0.017**	-0.073	-0.017
	(0.009)	(0.003)	(0.012)	(0.003)	(0.053)	(0.008)	(0.046)	(0.012)
Asset turnover	-1.158***	-0.312***	-1.233**	-0.320**	-3.059	-0.241	-1.914	-0.058
	(0.424)	(0.107)	(0.591)	(0.142)	(3.168)	(0.288)	(3.240)	(0.422)
Tangibility	1.242	1.149	3.549**	1.970*	12.703**	1.562**	12.203**	1.758**
	(1.883)	(0.899)	(1.712)	(1.010)	(5.453)	(0.660)	(5.403)	(0.711)
State ownership share	0.009	0.004*	0.011	0.004*	-0.035**	-0.005*	-0.041***	-0.006
	(0.006)	(0.002)	(0.008)	(0.002)	(0.017)	(0.003)	(0.013)	(0.005)
Political/Environment variables								
City size <=150[c]	0.771*	0.186	0.343	-0.026	1.990*	0.352*	2.255	0.354
	(0.465)	(0.176)	(0.422)	(0.135)	(1.021)	(0.187)	(2.011)	(0.293)
City size >150 and <=600	0.324	0.010	-0.054	-0.160	1.111	0.134	2.264	0.272
	(0.531)	(0.149)	(0.567)	(0.124)	(1.253)	(0.144)	(1.843)	(0.319)
City size > 600 and <=1200	0.910*	0.204	0.587	0.055	0.953	0.195	2.186	0.366
	(0.495)	(0.124)	(0.499)	(0.112)	(1.301)	(0.174)	(1.856)	(0.339)
Post-crisis regional governor appoint.[d]	0.080	-0.027	-0.151	-0.091	1.954*	0.072	2.029	0.078
	(0.380)	(0.100)	(0.392)	(0.103)	(1.050)	(0.144)	(1.242)	(0.164)
Pre-crisis regional governor appoint.[e]	-0.062	-0.194	-0.380	-0.258*	-1.121	-0.085	-1.166	-0.173
	(0.521)	(0.144)	(0.495)	(0.135)	(1.707)	(0.225)	(1.476)	(0.223)
Constant	-6.818***	-1.591**	-7.547***	-1.107	-27.326***	-4.086***	-22.616***	-3.943**
	(1.490)	(0.677)	(2.473)	(0.813)	(7.610)	(1.348)	(7.558)	(1.954)
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.315	0.247	0.343	0.271	0.628	0.648	0.585	0.598
Wald Chi-sq	115.48		57.62		103.29		153.42	
F-test		3.44		3.07		6.60		9.43
N. of observations	372	372	261	261	128	128	94	94

Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; [a] Recipient equals 1 if a firm received aid from the government in 2009; [b] Help/Assets ratio is calculated as a ruble value of the subsidy or loan guarantee received by the firm in 2009 to the firm's average value of the total assets over 2006-2008; [c] A dummy equals 1 if the firm is located in a city belonging to one of the city size brackets. [d,e] A dummy equals 1 if the firm is located in a region where the new governor was appointed during the pre-crisis 2006-2007 or the post-crisis 2010-2011 period respectively.

Table 2. Mean comparison t-test for unmatched and matched samples of interest rate subsidy recipients in a pre-crisis period

The table presents results of t-test for difference between the firm interest rate subsidy recipients and non-recipients before and after matching. The propensity score estimation method employs the logit single nearest-neighbor specification without replacement and average values of the following variables: Log of Total Asset, Return on Assets, Total Debt/Assets and Industry dummies and regional locations over 2006-2008. Out of 301 non-recipients 71 firms are selected for a control sample.

Variable		Mean			% reduct.	t-test	
		Treated	Control	%bias	bias	t	p>|t|
Log of Total Assets	Unmatched	14.618	13.233	90.2		7.30	0.000
	Matched	14.618	14.3	20.7	77.0	1.11	0.271
Tangible Fixed Assets / Assets	Unmatched	0.238	0.289	-29.2		-2.13	0.034
	Matched	0.238	0.249	-6.2	78.7	-0.34	0.732
Construction-In- Progress / Assets	Unmatched	0.044	0.047	-4.2		-0.26	0.796
	Matched	0.0446	0.047	-4.4	-5.0	-0.28	0.777
Cash / assets	Unmatched	0.044	0.091	-56.8		-3.51	0.001
	Matched	0.044	0.052	-9.6	83.1	-0.78	0.435
Inventory / Revenue	Unmatched	0.879	0.403	70.8		6.20	0.000
	Matched	0.879	0.614	39.4	44.4	1.98	0.050
Long-term Debt/Assets	Unmatched	0.109	0.046	58.7		4.86	0.000
	Matched	0.109	0.079	28.2	52.0	1.41	0.160
ROA	Unmatched	0.032	0.089	-77.0		-5.54	0.000
	Matched	0.032	0.040	-10.6	86.2	-0.69	0.493
Assets turnover=Revenue / Assets	Unmatched	0.668	1.153	-80.6		-5.03	0.000
	Matched	0.668	0.727	-9.8	87.9	-0.88	0.382
Region dummy	Unmatched	31.234	30.803	3.1		0.22	0.823
	Matched	31.234	32.141	-6.5	-109.9	-0.38	0.707
Industry dummy	Unmatched	4.9063	4.6973	10.7		0.84	0.399
	Matched	4.9063	4.5625	17.7	-64.5	0.94	0.348

Table 3. Difference-in difference tests for the *interest rate subsidy recipients* before and after government subsidization program

This table reports difference-in-difference mean estimate of key financial variables across treated and control groups of firms. Treated firms represent 71 interest rate subsidy recipients; control firms represent 71 non-recipients selected by the propensity score matching estimator from eligible 301 non-recipients. Column (7) reports D-in-D estimate without control variables. Column (9) reports a specification that includes firm size, government ownership stake and industry and geographic location dummies as control variables. The government funding was distributed in 2009. The pre-crisis characteristics are calculated as firm-specific averages over the 2006-2008 period. The post-crisis characteristics are averaged over the 2010-2011 period.

	Pre-Crisis period (2006-2008)			Post-crisis period (2010-2011)				D-in-D	
	Control firms	Treated firms	Difference in pre-crisis period (no controls)	Control firms	Treated firms	Difference in post-crisis period (no controls)	Difference in post-crisis period with controls	D-in-D (no controls)	D-in-D with controls
	(1)	(2)	(3)=(2)-(1)	(4)	(5)	(6)=(5)-(4)	(7)=(5)-(4)	(8) =(6)-(3)	(9) =(6)-(3)
Tangible Fixed Assets / Assets									
	0.249	0.238	-0.011	0.288	0.266	-0.022	-0.021	-0.011	-0.012
	(0.022)	(0.021)	(0.031)	(0.027)	(0.024)	(0.038)	(0.035)	(0.048)	(0.045)
Construction-In-Progress / Assets									
	0.043	0.045	0.002	0.052	0.029	-0.022**	-0.021**	-0.024*	-0.024*
	(0.007)	(0.005)	(0.009)	(0.008)	(0.005)	(0.009)	(0.013)	(0.010)	(0.013)
Cash / Assets									
	0.052	0.044	-0.008	0.085	0.042	-0.043***	-0.039***	-0.035**	-0.035**
	(0.007)	(0.006)	(0.008)	(0.012)	(0.006)	(0.013)	(0.013)	(0.015)	(0.017)
Inventory / Revenue									
	0.456	0.530	0.074	0.396	0.510	0.113**	0.111**	0.039	0.038
	(0.031)	(0.039)	(0.049)	(0.040)	(0.040)	(0.056)	(0.047)	(0.076)	(0.080)
Long-term Debt / Assets									
	0.079	0.110	0.031	0.086	0.143	0.057**	0.049*	0.026	0.027
	(0.014)	(0.015)	(0.023)	(0.020)	(0.023)	(0.026)	(0.026)	(0.039)	(0.030)
Short-term Debt / Assets									
	0.128	0.121	-0.007	0.091	0.082	-0.009	-0.010	-0.003	-0.003
	(0.019)	(0.018)	(0.024)	(0.018)	(0.012)	(0.022)	(0.022)	(0.032)	(0.036)
ROA									
	0.040	0.033	-0.008	0.044	0.019	-0.025**	-0.022*	-0.017	-0.016
	(0.007)	(0.010)	(0.012)	(0.010)	(0.008)	(0.013)	(0.013)	(0.016)	(0.017)
Assets turnover=Revenue / Assets									
	0.728	0.669	-0.059	0.687	0.530	-0.157**	-0.138**	-0.098	-0.100
	(0.040)	(0.051)	(0.071)	(0.054)	(0.030)	(0.063)	(0.069)	(0.097)	(0.094)

Note: * Denotes significance at 10%; ** Denotes significance at 5%; *** Denotes significance at 1%. All standard errors are bootstrapped with 150 replications

Table 4. Difference-in difference tests for the recipients of *loan guarantees* from state banks before and after government subsidization program

This table reports difference-in-difference mean estimate of key financial variables across treated and control groups of firms. Treated firms represent 11 loan guarantees recipients; control firms represent 11 non-recipients selected by the propensity score matching estimator from eligible 117 non-recipients. Column (7) reports D-in-D estimate without control variables. Column (9) reports a specification that includes firm size, government ownership stake and industry and geographic location dummies as control variables. The government funding was distributed in 2009. The pre-crisis characteristics are calculated as firm-specific averages over the 2006-2008 period. The post-crisis characteristics are averaged over the 2010-2011 period.

	Pre-Crisis period (2006-2008)			Post-crisis period (2010-2011)				D-in-D	
	Control firms	Treated firms	Difference in pre-crisis period (no controls)	Control firms	Treated firms	Difference in post-crisis period (no controls)	Difference in post-crisis period with controls	D-in-D (no controls)	D-in-D with controls
	(1)	(2)	(3)=(2)-(1)	(4)	(5)	(6)=(5)-(4)	(7)=(5)-(4)	(8) =(6)-(3)	(9) =(6)-(3)
Tangible Fixed Assets / Assets									
	0.122	0.153	0.031	0.131	0.162	0.031	0.045	0.000	0.003
	(0.037)	(0.022)	(0.043)	(0.031)	(0.024)	(0.041)	(0.035)	(0.060)	(0.053)
Construction-In-Progress / Assets									
	0.029	0.029	0.000	0.022	0.030	0.008	0.014	0.009	0.009
	(0.009)	(0.006)	(0.011)	(0.011)	(0.010)	(0.015)	(0.016)	(0.021)	(0.018)
Cash / Assets									
	0.053	0.030	-0.022	0.072	0.031	-0.041**	-0.045**	-0.019	-0.019
	(0.014)	(0.010)	(0.018)	(0.014)	(0.014)	(0.019)	(0.018)	(0.025)	(0.026)
Inventory / Revenue									
	0.847	0.780	-0.067	0.843	0.768	-0.076	-0.105	-0.009	-0.029
	(0.109)	(0.165)	(0.187)	(0.153)	(0.138)	(0.213)	(0.226)	(0.297)	(0.282)
Long-term Debt / Assets									
	0.258	0.335	0.097	0.264	0.312	0.048	0.048	-0.049	-0.047
	(0.048)	(0.067)	(0.083)	(0.049)	(0.039)	(0.062)	(0.067)	(0.096)	(0.094)
Short-term Debt / Assets									
	0.151	0.162	0.012	0.062	0.165	0.103***	0.097**	0.091*	0.091*
	(0.041)	(0.018)	(0.046)	(0.023)	(0.026)	(0.033)	(0.041)	(0.052)	(0.055)
ROA									
	0.030	0.012	-0.018	0.017	0.021	0.005	0.005	0.022	0.022
	(0.007)	(0.009)	(0.012)	(0.005)	(0.017)	(0.018)	(0.019)	(0.021)	(0.022)
Assets turnover=Revenue / Assets									
	0.413	0.458	0.045	0.371	0.376	0.005	0.050	-0.040	-0.034
	(0.069)	(0.074)	(0.100)	(0.083)	(0.067)	(0.109)	(0.095)	(0.153)	(0.146)

Note: * Denotes significance at 10%; ** Denotes significance at 5%; *** Denotes significance at 1%. All standard errors are bootstrapped with 150 replications