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Government intervention and firm investment☆

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ABSTRACT

This paper examines how government intervention affects firms' investment and investment efficiency, focusing on the world's largest economic stimulus package (ESP) during the 2008 global financial crisis period. The RMB four trillion ESP aimed to restore the economy by promoting investment in priority areas. Thus it provided an exogenous shock to firms' investment environment and exacerbated the impact of government intervention on firms' investment and investment efficiency. We use propensity score matching to match government-intervened firms with their controls to reduce the endogeneity issue of government intervention. Our difference-in-differences analysis shows that government-intervened firms invested more than control firms. Further analysis shows that the source of funding for investment was mainly from bank loans rather than internal cash flows. However, the post-investment performance was poor. We find that the investment efficiency of government-intervened firms decreased and government-intervened firms overinvested after the ESP. Our results are robust to alternative model specifications and placebo tests. The findings suggest that government intervention can play a negative role in government-intervened firms.

1. Introduction

A fundamental question in corporate finance is what determines firms' capital allocation and investment. In the perfect world without market friction (Modigliani and Miller, 1958), firms' investment would be determined only by their investment opportunities (Stein, 2003). However, in the real world, it has been long observed that a firm may underinvest due to market frictions such as information asymmetry (Myers and Majluf, 1984; Fazzari et al., 1988), or overinvest due to moral hazard and agency problems (Jensen, 1986; Lang et al., 1991). Using a sample of Chinese listed firms from 2001 to 2006, Chen et al. (2011) provide new evidence to the strand of literature by showing that a new friction in China, namely, government intervention in state-owned enterprises (SOEs), may distort firms' investment behavior. They measure government intervention by government ownership and political background of top executives (political connections). Their paper finds that SOEs, especially those with politically connected executives, have lower investment efficiency. Our research aims to extend the research on government intervention

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in firms' investment by focusing on an event that is likely to have exacerbated the impact of government intervention in firms' investment, namely the massive economic stimulus package (ESP) in China in 2008.

Corporate investment declined significantly during the 2008 global financial crisis.[1] To provide liquidity to the market and restore the economy, governments all over the world implemented various policies, among which capital injection by a quantitative easing (QE) monetary policy was an important instrument. For example, the US government approved a Troubled Asset Relief Program (TARP) in 2008 to purchase assets and equity from financial institutions. As an export-driven economy, China was also affected by the financial crisis with the economic slowdown in the US and Europe. To counteract the impact of the financial crisis on China and stabilize the economy, the Chinese government initiated an economic stimulus package of RMB four trillion (US$ 586.68 billion) in 2008. Compared with the 30 trillion yuan GDP of China in 2008, the magnitude of the stimulus plan was quite large. This was also the largest economic stimulus plan in the world during the financial crisis, equal to three times the size of the US efforts (Wong, 2011). Different from the case in the US, where the government bailed out financial institutions to provide more liquidity to the market, the four trillion yuan were used to promote investment in priority areas such as housing, rural infrastructure, transportation, health and education, environment, industry, disaster rebuilding, income-building, tax cuts, and finance.[2]

The 2008 economic stimulus package in China provided an exogenous shock to firms' investment environment. The ESP may affect firm's investment behavior in the following ways. Firstly, the government invested directly in priority areas under the program, thus creating demand for the upstream and downstream enterprises, which would affect the firms' investments. Secondly, China's government initiated an accommodative monetary policy regime under the economic stimulus program. The central bank reduced the interest rate five times to encourage firms to borrow money from banks. As a result, firms would enjoy easier access to bank credits with a lower interest rate, which provided ample funding for firms' investments. Moreover, the government sharply enlarged the size of credit to enterprises from commercial banks, making firms more easily obtain bank loans to support their investments. Thirdly, the government encouraged firms to invest in key areas by offering tax reduction and subsidies with the support of the stimulus plan. This provided motivation for firms to increase investments. Finally, the government could utilize political power to exercise control over SOEs and require SOEs to invest directly in specific areas. For non-SOEs, government intervention may have taken effect via politically connected top executives.

Since the financial crisis and the subsequent economic stimulus package were not expected,[3] it is unlikely that the government changed its intervention in anticipation of the ESP. Therefore, with the exogenous shock to the investment environment, it is interesting to investigate how the world's largest government-led stimulus program affected firms' investment behavior and, more importantly, how the effect of the stimulus program on corporate investment differed with different levels of government intervention.

In China, the government can intervene in firms in several ways. The most effective method of intervention is direct ownership control, which makes the firms SOEs. Such ownership may be used by politicians to interfere in SOEs to support the economy (Fan et al., 2011). The other indirect method of intervention is conducted through informal networks such as politically connected executives. This kind of intervention usually works in private firms which have a natural disadvantage compared with SOEs. So private firms need to utilize political connections to pursue political rents and in turn, these firms have to adjust decisions in order to cater to the government's goals.

With the above institutional settings and following prior research (Chen et al., 2011), we identify two instruments of government intervention with state ownership and political connections. According to the degree of intervention, we first classify SOEs as one type of intervened firms. Private firms with politically connected executives are classified as the other type of intervened firms (PC firms). The literature has shown that political connection to central government may have a different impact from connections with local government (Wu et al., 2012), and that central government has great resources to allocate in implementing stimulus plans, so we further focus on a subset of PC firms which have a political connection with central government (CC firms). Following related research on political connection (Fan et al., 2007; Fisman and Wang, 2015; Zheng et al., 2015), a private firm is politically connected if the Chairman or CEO of the firm is a current or former government official or a military officer or has taken a position on key political committees such as the National People's Congress, the People's Political Consultative Conference or the Congress of the Chinese Communist Party.[4]

We hypothesize that the effect of economic stimulus package on firms' investment behavior varies with different degree of government intervention. Specifically, the economic stimulus package provides positive shock to the supply of external finance, together with the presence of government intervention, might promote investments. Moreover, such effects should be more significant in firms facing more government intervention such as SOEs, PC and CC firms. Meanwhile, it is less clear-cut how firms' investment efficiency may be affected. In theory, positive shocks to external finance supply make financial constrained firms enable to fund profitable projects, which had to be ignored before. If this is the case, investment efficiency should be increased. However, under the unprecedented magnitude and great sense of urgency of the economic stimulus package, firms may be provided more capital than they needed in the short term, which leads to overinvestment and the effect should be more significant in

[1] The predominant view has attributed the decline of firm investment to the sharp decrease in the supply of external capital such as bank lending (Ivashina and Scharfstein, 2010; Duchin et al., 2010).

[2] "China plans 10 major steps to spark growth as fiscal, monetary policies ease". News.xinhuanet.com. Retrieved 2012-05-20.

[3] See Naughton (2009) for a detailed discussion of how urgent the economic stimulus package was initiated and implemented since it was unexpected.

[4] These positions are crucial instruments for entrepreneurs in private firms to build their political connections, because they are the only way to engage in the process of political decision-making in central and local government. Additionally, these positions are a reflection of social recognition, which helps to build a larger social network.

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government intervened firms. As a result, the impact of economic stimulus package on firms' investment efficiency remains an empirical issue.

Using the data from 2006 to 2010, this paper aims to examine the impact of economic stimulus package on firm's investment and investment efficiency and how it varies with government intervention. It is worth noting that government intervention is not random for firms. The unobservable characteristics which drive the selection of government intervention may also affect firm investment behaviors. To mitigate the possible endogeneity problem, we conduct propensity score matching (PSM) before comparison. The PSM approach allows us to disentangle the treatment effect and selection effect of government intervention on firm investments based on observable characteristics. Then we use the difference-in-differences (DiD) test to conduct further analysis. The utilization of the DiD technique in our paper also helps mitigate the endogeneity issue and make our results more reliable and robust.

Our main findings are summarized below.

Firstly, government intervention increased firms' investments post the economic stimulus program. In contrast to the situation in the US where firms shrank their investments (Duchin et al., 2010), most Chinese firms increased their investments during the financial crisis period after the introduction of the stimulus plan. Specifically, SOEs increased their investment rate (of total asset) by 1.81% from 3.38% to 5.2%. In terms of investment amount, a typical SOEs increase investments by 41.63 million yuan after the ESP. And the change accounts for >40% of the investment level before the economic stimulus plan. The PSM matched control firms increased their investment (rate) by only 20.24 million yuan (0.88%), which is statistically and significantly lower than that of SOEs. Among private firms, PC firms increased their investment (rate) by 25.41 million yuan (1.1%), while the investments of controlled non-connected firms remained unchanged. For politically connected private firms, CC firms increased their investment by 68.88 million yuan. And the difference between CC firms and non-CC firms is 54.78 million yuan, significant at 1% level.

Secondly, we further investigate where the funding for investment came from. Our results show that government-intervened firms' investment relied less on internal cash flow after the introduction of the stimulus package. Government-intervened firms had lower investment-internal cash flow sensitivities than their matched peers. Additional analysis reveals that all government-intervened firms had more bank loans after the initiation of the stimulus plan. Thus we provide further evidence on why firms increased their investments during the financial crisis period by showing that easier access to bank loans makes the firms less dependent on internal cash flow.

Thirdly, a natural question following is whether or not the increased investments were efficient. The results show that government-intervened firms such as SOEs, PC firms and CC firms all had lower investment efficiency than their matched control firms, as measured by the investment-Tobin's Q relationship. We further examine firms' investment efficiency from the perspective of overinvestment or underinvestment. It is found that SOEs overinvested before the initiation of ESP and the overinvestment issue became more severe after the ESP. Private firms before the stimulus underinvested and the underinvestment was mitigated by the stimulus plan, although they still underinvested after the stimulus package. PC firms changed from underinvestment to overinvestment after the stimulus package. The pattern was similar for both CC firms and control groups. Non-connected private firms continued to underinvest and the underinvestment problem was more severe after the stimulus plan. In addition, we examine the post-ESP firm performance, including both accounting performance and stock market performance. The results show that ROA of sample firms dropped after the stimulus plan, which is consistent with our previous finding on decreased investment efficiency. The accounting performance of government-intervened firms dropped more than their peers, showing that government intervention hurt performance. Raw stock return and industry-adjusted return were lower post-economic stimulus plan and government intervention exacerbated the effect.

Overall, the research shows that government intervention played an important role in firms' investment decisions during the 2008 economic stimulus program. Firms with strong government intervention, such as SOEs, PC firms and CC firms, increased their investments significantly against the background of the global financial crisis. The increased investments were mainly supported by bank loans rather than internal cash flows. Further analysis shows that firms with stronger government intervention had lower investment efficiency and poor post-ESP performance. Our findings are robust to different model specifications, variable measurements and placebo test.

Our paper contributes to the literature in the following ways.

First, we add to the research on government intervention and firm investment efficiency. Traditional literature has shown that firms' investments should be dependent solely on their investment opportunities in the perfect world without market friction (Stein, 2003). However, researchers have shown that information asymmetry and agency problems are the two most important frictions that may prevent firms from making optimal investments. Chen et al. (2011) provide new evidence to the strand of literature by identifying government ownership or political connections as another market friction which may affect firm investment behavior. Specifically, they show that government intervention in SOEs reduces firms' investment efficiency. However, this effect is not consistent among all government-intervened firms. More importantly, their sample period is in normal period from 2001 to 2006. It is much less clear how government intervention fares in financial crises period. We add to the strand of literature by showing that government intervention has a negative role on government-intervened firms during financial crisis period and the negative impact is consistent on both SOEs and politically connected private firms. Meanwhile, placing our research question under the background of ESP when government has more power over the resources allocation, we could better observe the role of government and the consequences of such intervention.

Second, our study provides additional evidence on the social cost of political connections. Most prior literature on political connections find that the connections help firms to better access external finance (Khwaja and Mian, 2005; Faccio et al., 2006; Li et al., 2008), to enjoy favorable taxation treatment (Faccio, 2010), and to receive more supporting during distress period (Blau et al.,

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2013). Only a few papers have paid attention to the social costs associated with political connections (Cingano and Pinotti, 2013; Amore and Bennedsen, 2013; Fisman and Wang, 2015). Although these papers suggest that political connections may bring social cost and reduce social welfare, their findings imply that political connection does benefit connected firms at firm level. Our paper provides new evidence that the helping hand of government may not always help. In this research, private firms with political connections gain more bank loans, which reduce their investment reliance on internal cash flows and increases investments. However, their investment efficiencies are reduced. Reduced investment efficiency and the associated overinvestment problem may lead to social welfare reduction and increased social cost. The finding implies that government intervention can hurt not only the social welfare, but also the firm itself.

Finally, our paper contributes to the literature on financial crisis by identifying government intervention as another factor to explain the variation of firm investment during crisis period. Extant literature on financial crisis shows that firm investment drops significantly during crisis period and the research in this area tries to explain the variation from perspectives of firm liquidity, credit lines and financial polices etc. (Duchin et al., 2010; Ivashina and Scharfstein, 2010; Kahle and Stulz, 2013). However, in China, firm investments are found to increase during crisis period. We provide an explanation from the perspective of government intervention under the world's largest stimulus package in 2008. This ESP is implemented under the control of Chinese government, which enhances the role of government intervention. Our empirical results confirm that firms with different level of government intervention behave differently in investment and investment efficiency. Thus government intervention plays an important role in explaining the variation of firm investment and investment efficiency during the crisis period.

The rest of this paper is organized as follows. Section 2 develops research hypotheses. Section 3 describes the data and sample. Section 4 reports the empirical results. Section 5 presents robustness tests, and the last section concludes this paper.

2. Hypothesis development

The economic stimulus package is composed with an investment plan, a funding mechanism and a series of industrial policies (Naughton, 2009). It is initiated to promote corporate investment and stabilize the economy. Most firms were shrinking their investments because of the great uncertainty caused by the financial crisis before the stimulus plan. With the introduction of the stimulus package, firms may change their investments for a number of reasons. Firstly, with a lower interest rate and easier access to credit, firms may be able to gain capital for positive net present value projects, thus increasing their investments. Secondly, firms may increase investments to secure government subsidies or tax refunds, leading to an increase in investment. Thirdly, the government promotes investments by directly increasing investments in priority areas under the economic stimulus plan. For those firms related to these projects, perhaps by means of the supply chain or outsourcing parties, their investments may increase. Finally, the government may exert its intervention directly in intervened firms by forcing firms to increase investments. As a result, firms' investment should be increased under the economic stimulus package.

However, the effect may vary with government intervention. As China's firms rely heavily on relationships and networks (Allen et al., 2005), connections with government are extremely valuable. SOEs enjoy a large amount of government privilege. Conversely, private firms are discriminated against in various aspects of business, including applying for bank loans, getting approval for investment projects, and entering regulated industries. Without market-oriented resource allocation, private firms have to rely on informal institutions to relieve political constraints. The creation of political connections is thus an important informal institution. Li et al. (2008) provide evidence that entrepreneurs' party memberships are associated with better performance in Chinese private firms because building connections using party members' identity can assist firms in procuring more bank loans and protecting property rights. Francis et al. (2009) find that IPOs of politically connected firms are less underpriced, and that these firms spend less money on the process of listing.

As a country in transition from a planned economy to a market economy, China's government tightly controls valuable resources such as land, energy, and capital, and intervenes in firms through administrative approval, taxation, and industry regulation. The stimulus plan was implemented under a sense of great urgency following previous Premier Wen Jiabao's call to make the stimulus “big, fast and effective”. The implementation of the economic stimulus plan was led by the central and local government to make it efficient and effective. In this way, government control and intervention were strengthened under the stimulus plan during the crisis, as the government was the major provider of the stimulus funding. Under this situation, we argue that government-intervened firms may behave differently from their peers for the following reasons.

First, government-intervened firms such as SOEs, PC firms and CC firms may benefit more from the ease of credit. There is ample evidence showing that SOEs enjoy more favorable treatment under China's financial system to obtain bank credit than non-SOEs (Cull and Xu, 2003; Song et al., 2011). A number of studies also argue that politically-connected firms have better access to external capital and lower financial costs. For example, Khwaja and Mian (2005) use a large database of >90,000 firms to show that politically connected firms can obtain more bank loans and have higher default rates. Leuz and Oberholzer-Gee (2006) find that firms with political ties experience favorable treatment in the domestic capital market, while non-connected firms have to seek overseas listing to acquire capital. Connected firms are also found to have lower risk and thus lower equity costs (Boubakri et al., 2012). With more funding support from the ESP, government-intervened firms may receive more credit and invest more.

Second, it is shown that government-intervened firms have an advantage in receiving government subsidies (Chen et al., 2008; Johnson and Mitton, 2003; Faccio et al., 2006), enjoying lower tax rates (Adhikari et al., 2006; Faccio, 2010), or benefiting from other favorable policies (Pramuan and Wiwattanakantang, 2009). Recent studies show that political connections help firms to have more opportunities to acquire government supporting funds during a crisis (Duchin and Sosyura, 2012; Blau et al., 2013).

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For example, Blau et al. (2013) show that politically connected firms are not only more likely to receive government support, but also receive more, and earlier. Thus, government-intervened firms such as SOEs, PC firms and CC firms may have more likelihood of securing government projects or involving in government invested projects and increasing their investments due to their connections with the government.

Finally, the government may exert its influence through state ownership or politically connected executives to force firms invest more in priority investment areas in the ESP to promote the investment during crisis period. Meanwhile, government could lead the direction of firms' investment by directly investing in some industries or projects, which further attracts investments from related upstream and downstream firms. In this way, the government could direct the capital to flow into the target areas which could help to recover the economy. Such intervention further promotes the investment of the whole society and thus stabilizes the whole economy.

Taken together, government intervention does not only increase the capital allocation for firms' investments, but also guides the corporate investment with direct government investment. Hence, we have the first research hypothesis as following:

H1. Government-intervened firms invest more than other firms post-ESP.

Meanwhile, it is less clear-cut how firms' investment efficiency may be affected. In theory, the ESP provides positive shocks to external finance supply, enabling firms to fund profitable projects which may be given up without sufficient financial slack. If this is the case, firms' investment efficiency should be increased. As government-intervened firms are able to get more bank credit at lower interest rate, especially when equity financing is restricted by the authorities during crisis, and when bank credit is the major channel for raising capital, their investment efficiency improvements should be more significant. In addition, government-intervened firms generally have connections with the government, which could help obtain more inside information about investment opportunities and thus can invest more efficiently, given the government investment plan is strongly directional. With both more capital to invest and better investment opportunities, we propose the following hypothesis:

H2a. Government-intervened firms have higher investment efficiency than other firms post-ESP.

However, the government may intervene in firms' investments through state ownership or politically connected executives to force firms invest more which leads to overinvestment and lower investment efficiency. Given the national strategic target of "building a harmonious society", when China's economy is affected by the global financial crisis, the government has great incentive to use all the resources it controls to maintain social stability. Such an incentive leads the government to intervene in firms to alter their goals from maximizing shareholder wealth to achieving government's political aims (Boycko et al., 1996; Bertrand et al., 2007), thus creating conflicts between state shareholders (or government related controlling shareholders) and minority shareholders.

SOEs are directly controlled by the government and are thus more likely to serve the government's political goals, even if the investment project is not profitable. For instance, Fan et al. (2007) argue that politicians will pursue private benefit at the cost of firms' resources through political connections, so connected SOEs perform worse after IPO. Such effect will be more pronounced during a crisis period as the ESP does not only designate the direction of investment, but also provides ample capital for investment. In this scenario, SOEs could invest following governments' policies without considering the real needs of the firms' shareholders, which could lead to overinvestment at lower investment efficiency. For private firms, politically connected managers may prioritize the alignment of firm goals with government objectives rather than maximization of shareholder wealth (Wu et al., 2012). Thus, it is also possible that under the unprecedented magnitude and great sense of urgency of the economic stimulus package, government-intervened firms may deviate from the goal of maximizing shareholders' wealth and investment in negative NPV projects, which leads to a lower investment efficiency. Therefore, we have the following alternative hypothesis:

H2b. Government-intervened firms have lower investment efficiency than other firms post-ESP.

3. Data and methodology

3.1. Economic stimulus package

During a financial crisis, government-controlled resource allocation becomes useful as a tool for economic recovery. China's government launched an RMB four trillion investment plan for infrastructure and social welfare on November 5th, 2008. The whole package included 1.18 trillion yuan in central government funding plus 2.8 trillion yuan to be financed by local governments and bank credit. The total package accounted for 12.5% of China's GDP in 2008, to be spent from the fourth quarter in 2008 throughout the years 2009 and 2010.

The program was to be focused on seven priority areas with final weighting in parentheses: transport and power infrastructure, including railroads, roads, airports, electricity grids (37.5%); post-earthquake reconstruction (25%); rural village infrastructure (9.3%); environmental investment (5.3%); affordable housing (10.0%); technological innovation and structural adjustment (9.3%); and health and education (3.8%).

In the short term, the stimulus plan helped sustain China's economic growth rate around 8.7% in 2009 and 10.4% in 2010 while the US and Europe economies were slowing down. It can be seen from Fig. 1 that the contribution of net exports dropped a lot in 2008 and became negative in 2009 while the percentage of investment contribution to GDP increased sharply in 2009. As a result,

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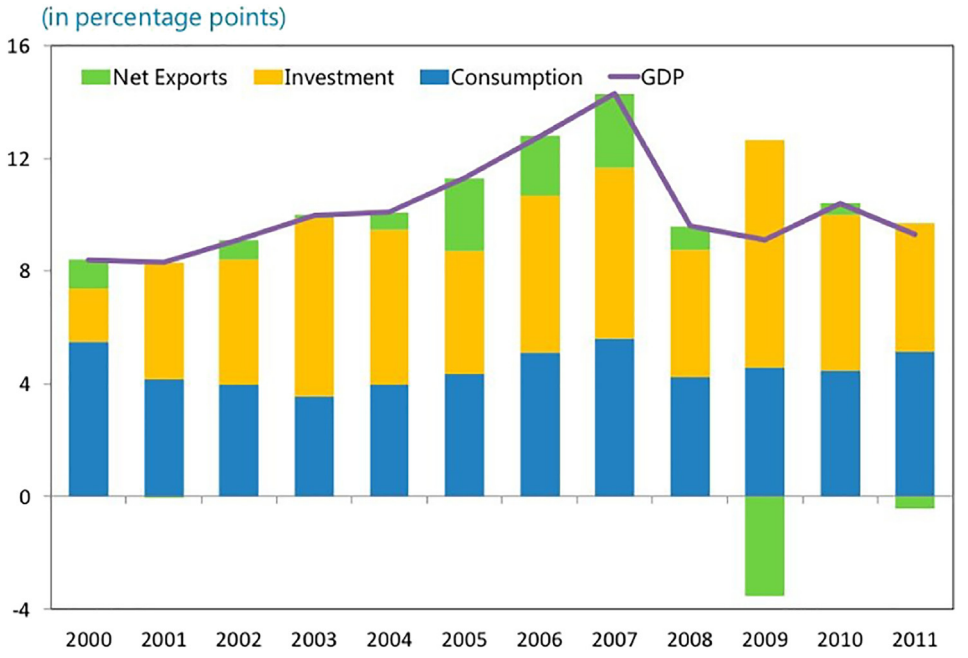

Fig. 1. China GDP: contribution to growth. This figure presents the GDP growth and contribution of net exports, investment and consumption to GDP growth in each year.
Source: Data source: IMF.

the total GDP was not much affected. It is obvious that investments were boosted by the four trillion yuan stimulus plan of Chinese government thus helped to maintain the GDP growth.

The intention of the stimulation plan was to promote investment and to promote the real economy. However, the stimulus appeared to spin quickly out of control, with investment in fixed assets jumping to 66% of GDP in 2009 (Wong, 2011). There were critics of the misallocation of capital, as a large part of the stimulus was used to encourage banks to lend money to SOEs and politically connected private firms to develop real estate, roads, and bridges. This also raised immediate concerns about the economy's absorptive capacity. Actually, the stimulus plan resulted in the current excess capacity problem in China. Excess capacity means the demand in products is less than potential supply. For example, the stimulus plan led to massive increases in domestic capacity such as steel, aluminum, and cement; nowadays, these steel, aluminum, and cement companies are facing falling prices and rising inventories. This phenomenon leads to the ongoing supply-side reforms in China, which aim to reduce the excess capacity. Thus it is important to investigate firms' investment behavior in the economic stimulus program to understand the reasons behind the excess capacity problem in China. Our findings will also help understand the consequence of the worldwide economic stimulus program.

3.2. The sample

The Chinese stimulus package was firstly proposed on November 5th, 2008 and finished at the end of 2010. Thus the stimulus period is defined as last quarter of 2008 (2008Q4) to last quarter of 2010 (2010Q4). To ensure temporal consistency across all variables, we use quarterly data in all analyses. To be systematic with the length of the nine quarter stimulus periods, we use nine quarters before the stimulus plan initiation for comparison purpose. This also helps minimize the compounding effect of other events. Thus our sample period starts from 2006Q3 and ends at 2010Q4.[5]

Table 1 presents our sample composition. Our initial sample contains 1135 SOEs, 526 politically connected private firms (PC firms) and 646 non-politically-connected private firms (non-PC firms), accounting for 49%, 23% and 28% of total sample size. Among the 526 PC firms, 97 are centrally politically connected firms (CC firms) and 429 are not connected with central government (non-CC firms). The results show that government intervention is prevalent in Chinese listed firms. Before matching, almost half of the listed firms are SOEs. Among the remaining private firms, 45% are politically connected and most of them are connected with local government. Only 97 out of 526 PC firms are connected with central government. Taken together, 72% are government-intervened firms.

Our focus is on government-intervened firms. To mitigate possible endogeneity concerns of government intervention, we use nearest neighbor matching, implementing the propensity score matching approach originally developed by Rosenbaum and Rubin

[5] As there may be a delay in the policy taking effect, we also extended the stimulus period to 2011Q4 as a robustness check. The results remain unchanged.

Table 1
Sample description. This table reports the description of our sample firms. Panel A and Panel B report the number and percentage of firms before and after propensity score matching.

Panel A: All firms pre-match

	SOE	Private firms		
		PC firms		Non-connected
		CC firms	Others	
Number of firms	1135	97	429	646
Percentage	49%	4%	19%	28%

Panel B: Sample firms post-match

	SOE	Private firms	
		PC firms	CC firms
Number of firms	1108	504	97
Percentage	65%	29%	6%

(1983) to match government-intervened firms with control firms to make comparisons. In each quarter t during our sample period, we start with all listed firms at quarter t and then exclude firms in the financial industry, special treatment (ST) firms, and firms without complete financial data. Then we use the PSM procedure to conduct 1:1 matching of government-intervened firms and control firms.[6] The procedure is repeated each quarter during our sample period and we finally get 23,850 firm quarter observations. Among these firms, there are 1108 pairs of SOEs and private firms (SOE group, hereafter), 504 pairs of PC firms and non-PC firms (PC group, hereafter), and 97 pairs of CC firms and non-CC firms (PC group, hereafter). All data are from the China Stock Market and Accounting Research (CSMAR) database and political connections data are hand-collected from the biographies of managers from CSMAR.

3.3. Propensity score matching

Our main research question is how the world's largest stimulus program affected firm investment behavior and more importantly, how government intervention affected the effect of the stimulus program on firm investment. We measure government intervention by government ownership and political connection of private firms. To reduce the endogeneity concern on the self-selection issue of government ownership and political connections, we use PSM to do 1:1 nearest neighbor matching first. The matching is based on Eq. (1), which is similar to that used in the first stage Heckman regression in Chen et al. (2011).

$$\text{Indicator} = \alpha + \beta_1 \text{UNEMPR} + \beta_2 Ln(\text{FDEF}) + \beta_3 Ln(GDP) + \beta_4 \text{HHI} + \beta_5 \text{TOP1} + \beta_6 \text{ROA} + \beta_7 \text{SIZE} + \beta_8 \text{LEV} + \alpha_{industry} + \alpha_t + \varepsilon \quad (1)$$

where *Indicator* measures the degree of government intervention and can be *SOE*, *PC* or *CC*. *SOE* measures government ownership and equals one if the firm is an SOE and zero otherwise. *PC* is an indicator variable for PC firms. It takes the value of one if the firm is politically connected. *CC* is an indicator for CC firms. It takes the value of one if the firm is politically connected with central government.

In the prediction model, we include various control variables which may help explain the government intervention in a firm. Among them, three are regional macroeconomic development variables: *UNEMPR* is the unemployment rate, *Ln*(*FDEF*) is the natural logarithm of fiscal deficit, and *Ln*(*GDP*) is the natural logarithm of GDP per capita. All these variables are measured at provincial level and obtained from the Macro China research support system.[7] Government intervention may vary with local economic conditions. On the one hand, in areas with lower GDP per capita, higher unemployment rate, and higher fiscal deficit, the government may exert more intervention on firms for more exploitation. On the other hand, government intervention may be stronger in firms located in wealthy regions where economic resources are rich. *HHI* is the Herfindahl-Hirschman Index of the industry in which the firm operates. One may expect government intervention to be stronger in less competitive industries. For example, SOEs are mainly in monopolized industries. We also include four firm level variables as controls. *TOP1* is the shareholding of the largest shareholder. *ROA*, *SIZE* and *LEV* measure firm profitability, firm size and leverage. We also control for industry fixed effect and quarter fixed effect by including $\alpha_{industry}$ and α_t.

The matching procedure is to run logit regression based on Eq. (1) and then use the propensity score (i.e., the predicted probability) from the pre-match regression and perform nearest neighbor 1:1 matching to match SOEs with private firms first. Table 2 reports the diagnostic tests of our propensity score matching. Column (1) reports the Probit regression estimated across 1135

[6] The details of the PSM procedure are described in Section 3.3.
[7] The MacroChina research support system collects macroeconomic indicators from official websites such as the National Bureau of Statistics, the Ministry of Finance in China, etc.

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Table 2
Propensity score matching: Diagnostic tests. This table reports the diagnostic tests of our propensity score matching based on Eq. (1). The dependent variable is government intervention and can be SOE, PC or CC. The first column contains the parameter estimates of the Probit model estimated using the sample prior to matching. These estimates are then used to generate the propensity scores for matching SOE and private firms. The second column contains the parameter estimates of the Probit model estimated using the subsample of SOEs and matched firms (SOE group). The third and fourth column is similar pre and post-matching for PC firms and non-PC firms (PC group). The last two columns are similar for pre and post-matching for CC and non-CC firms (CC group). All variables are defined in the Appendix A. We report t-statistics in parentheses. Our standard errors are robust and clustered at firm level. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	SOE	SOE	PC	PC	CC	CC
	Pre-match	Post-match	Pre-match	Post-match	Pre-match	Post-match
FDEF	−0.334*** (−7.02)	−0.254* (−1.80)	0.077* (1.89)	0.001 (0.01)	−0.301* (−1.86)	0.050 (0.30)
UNEMPR	29.613*** (4.94)	22.790 (1.60)	−3.564** (−2.42)	−0.722 (−0.08)	−4.076 (−0.20)	5.503 (0.29)
GDP	−0.237*** (−6.73)	−0.189* (−1.70)	−0.057** (−2.16)	−0.007 (−0.14)	−0.147 (−1.49)	0.042 (0.37)
HHI	−0.304 (−0.59)	0.120 (0.21)	1.048 (1.25)	−0.049 (−0.06)	−1.344 (−0.64)	0.211 (0.11)
Size	0.659*** (15.25)	0.456* (1.86)	0.010*** (2.19)	0.002 (0.04)	0.482*** (3.29)	0.015 (0.15)
Lev	−0.003 (−0.27)	−0.028 (−1.18)	0.000 (0.01)	0.000 (0.18)	0.059** (2.44)	0.009 (0.55)
ROA	−0.003 (−0.56)	−0.014 (−1.25)	−0.011 (−0.28)	0.026 (0.70)	0.260* (1.74)	0.075 (0.73)
Top1	1.781*** (6.05)	1.217 (4.01)	−0.199 (−0.51)	0.021 (0.05)	−0.771 (−0.95)	−0.120 (−0.14)
CONSTANT	−4.706*** (−3.39)	−2.786* (−1.92)	−2.899* (−1.81)	0.063 (0.03)	−1.373 (−0.30)	−2.278 (−0.51)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	0.12	0.04	0.08	0.00	0.05	0.00
chi^2	33.33	5.42	9.07	0.62	16.51	1.01
N	37,503	23,850	16,418	7570	5270	1600

SOEs and 1172 private firms with non-missing data. It can be seen that there are significant differences between SOEs and private firms. Column (2) reports the probit regression results using SOEs and matched private firms. Similarly, we report the PSM diagnostic test for PC firms and non-PC firms in column (3) and (4), as well as CC firms and non-CC firms in column (5) and (6). It can be seen that almost all significant variables in the "pre-match" column become statistically insignificant or only marginally significant in the "post-match" column, and the pseudo-R2 drops significantly post-matching. In addition, most of the chi-squared tests of overall model fitness in post-match suggest we cannot reject the null hypothesis that all of the coefficients of control variables are zero. These results suggest that our matching process has removed meaningful differences between government-intervened firms and control firms in terms of observable characteristics.

3.4. Research methods

Based on the matched firms, we first examine the effect of the economic stimulus plan on firms' investment level and how government intervention affects the effect. As in previous studies (Duchin et al., 2010; Duchin and Sosyura, 2012; Blau et al., 2013), we use the following model to investigate how Chinese firms made investment decisions during the financial crisis after the introduction of the stimulus package.

$$Inv_{i,t+1} = \alpha_0 + \alpha_1{}^{*} ESP^{*} Indicator_{i,t} + \beta^{*} Controls_{i,t} + \alpha_i + \alpha_t + \varepsilon \quad (2)$$

Our key variable of interest is the investment decision of a firm, so we use capital investment as our major dependent variable. In accordance with previous studies (Duchin et al., 2010; Campello et al., 2010; Chen et al., 2011), *Inv* is defined as capital expenditure divided by total assets. *ESP* captures the effect of the economic stimulus package and is equal to 1 if the observation is in the period after the introduction of the economic stimulus package and 0 otherwise. *Indicator* measures the degree of government intervention and can be *SOE, PC* or *CC*. The coefficient α_1 captures the effect of government intervention on firms' investment with the introduction of the economic stimulus package.

In addition to the key variable, we include a number of control variables for empirical specification following the literature (Lang et al., 1991; Richardson, 2006). We include firm size (*SIZE*), leverage (*LEV*), and return on assets (*ROA*) to control for the financial characteristics of firms. We also include the shareholdings of the largest shareholder (*TOP1*) and the shareholdings of the top executives (*PCT*) to control for governance structures. Detailed definitions of variables are presented in the Appendix A. We also control for firm fixed effect and quarter fixed effect by including α_i and α_t .[8]

We further test the financing sources for investment. Financing resources of a firm are either internal cash flow or external funding. We first use the following investment-cash flow sensitivity model from Fazzari et al. (1988) to examine whether

[8] The results remain unchanged when we exclude firm and quarter fixed effects. The results using OLS without fixed effects are not reported for the economy of space and are available upon request. This applies to all regression results in this paper.

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firms rely on their internal cash flow to invest.

$$Inv_{i,t+1} = \alpha_0 + \alpha_1 * CF_{i,t} + \alpha_2 * CF_{i,t} * ESP + \alpha_3 * CF_{i,t} * Indicator_{i,t} + \alpha_4 * ESP * Indicator_{i,t} + \alpha_5 * CF_{i,t} * ESP * Indicator_{i,t} + \beta * Controls_{i,t} + \alpha_i + \alpha_t + \varepsilon_{i,t} \quad (3)$$

where CF is the operating cash flow. Fazzari et al. (1988) argue that when firms face financial constraints, their investment has to rely more on internally-generated cash flow. The coefficient of cash flow can be a measure for the degree of financial constraint. There are critics of whether investment-cash flow sensitivities measure financial constraint (Kaplan and Zingales, 1997, 2000). Here, we do not intend to use the coefficient of CF to measure financial constraint. Instead, we would like to interpret the estimated α_1 of CF as a measure of investment-cash flow sensitivity, that is, the degree of dependence of investment on internal cash flow. Thus the coefficient of interaction term for CF and *ESP* shows the marginal effect of the stimulus package on firms' investment-cash flow sensitivity. If α_2 is negative, then firms are less dependent on their internal cash flows to make investments. The coefficient α_5 captures the DiD effect of government intervention on the above relationship. A negative α_5 means government intervention will further weaken firms' investment dependence on internal cash flows. Similarly, we also control for firm fixed effect and quarter fixed effect by including α_i and α_t .

Another major funding resource for firms' investment is external financing. Under the economic stimulus program, China's government initiated an accommodative monetary policy regime. The central bank reduced the interest rate five times to encourage firms to borrow money from banks. Meanwhile, the state council office issued a call to banks and aimed to increase total lending by four trillion RMB in 2008 (State Council Office, 2008). Thus, using the following model, we further explore whether government intervention affects the bank loans that firms can get from banks after the economic stimulus package.

$$Bank\ Loan = \alpha_0 + \alpha_1{}^{*} ESP^{*} Indicator + \beta^{*} Controls + \alpha_i + \alpha_t + \varepsilon_{i,t} \quad (4)$$

where *Bank Loan* is defined as the sum of long-term and short-term borrowings from banks, divided by total assets. *Indicator* takes the value of *SOE*, *PC* and *CC* separately. The coefficient of *ESP*Indicator* captures the DiD effect of government intervention on post-ESP bank loans. A positive estimated α_1 means that firms with more government intervention get more bank loans after the economic stimulus program. Similarly, we also control for firm fixed effect and quarter fixed effect by including α_i and α_t .

Table 3
Descriptive statistics. This table reports the descriptive statistics for key variables in our sample. Panel A includes 1108 pairs of SOEs and matched private firms (SOE group). Panel B contains 504 pairs of PC firms and matched non-PC firms (PC group). Panel C includes 97 pairs of CC firms and non-CC firms (CC group). All continuous variables are winsorized at 1%. Variable definitions can be found in the Appendix A.

	Mean	S.D.	Min	p25	Median	p75	Max
Panel A. SOE group							
Inv_{t+1}	0.04	0.06	0.00	0.01	0.02	0.06	0.46
$Loan_{t+1}$	0.01	0.05	−0.16	−0.01	0.00	0.02	0.36
CF	0.02	0.07	−0.19	−0.02	0.02	0.06	0.24
Tobin's Q	2.98	1.99	0.98	1.69	2.40	3.56	12.15
Size (bil yuan)	2.30	3.14	0.13	0.73	1.28	2.52	22.70
Lev	0.46	0.20	0.04	0.31	0.46	0.61	0.92
ROA	0.02	0.04	−0.11	0.00	0.01	0.03	0.18
Top1	0.33	0.14	0.09	0.22	0.30	0.42	0.71
Pct	0.02	0.09	0.00	0.00	0.00	0.00	0.70
Panel B. PC group							
Inv_{t+1}	0.05	0.07	0.00	0.00	0.02	0.06	0.45
$Loan_{t+1}$	0.01	0.06	−0.15	−0.01	0.00	0.03	0.40
CF	0.02	0.07	−0.21	−0.02	0.01	0.05	0.24
Tobin's Q	2.96	1.92	1.00	1.70	2.41	3.54	12.00
Size (bil yuan)	2.31	2.94	0.12	0.74	1.30	2.66	20.90
Lev	0.48	0.21	0.03	0.33	0.49	0.63	0.92
ROA	0.02	0.04	−0.12	0.00	0.02	0.04	0.19
Top1	0.32	0.14	0.08	0.21	0.29	0.41	0.74
Pct	0.03	0.13	0.00	0.00	0.00	0.00	0.84
Panel C. CC group							
Inv_{t+1}	0.06	0.12	0.00	0.00	0.02	0.05	0.64
$Loan_{t+1}$	0.03	0.12	−0.16	−0.01	0.00	0.04	1.32
CF	0.02	0.08	−0.28	−0.02	0.02	0.06	0.27
Tobin's Q	2.79	1.87	1.01	1.63	2.21	3.34	11.66
Size (bil yuan)	3.28	3.27	0.07	0.93	2.13	4.89	23.20
Lev	0.52	0.19	0.05	0.39	0.55	0.66	0.93
ROA	0.02	0.04	−0.11	0.00	0.02	0.04	0.19
Top1	0.31	0.14	0.06	0.21	0.28	0.39	0.74
Pct	0.03	0.10	0.00	0.00	0.00	0.00	0.69

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The third question is whether or not these investments are efficient. We first employ the following investment-Tobin's Q sensitivity model to investigate whether government intervention affects investment efficiency.

$$Inv = \alpha_0 + \alpha_1 * Tobin's Q + \alpha_2 * Tobin's Q * ESP + \alpha_3 * Tobin's Q * Indicator + \alpha_4 * ESP * Indicator + \alpha_5 * Tobin's Q * ESP * Indicator + \beta * Controls + \alpha_i + \alpha_t + \varepsilon_{i,t} \quad (5)$$

where Tobin's Q is calculated as the market value of equity and book value of debts, deflated by the book value of total assets. This model is built upon the traditional framework of Tobin (1969) wherein, in a frictionless market, the growth opportunity, measured by Tobin's Q, predicts investment. Within the framework, various researches (e.g., Wurgler, 2000; McLean et al., 2012) have used investment-Tobin's Q sensitivity to measure the efficiency of investment and capital allocation. The coefficient α_2 measures the investment efficiency change following the economic stimulus package and α_5 captures how government intervention affects the investment efficiency change. Again, we also control for firm fixed effect and quarter fixed effect by including α_i and α_t .

We also investigate post-investment performance from perspective of accounting performance and market performance. If the post-investment accounting and market performance is lower for government-intervened firms, it may imply the investment efficiency of these firms is lower.

4. Empirical results

4.1. Descriptive statistics

Table 3 presents the descriptive statistics for our sample. All continuous variables are winsorized at 1% to remove the effect of extreme values. Panel A, B and C present the statistics for SOE group, PC group, and CC group. The investment rate (*Inv*) on average is 0.04, 0.05 and 0.06 for SOE group, PC group and CC group respectively and the standard deviation of investment rate is 0.06, 0.07 and 0.12 correspondingly for three groups. Meanwhile, the variation range of investment rate is wide for each group. The collective evidence seems to suggest that firms make very different investment decisions during our sample period even if they are in the same group. Change of bank loans (*Loan*) is 1% of total asset per quarter for SOE group and PC group and 3% of total asset for CC group. Operating cash flow (CF) is on average 2% of total assets for all groups, with >25% having negative cash flow. The mean of Tobin's Q ranges from 2.79 in CC group to 2.98 in SOE group. CC group has the largest average firm asset of 3.28 billion yuan and the SOE group and PC group are similar in firm size, which is <3 billion yuan. The mean of firm leverage ranges from 0.46 for SOE group to 0.52 for CC group, indicating on average, the debt of a firm accounts for half of total asset. Profitability, measured by ROA, has an average of 2% for three groups. The largest shareholder holds on average around 30% of the listed firms' shares, suggesting concentrated ownership is common in listed firms in China. Top executives such as the CEO and Chairman hold 2–3% of total shares, indicating that managerial ownership was not prevalent in China during our sample period.

4.2. Government intervention and firm investments

Our first research question is how government intervention affects firm investments during the economic stimulus plan period. We first report firm investment change before and after the initiation of the economic stimulus plan for firms with different government intervention, using the DiD approach. The results are presented in Table 4. The whole sample is classified into three

Table 4
DiD analysis of firm investments. This table reports the DiD results of investment for each group before and after the initiation of economic stimulus package. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	Before ESP	After ESP	After-before
Panel A. SOE group			
SOE = 0 (control)	0.0280	0.0369	0.0088** (2.28)
SOE = 1 (treated)	0.0338	0.0520	0.0181*** (6.80)
Difference (t-statistics)	0.0058 (1.48)	0.0151*** (3.27)	0.0093*** (3.57)
Panel B. PC group			
PC = 0 (control)	0.0354	0.0323	−0.0030 (−1.44)
PC = 1 (treated)	0.0391	0.0501	0.0110*** (4.52)
Difference (t-statistics)	0.0037 (1.59)	0.0177*** (7.20)	0.014*** (5.48)
Panel C. CC group			
CC = 0 (control)	0.0338	0.0381	0.0044 (1.30)
CC = 1 (treated)	0.0393	0.0603	0.0210*** (4.21)
Difference (t-statistics)	0.0055 (1.10)	0.0222*** (3.94)	0.0167*** (3.01)

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groups for comparison according to the levels of government intervention. The three groups are SOE group, PC group and CC group. We calculate the investment level for each group before and after the initiation of the economic stimulus package and then use DiD to get the difference in change of investment for each group.

Panel A of Table 4 shows that both SOEs and private firms increased their investments after the initiation of the economic stimulus package. This is contrary to the cases in the US markets, where firm investment dropped a lot (Duchin et al., 2010; Ivashina and Scharfstein, 2010; Kahle and Stulz, 2013). Our results show that SOEs increased their investment rates by 1.81% (from 3.38% to 5.2%), while matched private firms only increased their investments by 0.88% (from 2.8% to 3.69%); the increase of investment was larger and statistically significant for SOEs. In terms of economic significance, SOEs increased their investments by 41.63 million yuan post-ESP,[9] which accounted for 44% of the average investment amount of 94.11 million of SOEs group in our sample period. For matched private firms, the change in investment amount was 20.24 million yuan, which accounted for 21.51% of group mean. In addition, before the ESP, the difference in investments between treated and control groups was not statistically significant, confirming that our treated and control samples meet the parallel trend assumption.

Similarly, we compare investments of PC firms and non-connected peers. The results are presented in Panel B of Table 4. We find that there was no significant change in investments for non-connected private firms, while politically connected firms increased their investments significantly by 1.1% from 3.91% to 5.01%. The DiD in investment rate between PC firms and control firms was 1.4% and statistically significant. In terms of economic significance, a typical PC firm increased its investment by 25.41 million yuan post-ESP. In contrast, control non-PC firms have no significant change in investments. Again, before ESP, the difference in investments between treated and control group was not statistically significant. Thus our treated and control samples met the parallel trend assumption.

We further compare CC firms with the matched control group. Panel C of Table 4 reports the results. Our analysis shows that there was no significant change in investments for control firms, while CC firms increased their investments by 2.1% from 3.93% to 6.03%. The difference between change in CC firms and change in control firms was 1.67% and statistically significant. In terms of economic significance, CC firms increase investments by 68.88 million yuan post-ESP. The difference in differences of CC firms and non-CC firms is 54.78 million yuan and significant at 1% level. Thus, central government-connected private firms had a statistically significant higher investment change than their peers. This provides the first piece of evidence in supporting of our first hypothesis H1.

Finally, we present the investment dynamics graphically in Fig. 2. This shows the investments of firms with different government intervention over an 18-quarter period centered on the third quarter of 2008. We observe that the three lines representing investment differences between government-intervened firms and their control firms are almost constant prior to initiation of the economic stimulus program. This implies that the investments of different government-intervened firms were trending closely in parallel before the stimulus plan. This also confirms that our DiD analysis meets the parallel trend assumption. However, after the stimulus plan, the three lines start to go upward steeply, which means investments of firms with more government intervention (such as SOEs, PC firms and CC firms) increased more than those of their matched peers. Among these changes, the difference between CC firms and matched firms is the largest. This is because the economic stimulus plan was proposed and led by central government. Thus, firms connected with central government acted in the quickest manner and with the largest magnitude. Overall, our collective evidence suggests that firms with more government intervention exhibited a substantially larger jump in investments compared with their peers after Q3 of 2008. This further supports our hypothesis H1.

We also conduct multivariable analysis of how government intervention affects firm investments. Table 5 reports the regression results based on Eq. (2). The coefficient of the interaction term for the *ESP* and *Indicator* (which can be *SOE*, *PC* or *CC*) is positive and statistically significant at 1%. This is consistent with our previous finding in Table 4 that firms with more government intervention invested more after the economic stimulus program. This provides another piece of evidence of our hypothesis H1. Firm characteristics also affect investments. Larger and more profitable SOEs and PC firms invested more during our sample period. Firms with higher leverage invested less, possibly due to the limited facility to borrow.

4.3. Funding source for firm investment

We have already shown that firms with more government intervention invest more than control firms. A natural question is where the money for investment comes from. We first investigate if the investment is supported by internal cash flow. We run regressions based on Eq. (3) to examine if firms' investments are more dependent on their internal cash flow after the ESP.

Table 6 shows the results of our regression analysis. The coefficients of CF**ESP* are negative and significant in the last two column, indicating that investment-cash flow sensitivities for PC and CC firms have reduced after the introduction of the stimulus program. Thus, these government-intervened firms are less dependent on their internal cash flows for investments.

We further analyze how the reduction of investment dependence varies with government intervention. The coefficient of the interaction term for CF**ESP*SOE* is significantly negative, suggesting that government-intervened firms such as SOEs are less

[9] The number is roughly as 2.30 billion * 0.0181 = 41.63 million, where 2.30 billion is the average total asset of SOE group. The calculation is similar for PC firms and CC firms.

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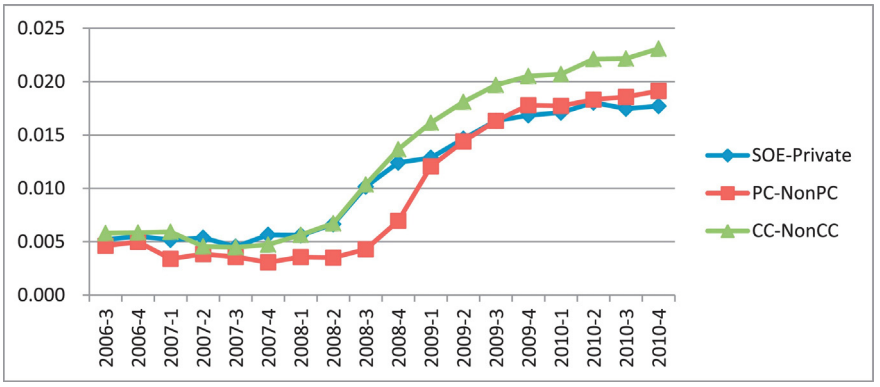

Fig. 2. Parallel trends in investment. This figure depicts average investment rates difference for government-intervened firms and control firms between 2006Q3 and 2010Q4.

dependent on internal cash flow than control firms. This is consistent with the situation in China, where SOEs have more financing sources than private firms.

Similarly, the coefficients of CF*ESP*PC and CF*ESP*CC are negative and significant, implying that investments in firms with more government intervention are less dependent on internal cash flows. We have shown that these firms increased investments post-ESP. These results seem to suggest that the increased investments of government-intervened firms are less likely to come from cash flow generated from operation. According to pecking order theory, firms use their internal cash flow first for investment, then external cash flow (Myers and Majluf, 1984). This raises the concern of whether the government-intervened firms increase their investments passively. This is possible, given the nature of the economic stimulus plan and the urgency of the central government to promote investments to boost the economy.

Next, we investigate the alternative funding sources of firms: bank loans. The major Chinese commercial banks are owned by the government. During a financial crisis, the equity market lacks capital supply from investors, and firms have to rely more on credit financing. On the other hand, the state council office issued a call to banks and aimed to increase total lending by four trillion RMB in 2008 (State Council Office, 2008). In this scenario, we suspect that, under the stimulus plan, government-intervened firms are offered more bank loans to invest.

To test our conjecture, we first conduct DiD analysis, as shown in Table 7. We report bank loans (as a percentage of total assets) before and after the ESP for government-intervened firms and control firms. We first notice that, unlike the results in the US market where bank loans sharply decreased during the crisis (Ivashina and Scharfstein, 2010; Duchin et al., 2010), bank loans increased by >10 times for all sample firms during the financial crisis period. Especially, we notice that government-intervened

Table 5
Government intervention and investment. This table presents the regression results of Eq. (2). The dependent variable is capital investment. Major independent variables are government intervention indicator (SOE, PC and CC) and economic stimulus plan indicator (ESP). All continuous variables are winsorized at 1% and defined in the Appendix A. We report t-statistics in parentheses. Our standard errors are robust and clustered at firm level. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)
	Inv_{t+1}	Inv_{t+1}	Inv_{t+1}
SOE × ESP	0.014^{***} (5.33)		
PC × ESP		0.054^{***} (6.05)	
CC × ESP			0.114^{***} (6.95)
Size	0.007^{***} (6.54)	0.003^{**} (2.50)	0.000 (0.01)
Lev	-0.012^{***} (−3.40)	-0.026^{***} (−5.20)	-0.025^{**} (−2.37)
ROA	0.217^{***} (12.24)	0.132^{***} (4.84)	-0.263^{***} (−3.05)
Top1	0.015^{***} (4.64)	0.047^{***} (4.60)	0.105^{***} (5.24)
Pct	0.031^{***} (13.87)	0.102^{**} (2.32)	0.075 (1.45)
Firm fixed effect	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes
CONSTANT	-0.116^{***} (−4.84)	−0.034 (−1.28)	0.014 (0.19)
R^2_within	0.05	0.13	0.17
F	207.89	55.08	16.14
ρ(u_i, Xb)	0.19	−0.10	−0.12
N	22,121	6987	1461

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Table 6
Government intervention and investment funding. This table presents the regression results of Eq. (3). The dependent variable is capital investment. Major independent variables are cash flows (CF), government intervention indicator (SOE, PC and CC), economic stimulus plan indicator (ESP) and interactions of these variables. All continuous variables are winsorized at 1% and defined in the Appendix A. We report t-statistics in parentheses. Our standard errors are robust and clustered at firm level. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)
	Inv_{t+1}	Inv_{t+1}	Inv_{t+1}
CF	0.097** (2.31)	0.112** (2.37)	0.151** (2.76)
CF × ESP	−0.079 (−1.20)	−0.211*** (−3.93)	−0.216*** (−3.29)
CF × SOE	0.148*** (3.00)		
ESP × SOE	0.013*** (5.32)		
CF × ESP × SOE	−0.190*** (−3.15)		
CF × PC		−0.041 (−0.81)	
ESP × PC		0.063*** (6.45)	
CF × ESP × PC		−0.474*** (−4.84)	
CF × CC			−0.378*** (−3.44)
ESP × CC			0.131*** (7.96)
CF × ESP × CC			−0.598*** (−3.43)
Size	0.006*** (6.38)	0.003*** (3.76)	−0.001 (−0.34)
Lev	−0.011*** (−2.99)	−0.025*** (−4.63)	−0.018* (−1.80)
ROA	0.174*** (11.12)	0.188*** (9.79)	−0.041 (−1.03)
Top1	0.014*** (4.50)	0.036*** (4.42)	0.077*** (4.41)
Pct	0.030*** (13.67)	0.100** (2.24)	0.087 (1.61)
Firm fixed effect	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes
CONSTANT	−0.099*** (−4.57)	−0.042* (−2.00)	0.038 (0.61)
R^2_within	0.08	0.26	0.32
F	98.74	138.27	28.75
ρ(u_i, Xb)	0.10	−0.10	−0.12
N	22,114	6986	1461

firms such as SOEs, PC firms and CC firms had a larger increase in bank loans. In specific, bank loans of SOEs increased by 2.66% while matched private firms increased by 1.09%. The difference was 1.57% and statistically significant at 1%. In terms of economic significance, the SOEs received more bank loans of 36.11 million yuan than that of private firms.[10] Similarly, the DiD effects for PC firms and CC firms were 1.74% (40.19 million yuan) and 1.02% (33.46 million yuan) respectively. These results support our conjecture that the stimulus program created a sharp increase in capital supply, and are also consistent with our prior results showing that firms were less dependent on their internal cash flows to invest.

The results are also shown graphically in Fig. 3, which illustrates the bank loan trends of firms with different government intervention over an 18-quarter period centered on Q3 of 2008. We observe that the three lines representing bank loan differences between government-intervened firms and control firms are almost constant in the nine quarters prior to initiation of the economic stimulus program. This confirms that our DiD analysis meets the parallel trend assumption. However, after the stimulus plan, the three lines start to go up sharply, which means bank loans to firms with more government intervention (such as SOEs, PC firms, and CC firms) increased more than those to their matched peers. Taken together, it seems that government-intervened firms were offered more bank loans to promote investments.

We further run regressions based on Eq. (4) to conduct multivariate analysis and Table 8 reports the results. We find that government-intervened firms had more bank loans, as indicated by the significant and positive coefficients of *ESP*SOE*, *ESP*PC* and *ESP*CC*. Consistent with the results regarding investment-cash flow sensitivities, government intervention had a crucial positive impact on bank loans, meaning that government-connected firms obtained more bank loans than control firms.

4.4. Investment performance of government-intervened firms

So far, we have shown that government-intervened firms are offered more bank loans. A natural question to be asked is whether the performance of these government-intervened firms is better. The impact of government intervention on firm investment performance can be bilateral.

On the one hand, government intervention offers related firms more bank credit and so relieves financial constraints. Thus firms may not need to forgo positive NPV projects. At the same time, government-related firms may have inside information from the government which helps them to better recognize investment opportunities. Within the economic recovery package, investment is the major effective instrument used by the Chinese government to stimulate the economy. However, capital is not

[10] The number is roughly estimated as 2.30 billion yuan * 0.0157 = 36.11 million yuan where 2.30 billion yuan is the average size of SOE group. The calculation is similar for PC firms and CC firms.

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Table 7
Bank loan DiD analysis. This table reports the DiD results of bank loans for each group before and after initiation of the economic stimulus package. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	Before ESP	After ESP	After-before
Panel A. SOE group			
SOE = 0 (control)	0.0019	0.0128	0.0109*** (3.71)
SOE = 1 (treated)	0.0021	0.0287	0.0266*** (6.98)
Difference (t-statistics)	0.0002 (1.47)	0.0159*** (4.39)	0.0157*** (4.12)
Panel B. PC group			
PC = 0 (control)	−0.0007	0.0033	0.0040** (2.51)
PC = 1 (treated)	0.0045	0.0259	0.0214*** (9.91)
Difference (t-statistics)	0.0052** (2.44)	0.0226*** (10.16)	0.0174*** (9.05)
Panel C. CC group			
CC = 0 (control)	0.0030	0.0159	0.0129 (0.64)
CC = 1 (treated)	0.0050	0.0281	0.0231*** (7.07)
Difference (t-statistics)	0.0020 (0.63)	0.0122*** (6.56)	0.0102*** (6.26)

invested without direction. The government prefers to invest money in utilities, infrastructure, and public housing, which are the most rapid means for rescuing the economy. In this process, firms with government connections have better information about favorable policies for investment projects, which helps firms to increase investment performance.

On the one hand, government-intervened firms may prioritize the alignment of firm goals with government objectives rather than the maximization of shareholder wealth. Thus, they are more likely to carry out the stimulus plans of the government, even if the investment projects are not profitable. This may lead to a lower investment performance.

The paper investigates investment performance from three perspectives: investment efficiency, accounting performance, and market performance. We first run regressions based on Eq. (5) to test investment efficiency and the results are presented in Table 9. It is shown that SOEs' investment has a lower response to investment opportunities, as indicated by the negative coefficient of the interaction term for ESP and Tobin's Q in column (1). These results suggest that although SOEs obtain more capital from the stimulus package, their investments are less efficient. The coefficients of government intervention *indicator*ESP*Tobin's Q* are significant and negative in all regressions, indicating that government-intervened firms are less responsive to growth opportunities post-ESP. Thus, government intervention reduced the investment efficiency of intervened firms after ESP. It provides the first piece of evidence to support our hypothesis H2a.

Accounting performance and market performance post-investment are reported in Table 10. We use ROA, defined as net income divided by total assets, to measure accounting performance. Market performance is measured by one year buy and hold stock returns. We use raw stock return, market-adjusted stock return, and industry-adjusted stock return. Panel A of Table 10 reports the results for SOEs and their matched control firms. It shows that both accounting performance and stock performance were worse for government-intervened firms such as SOEs, as indicated by the negative coefficient of *SOE*ESP*. Panel B and Panel C of Table 10 present the performance of PC group and CC group. The results are similar to those in Panel A. Investment performance was poor following initiation of the economic stimulus package and firms with government intervention had worse performance. Thus our results tend to be more consistent with our hypothesis H2a. Our results are also similar to those

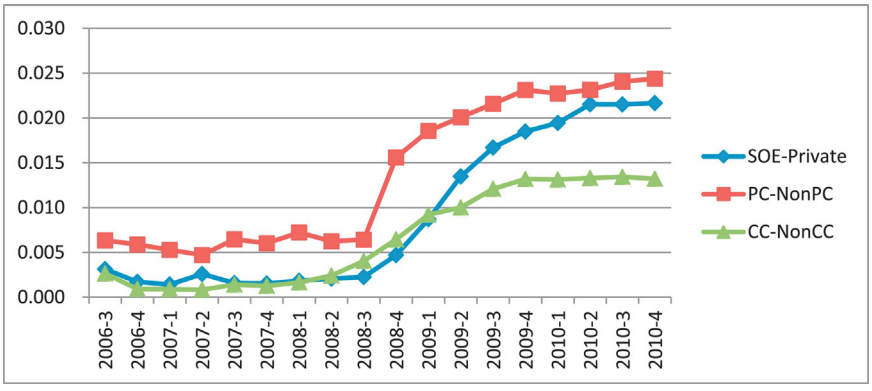

Fig. 3. Parallel trends in bank loans. This figure depicts average bank loan difference for government-intervened firms and control firms between 2006Q3 and 2010Q4.

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Table 8
Government intervention and bank loans. This table presents the regression results of Eq. (4). The dependent variable is bank loans. Major independent variables are government intervention indicator (SOE, PC and CC), economic stimulus plan indicator (ESP) and interactions of these variables. All continuous variables are winsorized at 1% and defined in the Appendix A. We report t-statistics in parentheses. Our standard errors are robust and clustered at firm level. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)
	Loan $_{t+1}$	Loan $_{t+1}$	Loan $_{t+1}$
SOE × ESP	0.002* (1.80)		
PC × ESP		0.016*** (6.80)	
CC × ESP			0.063*** (4.79)
Size	0.005*** (12.51)	0.006*** (4.86)	0.008* (1.93)
Lev	0.021*** (10.80)	0.032*** (4.60)	0.063** (2.47)
ROA	−0.014 (−1.32)	0.008 (0.29)	−0.078 (−0.53)
Top1	0.015*** (5.79)	0.037*** (3.89)	0.079** (2.89)
Pct	0.006 (1.09)	0.016** (2.53)	−0.003 (−0.17)
Firm fixed effect	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes
CONSTANT	−0.112*** (−13.99)	−0.140*** (−6.18)	−0.211** (−2.70)
R^2_within	0.02	0.04	0.07
F	80.40	33.27	9.28
ρ(u_i, Xb)	0.05	0.08	−0.01
N	22,125	6908	1428

in Duchin and Sosyura (2012), which show that politically connected banks are more likely to obtain government funding, but associated with lower stock return and accounting performance.

Taken together, our above empirical results confirm that during the implementation of the stimulus package, the government had a strong influence on capital allocation at the micro-level through state ownership and political connections. Specifically, we show that firms with government intervention invested more than control firms. Investment and government intervention are positively associated, because the government had strong control over resource allocation, leading to differences in investment decisions for government-intervened and control firms. Although the government provided more bank credit for intervened firms to relieve their financial constraints, these investments did not achieve higher investment efficiency or better performance.

Table 9
Government intervention and investment efficiency. This table presents the regression results of Eq. (5). We use investment-Tobin's Q sensitivity to measure investment efficiency. The dependent variable is capital investment and major independent variables are Tobin's Q, government intervention indicator (SOE, PC and CC), economic stimulus plan indicator (ESP) and interactions of these variables. All continuous variables are winsorized at 1% and defined in the Appendix A. We report t-statistics in parentheses. Our standard errors are robust and clustered at firm level. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)
	Inv_{t+1}	Inv_{t+1}	Inv_{t+1}
Tobin's Q	0.006* (1.67)	0.002* (1.74)	0.002* (1.91)
Tobin's Q × ESP	−0.010** (−2.68)	0.006*** (3.19)	0.003 (1.11)
Tobin's Q × SOE	0.001 (0.94)		
ESP × SOE	0.027*** (5.61)		
Tobin's Q × ESP × SOE	−0.005*** (−4.38)		
Tobin's Q × PC		0.011*** (3.14)	
ESP × PC		0.104*** (8.46)	
Tobin's Q × ESP × PC		−0.031*** (−10.93)	
Tobin's Q × CC			0.010*** (3.66)
ESP × CC			0.113*** (4.88)
Tobin's Q × ESP × CC			−0.018*** (−4.67)
Size	0.004*** (5.27)	0.004*** (4.83)	0.000 (0.12)
Lev	−0.011** (−2.78)	−0.037*** (−7.65)	−0.011 (−0.72)
ROA	0.216*** (9.61)	0.092** (2.87)	−0.177 (−1.66)
Top1	0.011*** (3.87)	0.035*** (5.47)	0.093*** (4.67)
Pct	0.028*** (9.23)	0.074* (2.05)	0.083 (1.66)
Firm fixed effect	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes
CONSTANT	−0.046** (−2.44)	−0.063*** (−2.92)	0.001 (0.01)
R^2_within	0.12	0.27	0.23
F	141.46	89.38	61.06
ρ(u_i, Xb)	−0.12	−0.07	−0.01
N	21,664	6785	1404

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Table 10
Firm performance post-investment. This table reports the accounting performance and market performance post-investment. The dependent variables are ROA and one year buy and hold stock returns. Panel A reports regression results for SOEs and matched private firms. Panel B and Panel C report results for PC firms and CC firms. All continuous variables are winsorized at 1% and defined in the Appendix A. We report t-statistics in parentheses. Our standard errors are robust and clustered at firm level. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)	(4)
	ROA_{t+1}	Raw Ret_{t+1}	Market-adjusted Ret_{t+1}	Industry-adjusted Ret_{t+1}
Panel A. SOE group				
SOE × ESP	−0.029*** (−5.80)	−0.132** (−2.87)	−0.078*** (−5.54)	−0.062*** (−7.23)
Size	−0.002** (−2.25)	−0.034*** (−6.81)	−0.027*** (−8.35)	−0.024*** (−6.43)
Lev	0.012*** (3.39)	0.123*** (5.58)	0.093*** (5.12)	0.079*** (4.99)
Top1	0.011*** (5.39)	0.044 (1.31)	0.044 (1.61)	0.051** (2.61)
Pct	−0.006 (−1.09)	0.564** (2.66)	0.365** (2.21)	0.383** (2.56)
ROA		0.537** (2.54)	0.469*** (3.40)	0.455*** (3.67)
Firm fixed effect	Yes	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes	Yes
CONSTANT	0.068*** (4.73)	0.761*** (7.44)	0.549*** (8.73)	0.459*** (5.97)
R^2_within	0.09	0.08	0.06	0.06
F	73.01	24.08	46.01	91.72
ρ(u_i, Xb)	0.04	0.00	−0.02	0.10
N	22,672	22,518	22,518	22,518
Panel B. PC group				
PC × ESP	−0.010*** (−4.84)	−0.152*** (−3.01)	−0.092*** (−7.67)	−0.083*** (−10.56)
Size	0.002 (1.57)	−0.038*** (−6.11)	−0.031*** (−9.28)	−0.027*** (−5.52)
Lev	0.038*** (6.01)	0.142*** (4.77)	0.107*** (5.95)	0.096*** (4.32)
Top1	0.025*** (6.21)	0.046 (1.05)	0.036 (1.22)	0.045 (1.42)
Pct	0.006 (1.64)	0.300* (1.84)	0.210 (1.53)	0.240* (1.78)
ROA		0.754*** (3.83)	0.719*** (5.65)	0.542*** (4.33)
Firm fixed effect	Yes	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes	Yes
CONSTANT	−0.013 (−0.43)	0.846*** (6.34)	0.627*** (8.94)	0.512*** (4.98)
R^2_within	0.07	0.07	0.06	0.05
F	14.48	16.10	71.55	44.90
ρ(u_i, Xb)	0.09	0.01	−0.04	0.14
N	7172	7029	7029	7029
Panel C. CC group				
CC × ESP	−0.011*** (−6.69)	−0.203*** (−3.66)	−0.128*** (−6.02)	−0.120*** (−7.07)
Size	0.004** (2.22)	−0.040** (−2.63)	−0.041*** (−4.27)	−0.031*** (−2.97)
Lev	0.044*** (4.25)	0.196** (2.44)	0.066 (1.18)	0.090 (1.69)
Top1	0.017** (2.23)	0.042 (0.65)	0.113* (1.80)	0.070 (1.28)
Pct	−0.003 (−0.80)	0.126 (0.87)	0.111 (0.80)	0.152 (0.94)
ROA		0.943* (1.76)	0.514 (1.57)	0.580 (1.52)
Firm fixed effect	Yes	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes	Yes
CONSTANT	−0.042 (−1.26)	0.908** (2.80)	0.882*** (4.45)	0.627** (2.84)
R^2_within	0.08	0.07	0.06	0.06
F	13.43	9.73	9.95	11.55
ρ(u_i, Xb)	0.07	−0.06	−0.12	−0.04
N	1472	1440	1440	1440

5. Robustness tests

5.1. Alternative model for investment efficiency

In examining how government intervention helps firms to increase investment efficiency, we use the investment-Tobin's Q sensitivity to measure investment efficiency. However, prior literature also uses Richardson's over- or underinvestment model (2006) to measure investment efficiency. We therefore use this model to reexamine the effect of government intervention. In addition, the lower investment-Tobin's Q sensitivity found in previous analyses also raises a concern of overinvestment, as investments are less responsive to growth opportunities.

For empirical specification, we first estimate the following Richardson model (2006) and obtain the residual as a measure of over- or underinvestment.

$$Inv_t = \alpha_0 + \alpha_1 \times BM_{t-1} + \alpha_2 \times Lev_{t-1} + \alpha_3 \times Cash_{t-1} + \alpha_4 \times Age_{t-1} + \alpha_5 \times Stock\ Return_{t-1} + \alpha_6 \times Inv_{t-1} + \alpha_i + \alpha_t + \varepsilon_{i,t} \quad (6)$$

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Table 11
Investment efficiency DiD analysis. This table reports the DiD results of investment efficiency for each group before and after the initiation of an economic stimulus package. Investment efficiency is measured by overinvestment or underinvestment estimated from Eq. (6). *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	Before ESP	After ESP	After-before
Panel A. SOE group			
SOE = 0 (control)	−0.0010	−0.0004	0.0006* (1.70)
SOE = 1 (treated)	0.0007	0.0042	0.0035*** (4.42)
Difference (t-statistics)	0.0017** (2.09)	0.0046*** (3.31)	0.0029*** (2.78)
Panel B. PC group			
PC = 0 (control)	−0.0012	−0.0019	−0.0007* (−1.73)
PC = 1 (treated)	−0.0008	0.0012	0.0020** (2.03)
Difference (t-statistics)	0.0004 (1.24)	0.0031*** (2.61)	0.0027** (2.25)
Panel C. CC group			
CC = 0 (control)	−0.0012	0.0004	0.0016** (2.25)
CC = 1 (treated)	−0.0004	0.0018	0.0022*** (3.05)
Difference (t-statistics)	0.0008* (1.87)	0.0014** (2.35)	0.0006* (1.66)

where *BM* is the book to market ratio; *Lev* is the firm leverage, defined as total debt divided by total asset; *Cash* is the cash and cash equivalent of the firm; and *Age* is the firm age since establishment. *Stock return* measures past market performance, defined as one year buy and hold return adjusted by market index return. Again, we also control for firm fixed effect and quarter fixed effect by including α_i and α_t. The value of the residual is used as a measure of overinvestment or underinvestment. If the residual is positive, then it denotes overinvestment; otherwise, underinvestment.

We first report the DiD analysis of the residual in Table 11. It shows that SOEs overinvested before the ESP and their overinvestments were more severe after the ESP. PC firms changed from underinvestment to overinvestment with the introduction of the economic stimulus package. CC firms also changed from underinvestment to overinvestment, and the change is statistically significant. These findings confirm our previous conjecture that government intervention reduces firm investment efficiency and leads to an overinvestment problem.

We also regress the residual (in absolute value) against government intervention in subsamples of overinvestment (residual >0) and underinvestment (residual <0). Table 12 shows that the overinvestment issue became more significant after the ESP for government-intervened firms, as indicated by the positive and significant coefficient of *Indicator*ESP* in all overinvestment subsamples. The collective evidence suggests government intervention leads to a more severe overinvestment problem.

Table 12
Robust tests for alternative model for investment efficiency. This table reexamines the effect of government intervention and investment efficiency during stimulus period with an alternative model for investment efficiency. We use the residual of model (7) to measure over- or underinvestment. The dependent variable is absolute and positive value of residuals. All continuous variables are winsorized at 1% and defined in the Appendix A. We report t-statistics in parentheses. Our standard errors are robust and clustered at firm level. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	$Abs(OverInv_{t+1})$	$Abs(OverInv_{t+1})$	$Abs(OverInv_{t+1})$	$Abs(OverInv_{t+1})$	$Abs(OverInv_{t+1})$	$Abs(OverInv_{t+1})$
	OverInv > 0	OverInv < 0	OverInv > 0	OverInv < 0	OverInv > 0	OverInv < 0
SOE × ESP	0.063*** (8.55)	0.000 (0.02)				
PC × ESP			0.111*** (4.78)	−0.001 (−0.76)		
CC × ESP					0.219** (2.18)	−0.003 (−1.44)
Size	−0.003 (−1.13)	−0.001 (−0.76)	0.022 (1.70)	−0.001 (−1.26)	−0.081 (−1.36)	−0.000 (−0.38)
Lev	−0.012 (−1.06)	0.001 (0.21)	−0.030 (−1.02)	−0.002 (−0.77)	0.080 (1.22)	−0.005 (−1.29)
ROA	−0.028 (−0.56)	0.021 (1.18)	−0.317 (−1.40)	0.017 (0.73)	0.391 (0.69)	−0.035 (−0.94)
Top1	0.008 (1.12)	0.010*** (5.07)	−0.019** (−2.62)	0.010** (2.41)	−0.215 (−0.92)	0.014** (2.77)
Pct	−0.020 (−0.89)	−0.002 (−1.50)	0.026** (2.77)	0.002*** (4.98)	0.091 (0.90)	0.003 (0.54)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Quarter fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
CONSTANT	0.084 (1.66)	0.031** (2.16)	−0.413 (−1.61)	0.039*** (2.99)	1.770 (1.42)	0.028 (1.49)
R^2_within	0.02	0.00	0.01	0.01	0.02	0.01
F	51.16	7.75	18.75	89.72	0.93	3.24
ρ(u_i, Xb)	−0.01	0.11	0.00	0.09	0.11	−0.11
N	7888	13,686	2438	4255	496	873

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Table 13
Placebo test. This table reports the placebo test of our analysis. The DiD results are based on investment for each group in the period 2005–2006 without economic stimulus plan. *, **, *** indicate that the coefficients are significant at 10%, 5% and 1%, respectively.

	2005	2006	2006–2005
Panel A. SOE group			
SOE = 0 (control)	0.0356	0.0271	−0.0085*** (−4.07)
SOE = 1 (treated)	0.0406	0.0332	−0.0074*** (−3.30)
Difference (t-statistics)	0.0050* (1.92)	0.0061*** (3.96)	0.0011 (0.24)
Panel B. PC group			
PC = 0 (control)	0.0382	0.0343	−0.0039(−1.51)
PC = 1 (treated)	0.0418	0.0309	−0.0109* (−1.80)
Difference (t-statistics)	0.0036 (1.52)	−0.0034 (−1.43)	0.0070 (−1.61)
Panel C. CC group			
CC = 0 (control)	0.0389	0.0322	−0.0067 (−1.13)
CC = 1 (treated)	0.0470	0.0363	−0.0107* (−1.85)
Difference (t-statistics)	−0.0081 (−1.12)	0.0041 (1.47)	0.004* (1.76)

5.2. Placebo test

We also conduct a placebo test to make sure that our results are driven by the economic stimulus plan rather than unobservable characteristics. As an illustration, we use the year 2005–2006 as our sample period and redo our analysis. The DiD results on investment rates are reported in Table 13. It is shown that the pattern in Table 3 does not exist in 2005–2006. Almost all firms reduced investments in 2006 compared with 2005, and firms with government intervention did not have statistically significant higher investment rates than control groups in most panels. We also conduct other placebo tests for other findings, the results of which are not reported here to save space. Thus, our findings seem to be caused by the initiation of the economic stimulus plan rather than other variables.

6. Conclusion

This paper investigates how government intervention affected firms' investment behavior during the world's largest economic stimulus package led by China's government. The empirical results show that government-intervened firms invested more than their matched peers. Further analysis shows that the source of funding was mainly from bank loans instead of internal cash flows. However, the post-investment performance was poor. We find that the investment efficiency of government-intervened firms decreased and government-intervened firms overinvested after the ESP. Our results are robust to alternative model specifications and placebo tests. The findings suggest that government intervention can play a negative role in both SOEs and private firms.

Appendix A. Definitions of variables

	Definition
Inv	Capital expenditure divided by total assets
ESP	Dummy variable equals one if the observation is in the period from 2008Q4 to 2010Q4, otherwise zero.
SOE	SOE measures government ownership and equals one if the firm is a state-owned enterprise and zero otherwise.
PC	PC is an indicator variable for PC firms. It takes the value of one if the firm is politically connected (PC firm).
CC	CC is an indicator for CC firms. It takes the value of one if the firm is politically connected with central government (CC firm).
UNEMPR	UNEMPR is the unemployment rate.
Ln(FDEF)	Ln(FDEF) is the natural logarithm of fiscal deficit.
Ln(GDP)	Ln(GDP) is the natural logarithm of GDP per capita.
HHI	Herfindahl-Hirschman Index of the industry in which the firm operates.
CF	Operating cash flow divided by total assets
Size	Natural logarithm of total assets
Lev	Total debt divided by total assets
ROA	Net income divided by total assets
Tobin's Q	Market value of equity and book value of liability divided by book value of asset
Loan	Change of short-term and long-term borrowings divided by total assets
Top1	Shareholdings of the largest shareholder
Pct	Shareholdings of Chairman and CEO
Raw Ret	The raw stock return, which is equal to one year buy and hold stock return.
Market-adjusted Ret	One year buy and hold abnormal return, equal to Raw Ret adjusted by market return.
Industry-adjusted Ret	One year buy and hold abnormal return, equal to Raw Ret adjusted by market return.

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