



Research on the Impact of Government Subsidies on the Investment Efficiency of Enterprises

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Abstract. In the context of governmental involvement in market operations, subsidies represent a crucial instrument for macroeconomic regulation and the reallocation of societal resources. Given the significance of macroeconomic policies on micro-level enterprises as well as corporate governance structures, this paper tries to explicate the specific association between governmental financial support and the amplification of firm value. As a matter of fact, enterprise investment efficiency stands as a salient metric reflecting the intrinsic value of an enterprise, and during the epoch of economic metamorphosis in China, a prevalent condition of suboptimal investment, encompassing both under-investment and over-investment, is observable among publicly-listed corporations. Considering that existing studies have largely overlooked the intricacies of the relationship between government financial subsidies and corporate investment efficiency within the unique institutional milieu of China, this research employs a comprehensive empirical examination of non-financial firms listed on the Shanghai, Shenzhen and Beijing A-share markets over the interval spanning from 2010 to 2021 to address this gap. The findings reveal that government subsidies do affect corporate investment effectiveness, with varying degrees of effectuation observed across different types of companies. Specifically, government subsidies possess the capacity to mitigate instances of corporate under-investment, while such financial incentives may also have the potential to intensify problems associated with corporate over-investment. Notably, these effects are more pronounced within the subset of non-state-owned enterprises.

Keywords: Investment efficiency; Over-investment; Government subsidies; Panel regression.

1 Introduction

Amidst the intensification of China's economic system reform, myriad challenges have begun to surface. A pivotal issue that demands resolution within the trajectory of China's economic transition is the delineation of the interplay between government and market forces. Various industrial policies introduced by the Chinese government have promoted the rapid growth of China's economy, and have had a certain positive impact

on the optimal allocation of resources and industrial restructuring. To buttress the efficacious enactment of these industrial policies, the government typically resorts to a dual-pronged approach: direct intervention and indirect guidance, with government subsidies serving as a primary instrument of the latter to bolster enterprise innovation as well as transformation and upgrading. For all enterprises, it is still unknown how government subsidies affect their performance. Notably, access to government subsidies is not a universal privilege, and even among the recipients, there exists a marked heterogeneity predicated on industry type, corporate nature, and developmental phase. Moreover, the actual utilization of the subsidy funds is not guaranteed to be effective; the efficacy of government subsidy implementation is subject to variation across enterprises, influenced by divergent governance structures among other factors. Considering these considerations, it becomes imperative to conduct empirical studies on these enterprises to decipher the impact of government subsidies on their financial performance. Such research would aim to elucidate the specific manifestations of this impact. It is against this background that this paper undertakes its study.

Extant research predominantly concentrates on the immediate influence of government subsidies on corporate investment, frequently neglecting the variegated impacts these subsidies may have on different types of enterprises. In fact, as private enterprises play an increasingly important role in the national economy, it is imperative to explore whether subsidies granted to such entities facilitate efficient resource allocation. Therefore, this study leverages a panel dataset comprising Chinese listed enterprises from the years 2010 to 2021 to rigorously examine the factors, both intrinsic and extrinsic, that contribute to the surplus in corporate investment. It positions government subsidies and agency costs as central determinants to assess their effects on corporate investment behaviors, and elucidates the mechanisms underlying these effects. Furthermore, the study pays special heed to the differential effects that government subsidies exert across diverse classes of listed corporations.

2 Rationale and Research Assumptions

Enterprises serve as the principal agents of a country's economic activities, exerting a crucial impact on macroeconomic dynamics. As an important tool of macroeconomic policy, government subsidies have the property of directly affecting enterprise investment (Zheng, Wang & Li, 2021)^[1]. These subsidies can effectively steer corporate economic conduct, particularly by altering the financing costs for enterprises and reducing their production expenses, thereby engendering noteworthy effects. Davies (2013) has observed that post-financial crisis, the Chinese government has sought to incentivize increased investment by enterprises and facilitate the enhancement of industrial structure through the enactment of subsidy policies, including industrial support initiatives and scientific and technological innovation funds^[2]. Empirical evidence, as depicted in Figure 1 below, illustrates that from the year 2011 onwards, approximately half of the extraordinary income and expenses reported by listed companies have been attributable to government subsidies (CKGSB, 2021)^[3].

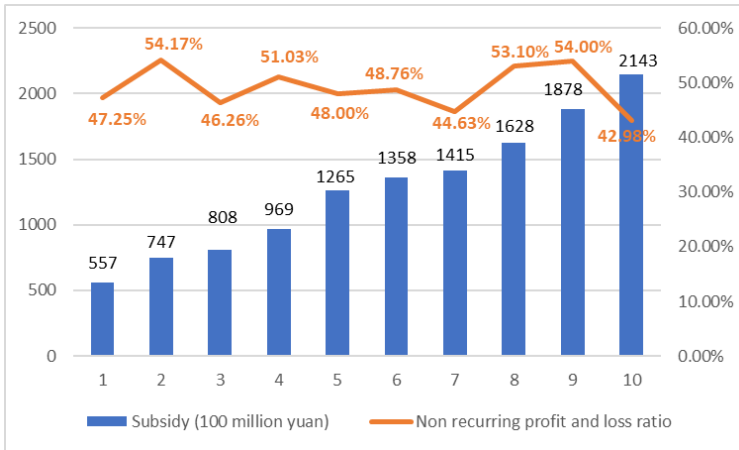


Fig. 1. Government Subsidies Received by A-share Listed Companies from 2011 to 2020 and Their Proportion in Non-recurring Gains and Losses

However, the efficacy of governmental policies is subject to attenuation over temporal progression, posing a conundrum for state administrations in their pursuit of equilibrium between the incentivization of corporate entities and the imperatives of fiscal sustainability. Uncertainty about such policy adjustments gradually emerges, exposing firms to more risk in their investment decisions. In practice, the impact of government subsidies on firms' investment behavior is manifested in multiple ways. It is postulated that such fiscal inducements exert a direct effect on corporate investment behavior, thereby implicating corporate profitability. Fan and Xu (2018) have elucidated that macroeconomic stratagem, inclusive of research and development subsidies and tax concessions, possess the capacity to allure enterprises towards predetermined developmental trajectories^[4].

On the one hand, government subsidies, as a financial instrument, can provide additional financial support for enterprises and reduce their financing burden (Li, 2021)^[5]. In this case, government subsidies potentially mitigate the constraints on corporate investment due to limited funding. By guiding enterprises to increase investment, government subsidies can, to a certain extent, promote economic activities, sustain or augment employment rates, and promote industrial development. On the other hand, government subsidies may also trigger the risk of over-investment. This concern emanates from the theory of information asymmetry, first proposed by American economists Joseph Stigitz, George Akerlof and Michael Spence in 1970, which postulates that market transactions are characterized by a possible disparity in information between the parties involved, conferring an advantage to the more informed entity (Lofgren, Persson & Weibull, 2002)^[6]. The prevalence of information asymmetry between the government and firms is notable, as government entities lack the capacity to engage in the internal operations of the firms and consequently possess inferior insights into their internal processes. Such a knowledge gap undermines the government's ability to tailor subsidies that precisely address the growth necessities of firms. At the same time, the enter-

prise operators, due to their participation in daily management, have more comprehensive information than external investors, in which case they are likely to engage in myopic investment decisions driven by personal interests and the pursuit of immediate gains, thereby distorting the intended effect of government subsidies and leading to redundant enterprise investments. The overzealous pursuit of subsidized sectors or projects can prompt enterprises to excessively prioritize short-term returns, overshadowing the importance of long-term investment sustainability. In this case, government subsidies are likely to exacerbate the unbalanced allocation of market resources, leading to the creation of economic bubbles in specific sectors, which may ultimately lead to economic instability. Moreover, the differential impact of government subsidies on state-owned and non-state-owned enterprises must be considered. Lin Yifu (1994) posits that, given the policy burdens shouldered by state-owned enterprises, government subsidies may act as compensation for incurred losses, a form of financial support not typically extended to non-state-owned enterprises. Hence, state-owned enterprises are more likely to obtain government subsidies for other purposes, which will weaken the effect of investment stimulus^[7]. Nonetheless, Lin's hypothesis requires further empirical validation to substantiate its claims.

Therefore, synthesizing the existing body of scholarly literature and the critical assessment therein, this study articulates its research hypotheses as follows:

H1: Government subsidies may alleviate firms' underinvestment;

H2: Government subsidies may exacerbate firms' overinvestment;

H3: The effect of government subsidies on investment efficiency is more significant in non-state-owned enterprises.

3 Empirical Tests

3.1 Sample selection and data source

This paper compiles a data set which consists of annual records from A-share listed companies across Shanghai, Shenzhen, and Beijing stock exchanges, spanning the years 2010 to 2021. The initial data were primarily sourced from the Oriental Wealth CHOICE financial database, and industry classification adhered to the standards promulgated by the Securities and Futures Commission in 2012. To enhance the reliability of our findings, the data set underwent a rigorous screening process. Specifically, we excluded any firm data with missing values for the relevant variables. Additionally, companies operating within the financial sector were omitted due to their distinct regulatory and financial reporting frameworks. Furthermore, firms that experienced abnormal operational issues, as indicated by the 'ST' or '*ST' designation during the study period, were removed from the sample. Following these criteria, the final sample comprised a cohort of 16,186 firms for subsequent analysis.

3.2 Variable definition and measurement

3.2.1 Explained variable - Investment efficiency.

In this paper, we refer to Richardson's (2006) residual measure model to measure the investment efficiency of a firm by constructing an expected investment model with the difference between the firm's expected investment and its real investment^[8]. Where the residual difference is greater than 0, it indicates that the enterprise has over-investment, and the residual difference is less than 0, it indicates that the enterprise has under-investment. The model is set up as follows:

$$INV_t = \alpha_0 + \alpha_1 * Growth_{t-1} + \alpha_2 * LEV_{t-1} + \alpha_3 * CF_{t-1} + \alpha_4 * ROA_{t-1} + \alpha_5 * Size_{t-1} + \alpha_6 * BM_{t-1} + \alpha_7 * FA_{t-1} + \alpha_8 * IVN_{t-1} + \alpha_9 * REV_{t-1} + \alpha_{10} * AGE_{t-1} + \sum Industry + \varepsilon_t \quad (1)$$

3.2.2 Explanatory variables - Government subsidies.

Under the new accounting standards, government subsidies are no longer reflected in the income statement as "subsidy income", but in the accompanying notes to the financial statements. In this paper, we study the impact of government subsidies on investment efficiency under the new accounting standards (the treatment of government subsidies under the old standards before 2007 is not uniform, and the data are not comparable to some extent), so the data of government subsidies in this paper are obtained from the notes of the sample companies through Choice Financial Data Terminal. And the financial subsidies are quantitatively defined as the ratio of subsidy income received from the government to the operating income of the enterprise.

3.3 Empirical model

Based on the research hypotheses established above, a multiple regression model is constructed to test the effect of government grants on the company's investment efficiency, and the regression formula is as follows:

$$I_over_{i,t}/I_under_{i,t} = \beta_0 + \beta_1 Subsidy_{t-1} + \gamma \times ControlVariables_{i,t-1} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (2)$$

Where I_over is the redundant part of corporate investment, I_under is the under-investment part of corporate investment, $Subsidy$ is the government subsidy, and $ControlVariables$ are the individual control variables concluded from previous empirical studies on corporate investment behavior, including: firm size (A), management shareholding ($MANAGER$), leverage ratio (LEV), net cash flow (CF), revenue (REV), fixed asset ratio (FA), firm growth ($GROWTH$), return on total assets (ROA), book-to-market ratio (BM) and age of business (AGE).

4 Research Findings and Analyses

4.1 Descriptive statistics

To count the basic descriptive characteristics of each variable, descriptive statistics analysis was carried out. Table 1 shows the results of descriptive statistics of the main variables, from which it can be seen that: (1) the mean and standard deviation of I_{over}/I_{under} , a measure of corporate investment efficiency, are -0.3846 and 1025.2951, respectively, indicating that there is a huge difference in the investment efficiency among the sample firms; (2) the mean value of SUB , an indicator of government subsidies, is 44321217.2429 and the standard deviation is 144414546.0713, indicating that the instability of government grants in China is large; (3) the distribution of other variables is within a reasonable range.

Table 1. Results of descriptive statistics

Variables	Sample size	Average	Standard deviation	Minimum	Median	Maximum
<i>INV</i>	16186	522.4431	1126.3533	-5393.2110	334.6639	100024.5913
<i>I over/I under</i>	16186	-0.3846	1025.2951	-11032.8486	-81.5448	90280.2469
<i>SUB</i>	16186	44321217.2429	144414546.0713	-24321546.2800	13005433.2200	4718105151.7200
<i>MANAGER</i>	16186	14.6939	18.6791	0.0000	4.1328	95.3426
<i>CF</i>	16186	4.9999	6.8414	-64.9793	4.7615	66.4138
<i>Growth</i>	16186	17.7293	131.4032	-130.9156	9.7329	8748.3663
<i>A</i>	16186	1457549.3860	5681257.9662	10410.8136	396076.0328	219217383.9000
<i>LEV</i>	16186	41.8158	20.7313	0.7969	41.1493	855.6570
<i>FA</i>	16186	20.8444	15.4307	0.0206	17.8386	295.9932
<i>ROA</i>	16186	5.5424	7.7439	-183.9808	5.2841	104.5663
<i>BM</i>	16186	0.4298	0.2861	-1.2507	0.3652	6.4652
<i>REV</i>	16186	899097.8376	3982095.7509	-11485.6852	201655.6046	161502332.7000
<i>AGE</i>	16186	19.0882	5.6789	2.0000	19.0000	65.0000

4.2 Correlation analysis

To initially judge whether there is a large correlation between the variables, correlation analysis was carried out. The conclusion could be drawn that: (1) the correlation coefficient between government subsidies and enterprise investment efficiency is 0.046349, which initially indicates that government subsidies have a promotional effect on the enhancement of enterprise investment efficiency, which is consistent with the hypothesis; (2) the correlation coefficients of other variables are all lower than 0.7 in absolute value, meaning that there is no obvious covariance, so that all of them are retained.

4.3 Panel regression analysis

Based on the research hypotheses above, the full sample, SOEs and non-SOEs samples were tested separately and Table 2 demonstrates the main multiple regression results.

From the regression results of the full sample, Column (a) in the first sector shows that the p-value of government subsidy (*SUB*) is significant at 1% level of significance and its coefficient is positive. This suggests that government subsidies increase the efficiency of firms' investment and mitigate their underinvestment, i.e., government subsidies can reduce firms' costs and induce firms to invest more in R&D and innovation, which has a mitigating effect on firms' investment difficulty. Column (b) shows that after adding the control variables, the coefficient of government subsidy (*SUB*) remains positive and significant at the 1% significance level, proving that hypothesis H1 is valid. Meanwhile, Column (a) in the second sector ($I_{\text{over}}/I_{\text{under}} \geq 0$) shows that the coefficient of government subsidy is positive and p-value is significant at 1% level of significance, which suggests that government subsidy intensifies firms' investment. Column (b) shows that after adding the control variables, the coefficient of government subsidy remains positive and significant at 1% level of significance, proving that hypothesis H2 holds.

Comparing the regression results for the samples of SOEs and non-SOEs: (1) Column (a) for SOEs shows that the coefficient pertaining to government subsidy is positive, with a statistically significant p-value at the 5% significance threshold. Column (a) for non-state-owned enterprises indicates a positive coefficient for government subsidies, with statistical significance achieved at the 1% level. (2) Upon the inclusion of control variables, column (b) for state-owned firms shows that the coefficient of government subsidy *SUB* remains positive and the p-value is significant at the 5% level of significance. Column (b) for non-state-owned firms shows that the coefficient of government subsidy remains positive and the p-value is significant at the 1% level of significance. It shows that economic policy uncertainty affects investment efficiency in both SOEs and non-SOEs, but the effect is more significant in non-SOEs than in SOEs, proving that Hypothesis H3 is valid.

Table 2. Regression results for testing hypotheses

	Full Sample		I over/I under ≥ 0		State-owned Enterprise		Non-state-owned Enterprises	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
<i>SUB</i>	2.108e-07***	2.865e-07***	3.976e-07***	6.936e-07***	9.664e-08**	1.189e-07**	6.838e-07***	8.987e-07***
<i>MANAGER</i>		0.1463		1.6326		-0.7179		-0.2708
<i>A</i>		-3.963e-06**		-1.457e-05***		-3.095e-07		-2.043e-05***
<i>Growth</i>		-0.0137		0.0641		0.0430		-0.0570
<i>FA</i>		0.0721		1.8219		-1.1787**		0.8972
<i>LEV</i>		-0.1046		-0.4622		-0.6084		0.5032
<i>ROA</i>		-0.0459		1.1196		-3.2324*		0.7943
<i>CF</i>		0.2568		3.3750		1.5548		-0.5592
<i>BM</i>		-0.8588		212.04***		-53.862*		107.89**
<i>AGE</i>		-0.3223		-8.1047**		0.7162		-0.2003
<i>year</i>	2.9413	2.9158	85.009	115.89	-2.3395	-3.4715	-2.7435	-3.0317
<i>industry</i>	15.566	16.982	-737.95**	-656.80**				
<i>F</i>	0.5312	0.5725	2.3562	2.6920	2.8034	1.8603	13.955	4.0908
<i>R-squared</i>	0.0009	0.0013	0.0099	0.0151	0.0011	0.0039	0.0026	0.0041
<i>N</i>	16186	16186	6368	6368	5279	5297	10907	10907

Note: The table shows the coefficient of each variable, ***, **, * represent the coefficient is significant at 1%, 5% and 10% significance level respectively.

5 Robustness Test

In this study, the robustness test was carried out through the variable substitution method, i.e., the indicators are re-measured by changing the proxy variables, thus proving the steadfastness of the model. The Return on Invested Capital (*ROIC*), which represents the rate of return garnered on all invested capital in production and business activities, was employed as a surrogate to gauge the efficacy of a firm's investment undertakings. A high *ROIC* implies that the firm is efficient in its investment. Within this study, *ROIC* was incorporated as an explained variable and in a regression analysis conducted in connection with the variable reflecting government subsidies. This analysis, executed across the entirety of the sample, indicated that the government subsidy variable maintained a consistent and robust association as evidenced in preceding regression outcomes. The significance of the government subsidy was pronounced, denoted by a *p*-value of 0.0015, thereby achieving statistical significance at the 1 percent threshold. These findings lend additional support to the conclusions drawn in the antecedent scholarly article.

6 Conclusions

Using the panel data of listed enterprises in China from 2010 to 2021, this empirical research reveals a tripartite conclusion: first, that government subsidies serve to mitigate the phenomenon of underinvestment within corporations; second, that such subsidies possess the potential to intensify cases of overinvestment; and third, that the influence of government subsidies on investment efficiency is more pronounced within the context of non-state-owned enterprises.

The government can promote enterprise investment through the following support methods: (1) by reducing the taxation burden on firms, thereby incentivizing investment; (2) by extending direct financial aid in the form of low-interest rate loans; and (3) by offering fiscal incentives or subsidies to enterprises that engage in innovation and research and development (R&D), with the objective of fostering technological advancement and enhancing the competitive stature of enterprises.

Notwithstanding the contributions of this study, its scope is bound by certain constraints that pave the way for future scholarly inquiry. For example, the sample of the current study mainly covers Chinese firms, so it may be difficult to generalize the results to other industries and countries. Subsequent research endeavors could potentially yield a more expansive understanding by incorporating cross-national comparative analyses. Such methodological enhancements would significantly enrich the comprehension of governmental subsidy dynamics and their influence on corporate investment across diverse economic landscapes and industrial sectors.

Reference

1. Zheng, J.L., Wang, X.H. & Li, Y. (2021) 'Corporate Social Responsibility, Government Subsidies and Willingness to Innovate', *Journal of Chongqing University*, 2021. Vol. 27, Issue (6): 85-96. DOI: 10.11835/j.issn.1008-5831.jg.2021.06.002.
2. Davies, K. (2013) 'China Investment Policy: An Update', *OECD Working Papers on International Investment*, January 2013, OECD Publishing. Retrieved from [http:// dx. doi. org/ 10.1787/5k46911hmvbt-en](http://dx.doi.org/10.1787/5k46911hmvbt-en).
3. CKGSB (2021) 'Reading the annual reports of 4,286 listed companies in the A-share market, this data needs attention!'. Retrieved from https://ee.ckgsb.com/chuang/content/news_detail/899.
4. Fan, H.B. & Xu, C.Y. (2018) 'A study on the impact of government subsidies on corporate performance - empirical evidence from a Chinese enterprise labor matching survey', *Journal of Macro-Quality Research*, Vol. 7, No. 2, June 2018. DOI: 10.13948/j.cnki.hgzlyj.2018.6.001.
5. Li, J.Q. (2021) 'Utilize the "certification" effect of R&D subsidies on corporate innovation', *Science and Technology Daily*, July 8, 2021. Retrieved from <http://digitalpaper.stdaily.com>.
6. Lofgren, K., Persson, T. & Weibull, J.W. (2002) 'Markets with Asymmetric Information: The Contributions of George Akerlof, Michael Spence and Joseph', *ResearchGate*, June 2022. Retrieved from https://www.researchgate.net/publication/227735324_Markets_with_Asymmetric_Information_The_Contributions_of_George_Akerlof_Michael_Spence_and_Joseph_Stiglitz.
7. Lin Y.F. (1994) 'Policy burden is the biggest obstacle to the reform of state-owned enterprises', *China Academic Journal Electronic Publishing House*, 1994. Retrieved from <http://www.cnki.net>.
8. Richardson, S. (2006) 'Over-investment of free cash flow', *Review of Accounting Studies*, 11:159–189, June 23, 2006. DOI: 10.1007/s11142-006-9012-1.

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