# "Government subsidies, rent-seeking and corporate investment efficiency: Evidence from China"

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**BUSINESS PERSPECTIVES**

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# GOVERNMENT SUBSIDIES, RENT-SEEKING AND CORPORATE INVESTMENT EFFICIENCY: EVIDENCE FROM CHINA

## Abstract

Despite a large number of government subsidies, Chinese listed companies still face numerous challenges. This requires research into the effects of government subsidies on corporate investment efficiency. The paper provides empirical evidence to investigate investment efficiency and enriches the study on the interactions between government intervention, rent-seeking, and ownership structure. Generalized least square (GLS) models with fixed effects were constructed using 2012–2020 data from 869 Chinese listed A-share non-financial firms. Results show that government subsidies received by listed companies significantly damage investment efficiency ($\beta$ = .138, p < .01). This can be attributed to their rent-seeking behaviors to obtain subsidies, which also significantly harms investment efficiency ($\beta$ = .915, p < .05). Government subsidies are also found to significantly mediate the impact of rent-seeking on investment efficiency. In three-step regression for testing mediating effect, coefficients are 0.475, 0.915, and 0.131 at the level of 1%, 5%, and 5%, respectively. Furthermore, ownership structure shows a moderating effect in the relationship between subsidies and investment efficiency. The management shareholding ratio significantly reinforces the negative impact ($\beta$ = 1.369, p < .01), while the institutional shareholding ratio shows no significant moderating effect ($\beta$ = 0.0571, p = n.s). Non-state-owned enterprises show a more significant negative impact ($\beta$ = 0.17, p < .05) than state-owned enterprises ($\beta$ = 0.148, p < .1). Finally, the study tests the above relationships for companies in the manufacturing industry that receive the most percentage of government subsidies in China, and the results are robust.

| Keywords | government intervention, A-share firms, ownership structure, capital allocation, corporate performance |
|---|---|
| **JEL Classification** | G32, H21 |

## INTRODUCTION

Government subsidies are one of the main forms of government support. Chinese government prioritizes the provision of subsidies to selected sectors according to their policies to stimulate growth and economic development (Deng et al., 2017), and to help financially distressed firms overcome difficulties and constraints (Tao et al., 2017). According to the China Stock Market and Accounting Research (CSMAR) database, the amount of government subsidies to Chinese companies has increased from 28.88 billion Yuan in 2007 to 283.89 billion Yuan in 2020.

Despite a large number of government subsidies, Chinese listed companies still face numerous issues. For example, as reported by the Economic Information Daily, there are 265 listed companies in the A-share[1] market that receive subsidies from the government every year, have high debt ratios, and have rising inventory in 2016. Their performance has not been improved by the subsidies and there is even

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1   A-shares are the shares of incorporated companies based in mainland China, which constitute the vast majority of Chinese listed firms (Liu et al., 2018).

a tendency to further deteriorate. Many listed companies have poor performance and have been exposed to operating financial fraud (CSRC, 2021), which was found to be linked to government subsidies (Raghunandan, 2018).

Chinese listed firms are also facing a problem in investment efficiency (Chang et al., 2019), which is an important strategic channel by which value is generated (Cook et al., 2019). Companies engage in rent-seeking activities to seek subsidies from the state, but rents that do not come from wealth-creating activities reduce corporate efficiency (Liu et al., 2018; Rose-Ackerman, 2017). Additionally, given the socioeconomic characteristics of China, the government shapes state-owned enterprises (SOEs) with their agenda, other than maximizing profits, such as stimulating high employment rates (Shleifer and Vishny, 1994; Yu et al., 2020). Such intervention leads to inefficiency in investment (Deng et al., 2017). These issues beg the question of the functionality and efficiency of these subsidies.

## 1. LITERATURE REVIEW

Due to the important role of subsidies in government intervention, their impact on efficiency has generated a lot of scientific interest (Bai et al., 2018). However, the results from the relevant previous literature are rather contradictory due to differences in countries, regions, sectors, and firms, differences in the structure of subsidy policies, and differences in the data, periods, and applied methodology (Dimos & Pugh, 2016).

Some scholars find that government subsidies are positively related to companies' performance, for example, receiving subsidies enhances corporate investment efficiency, green efficiency, technological innovation, and firm value (Bai et al., 2018; Shin et al., 2019). Wang (2019) employs China's renewable energy firm-level panel data and supports an effective impact of government subsidies on renewable energy firms' investment efficiency. Other scholars find that government subsidies encourage inefficient investment (Zhang et al., 2019). For instance, Deng et al. (2017) conclude that companies influenced by government intervention perform worse than others. Hao and Lu (2018) also argue that government intervention distorts firms' investment allocations and, as a result, reduces investment efficiency.

Although government subsidies may bring positive effects, this will be counterbalanced by the costs of rent-seeking activities (Du & Mickiewicz, 2016). The Chinese government has strong flexibility in deciding to provide subsidies to enterprises, which provides a certain space for the rent-seeking activities of firms (Grafton & Williams, 2020).

Rent-seeking was first coined by Anne Krueger (1974) to refer to the behavior by which resources are unproductively used to pursue benefits without creating additional value (Du & Mickiewicz, 2016). Some researchers find that rent-seeking activities are helpful for companies to receive government subsidies, to get more external finance (Liu et al., 2018), and to enjoy favorable taxation treatment (Kwon, 2015). Although rent-seeking activities make access to subsidies easier, it reduces the utility of government subsidies, because rent-seeking activities consume a tremendous amount of resources (Cai et al., 2018; Rose-Ackerman, 2017). Zhang et al. (2014) find that companies obtain government subsidies through rent-seeking, and this is not beneficial to firms' performance, because the granting of subsidies is not based on a company's social contributions or promising prospects.

Apart from government subsidies and rent-seeking, the significant impact of ownership structure on companies is established in the literature (Chen et al., 2017; Dong et al., 2020; Jin et al., 2018; Xie, Huo, et al., 2019). The majority of Chinese listed companies are SOEs or controlled by SOEs (Wong, 2016; Xie, Xu et al., 2019). However, the interest of the state is often in conflict with those of other shareholders. The state wants controlled companies not only to maximize profit but also to realize political, economic, and social objectives (Chen et al., 2011; Xie, Xu et al., 2019). For example, SOEs are asked to help stimulate high employment rates (Shleifer & Vishny, 1994; Yu et al., 2020). Jin et al. (2018) find that the negative impact of government subsidies on R&D investment efficiency in SOEs is stronger than

in non-SOEs. Similarly, the empirical evidence from Indonesia, according to Arifin (2019), suggests that politicians may intervene in corporate investment decisions, beyond the optimum level, resulting in over-investment.

In contrast to state ownership, institutional investors and managerial shareholders are considered to contribute to the prosperity of firms (Chen et al., 2017; Sakawa & Watanabel, 2020). For the impact of institutional investors on corporate investment efficiency, Sakawa and Watanabel (2020) include a sample of large listed firms in Japan during 2010–2016 and find that institutional shareholders contribute to constructing sustainable corporate governance mechanisms and enhancing sustainable firm performance. It is also found that there is a positive correlation between institutional ownership and company value (Guoa & Platikanov, 2019). Managerial owners, as another category of minority shareholders, are found to help reduce agency costs and asymmetric information, thereby facilitating firms' investment efficiency (Vijayakumaran, 2021).

The literature on the effect of government subsidies on corporate investment efficiency is for the most part silent or inconclusive (Dimos & Pugh, 2016). The study addresses the answers to the functionality of government subsidies and their impact on corporate performance, which could influence management and investors' decisions. Rent-seeking activities and ownership structure are also relevant variables studied here.

Firstly, China is a good case to continue the studies because the government is intrusive in China (Du & Mickiewicz, 2016; Grafton & Williams, 2020), and the rent-seeking relationship between companies and the government is institutionally rooted (Erokhin, 2020). Companies contest for government subsidies and increase their rent-seeking costs. Thus, this study tests the mediating role of government subsidies in the impact of rent-seeking on investment efficiency.

Secondly, most previous studies use property rights (i.e. SOEs and non-SOEs) as the proxies for ownership structure when studying the influence

of ownership structure on firm-level efficiency (Claro, 2006; Tao et al., 2017; Xie, Xu, et al., 2019). However, as the stake of institutional investors and managers in listed firms has been growing in China (Chen et al., 2017), their shareholding ratio should be taken into consideration. This study uses property rights, institutional shareholding ratio and management shareholding ratio as three proxies of ownership structure and examines the moderating influence of corporate ownership structure.

## 2. AIMS AND HYPOTHESES

The paper aims to investigate the impact of government subsidies and rent-seeking on the investment efficiency of Chinese listed firms. In essence, the specific research objectives are as follows: (1) to examine the influence of government subsidies on corporate investment efficiency; (2) to examine the influence of rent-seeking on corporate investment efficiency; (3) to examine the mediating role of government subsidies on the relationship between rent-seeking and corporate investment efficiency; and (4) to examine the moderating role of ownership structure on the relationship between government subsidies and corporate investment efficiency. Therefore, the hypotheses include:

H1: *Government subsidies are negatively related to investment efficiency.*

H2: *Rent-seeking is negatively related to investment efficiency.*

H3: *Investment efficiency is negatively influenced by rent-seeking through government subsidies.*

H4: *SOEs have a stronger negative impact of government subsidies on corporate investment efficiency than non-SOEs.*

H5: *Institutional shareholding ratio weakens the negative impact of government subsidies on corporate investment efficiency.*

H6: *Managerial shareholding ratio weakens the negative impact of government subsidies on corporate investment efficiency.*

## 3. METHOD

Two theories are used in this paper. Firstly, the rent-seeking theory explains the interaction between government subsidies, rent-seeking, and firms' investment efficiency. It assumes a contest for obtaining benefits and focuses on the cost of rent-seeking (Angelopoulos & Philippopoulos, 2019). Companies may invest in unproductive activities to resist the transfer of government resources (Du & Mickiewicz, 2016). Resources that companies devote for seeking those benefits should be counted as part of their deadweight loss and damages corporate financial performance (Zhu & Liao, 2019).

Additionally, a new version of agency theory is used to support the interrelation between government subsidies, corporate ownership structure, and firm investment efficiency. Under concentrated ownership in Chinese companies, the agency conflict is raised between affiliated managers, who act on behalf of controlling shareholders, and the minority shareholders. Controlling shareholders can choose members of the board of directors; hence the conflict is between the controlling shareholders and dispersed minority shareholders, which is named as principal-principal goal incongruence (Young et al., 2008).

The paper did an ontological positivist work by six main variables. The dependent variable is corporate investment efficiency (IE). Followed by the model proposed by Richardson (2006) and Chen et al. (2017), it is measured in reverse from the perspective of inefficient investment, that is, the degree of over-investment and under-investment. A positive (negative) sign of the residual ε in the following equation indicates over- (under-) investment. The paper uses the absolute value of $\varepsilon$ to measure investment efficiency (IE). The higher IE is, the deeper the degree of inefficient investment is.

$$INV_{i,t} = \alpha_0 + \alpha_1 Q_{i,t-1} + \alpha_2 CASH_{i,t-1} +$$
$$+\alpha_3 LEV_{i,t-1} + \alpha_4 RET_{i,t-1} +$$
$$+\alpha_5 AGE_{i,t-1} + \alpha_6 SIZE_{i,t-1} +$$
$$+\alpha_7 INV_{i,t-1} + \varepsilon. \tag{1}$$

INV is estimated as the sum of fixed assets, construction in progress, intangible assets, and long-term investment, recalculated by the book value of total assets. Q measures the growth opportunities of any specified listed firm and is defined as the sum of the market value of equity and the book value of liabilities scaled by the book value of total assets. CASH is defined as net cash flows recalculated by the book value of total assets. LEV is defined as the ratio of debt to total assets. RET is the annual market-adjusted return. AGE is defined as the difference between the current year and the IPO year of any specified listed firm. SIZE is the natural logarithm of total assets.

The paper uses two independent variables such as government subsidies (GS) and rent-seeking (RS). The government subsidies (GS) are measured through the ratio of subsidies to operating income (Zhu & Liao, 2019). The rent-seeking (RS) is represented by companies' entertainment expenses incurred and is measured by the ratio of entertainment expenses to operating income (Li et al., 2018; Zhu & Liao, 2019). It is an item disclosed in the notes to administrative expenses. In addition, government subsidies are further used as the mediating variable between investment efficiency and rent-seeking.

The moderating variable, ownership structure, includes three sub-variables: property rights (PR), institutional shareholding ratio (ISR), and management shareholding ratio (MSR). The property rights is a dummy variable that takes 1 if an enterprise is state-owned, and 0 otherwise (Jin et al., 2018). The institutional shareholding ratio refers to the total percentage of a firm's shares owned by institutional investors (Cook et al., 2019). The management shareholding ratio refers to the total percentage of shares held by top management team members, including supervisory board members and top managers (Dong et al., 2020).

Control variables used in this study include Return on assets (ROA), growth (GRO), Board Size (BZ), Independent directors on board (ID), and Industry (IND). Return on assets (ROA) and growth (GRO) are used to control the financial status of firms. Return on assets is the net income divided by total assets (Deng et al., 2017). Growth refers to the sales growth ratio (Chen et al., 2017). Board Size (BZ) and Independent directors on board (ID) are included to control for corporate

governance characteristics except for ownership structure. They are the number of directors on the board and the proportion of independent directors on the board, respectively (Chen et al., 2017).

Industry (IND) and year (YEA) are to control for the industry/year fixed effects. Both industry and year fixed effects are included in regressions to control for macroeconomic conditions common to all firms for each year in the sample period and industry heterogeneity, respectively (Chen et al., 2017).

For the dataset, the paper selects Chinese A-share listed firms spanning 9 continuous years from 2012 to 2020. Due to the disclosure requirements and the lack of financial data, this particular period for the sample was chosen to meet the research requirements. The data were processed as follows: 1) companies that were delisted during this period were excluded; 2) companies belonging to the financial sector were excluded 3) ST[2] companies were excluded; 4) companies without government subsidies were excluded; and 5) companies with missing values for key variables, including entertainment expenses and investment efficiency were also excluded.

After the above processing, there remained 869 companies for 9 years, that is, 869*9 = 7821 effective observations. The data are gathered from the China Stock Market and Accounting Research (CSMAR) Database. To capture the effect on the dependent variable, a two-year lag is allowed for rent-seeking and a one-year lag is allowed for other independent variables (Chen et al., 2017). For instance, companies engaged in rent-seeking activities in the year 2012; then government subsidies are received in the year 2013, which will be associated with the corporate investment efficiency in the year 2014. This is performed to ensure that the number of government subsidies received is considered by companies before they decide to do their investment. To avoid the influence of extreme values, winsorization was applied to important variables at a 1% level.

Finally, the paper builds six models to estimate the relationship between variables. Model I is structured to examine the relationship between

government subsidies and investment efficiency. Control variables are incorporated in this model as presented below:

Model I

$$IE_{i,t} = \beta_0 + \beta_1 GS_{i,t-1} + \beta_2 ROA_{i,t-1} + \\ +\beta_3 GRO_{i,t-1} + \beta_4 BS_{i,t-1} + \beta_5 ID_{i,t-1} + \\ +\Sigma IND + \Sigma YEA + \mu_i. \quad (2)$$

Then, Model II is structured to examine the relationship between rent-seeking and investment efficiency. Control variables are also incorporated.

Model II

$$IE_{i,t} = \beta_0 + \beta_1 RS_{i,t-2} + \beta_2 ROA_{i,t-1} + \\ +\beta_3 GRO_{i,t-1} + \beta_4 BS_{i,t-1} + \beta_5 ID_{i,t-1} + \\ +\Sigma IND + \Sigma YEA + \mu_i. \quad (3)$$

Subsequently, models I and II are constructed to test the mediating effect of government subsidies. They also examine the relationships between rent-seeking, government subsidies, and investment efficiency.

Model III

$$GS_{i,t} = \alpha_0 + \alpha_1 RS_{i,t-1} + \Sigma IND + \Sigma YEA + \mu_i. \quad (4)$$

Model IV

$$IE_{i,t} = \gamma_0 + \gamma_1 RS_{i,t-2} + \gamma_2 GS_{i,t} + \\ +\gamma_3 ROA_{i,t-1} + \gamma_4 GRO_{i,t-1} + \gamma_5 EMP_{i,t-1} + \\ +\gamma_6 BS_{i,t-1} + \gamma_7 ID_{i,t-1} + \Sigma IND + \Sigma YEA + \mu_i. \quad (5)$$

Model II investigates whether rent-seeking has a significant effect on government subsidies. Model III includes independent variable (i.e., rent-seeking) and mediating variable (i.e., government subsidies) into the regression model to investigate the impact of these two variables on investment efficiency.

The paper also tests the impacts of ownership structure, including property rights (i.e., SOEs and non-SOEs), institutional shareholding ratio, and

2    ST refers to stocks that are specially treated, a warning of delisting risk (Li et al., 2020).

management shareholding ratio on the relationship between government subsidies and corporate investment efficiency, respectively. According to the moderating effect test method, since government subsidies, institutional shareholding ratio and management shareholding ratio are continuous variables, the paper uses the intersection terms of the independent variable and the moderating variable to measure their moderating effect. This paper constructs V and VI to verify the moderating effects of institutional shareholding ratio and management shareholding ratio, respectively.

Model V

$$
\begin{aligned}
IE_{i,t} = {} & \beta_0 + \beta_1 RS_{i,t-2} + \beta_2 GS_{i,t-1} + \\
& + \beta_3 ISR_{i,t-1} + \beta_4 GS_{i,t-1} \cdot ISR_{i,t-1} + \\
& + \beta_5 MSR_{i,t-1} + \beta_6 ROA_{i,t-1} + \\
& + \beta_7 GRO_{i,t-1} + \beta_8 BS_{i,t-1} + \\
& + \beta_9 ID_{i,t-1} + \Sigma IND + \Sigma YEA + \mu_i.
\end{aligned}
\tag{6}
$$

Model VI

$$
\begin{aligned}
IE_{i,t} = {} & \beta_0 + \beta_1 RS_{i,t-2} + \beta_2 GS_{i,t-} + \\
& + \beta_3 ISR_{i,t-1} + \beta_4 MSR_{i,t-1} + \\
& + \beta_5 GS_{i,t-1} \cdot MSR_{i,t-1} + \beta_6 ROA_{i,t-1} + \\
& + \beta_7 GRO_{i,t-1} + \beta_8 BS_{i,t-1} + \beta_9 ID_{i,t-1} + \\
& + \Sigma IND + \Sigma YEA + \mu_i.
\end{aligned}
\tag{7}
$$

The moderating effect of property rights (PR) is also tested. Since it is a category variable, group regression analysis should be performed. Model I is used here to examine the relationship between government subsidies and investment efficiency in the full sample, the SOEs sample, and the non-SOEs sample, respectively.

## 4. RESULTS

Table 1 shows the descriptive statistics of the sample. The variation range of government subsidies (GS) is wide for different listed firms, and the collective evidence seems to suggest that the government supports firms differently. Meanwhile, the variation range of investment efficiency (IE) shows that firms make very different investment decisions during the sample period. As indicated, the median is less than the mean of rent-seeking (RS), so rent-seeking spending by most Chinese listed firms is below the average level. The mean of property rights (PR) is 0.442, indicating an almost equal number of state-owned enterprises and non-state-owned enterprises. The maximum value of the institutional shareholding ratio (ISR) is 0.987 and the minimum value is 0, indicating that there are significant differences in the institutional investors' shareholding ratio. Meanwhile, the minimum value of management shareholding ratio (MSR) is 0 and a mean of 0.059, indicating that some company executives do not hold shares and that overall, management participation is not very prevalent in China during the sample period.

Among the control variables, the minimum value of company growth (GRO) is −0.94, the maximum value is 251.2, the mean value is 0.217, and the standard deviation is 3.128, which indicates that Chinese listed companies have a relatively large growth capacity. The mean value, minimum value, and standard deviation of board size (BS) are 8.706, 4, and 1.719, respectively, indicating that there is a large gap in the board size of listed companies in the sample.

The coefficients in Table 2 show the correlation and multicollinearity between variables of sam-

**Table 1.** Descriptive statistics

| Variables | N | mean | median | sd | min | max | range |
|---|---|---|---|---|---|---|---|
| RS | 7821 | 0.0030 | 0.0020 | 0.0050 | 0 | 0.258 | 0.258 |
| GS | 7821 | 0.0150 | 0.0060 | 0.1880 | 0 | 16.470 | 16.470 |
| PR | 7821 | 0.4420 | 0 | 0.4970 | 0 | 1 | 1 |
| ISR | 7821 | 0.4540 | 0.4750 | 0.2240 | 0 | 0.987 | 0.987 |
| MSR | 7821 | 0.0590 | 0 | 0.1180 | 0 | 0.748 | 0.748 |
| IE | 7821 | 0.0800 | 0.0670 | 0.0750 | 0 | 2.380 | 2.380 |
| ID | 7821 | 0.3730 | 0.3330 | 0.0540 | 0.200 | 0.667 | 0.467 |
| ROA | 7821 | 0.0360 | 0.0320 | 0.0620 | −0.952 | 0.517 | 1.469 |
| GRO | 7821 | 0.2170 | 0.0800 | 3.1280 | −0.940 | 251.2 | 252.2 |
| BS | 7821 | 8.7060 | 9 | 1.7190 | 4 | 20 | 16 |

**Table 2.** Correlations and VIF

| Variables | IE | RS | GS | PR | ISR | MSR | ID | ROA | BS | GRO |
|---|---|---|---|---|---|---|---|---|---|---|
| IE | 1 | | | | | | | | | |
| RS | 0.0019 | 1 | | | | | | | | |
| GS | 0.0371*** | 0.2429** | 1 | | | | | | | |
| PR | 0.0993*** | −0.0175 | −0.1507** | 1 | | | | | | |
| ISR | 0.1176** | −0.0127 | −0.1421*** | 0.4261* | 1 | | | | | |
| MSR | −0.0972*** | 0.0011 | 0.0877*** | −0.4241* | −0.6135*** | 1 | | | | |
| ID | −0.0039 | −0.0090 | 0.0312** | −0.0655* | −0.1050*** | 0.0840*** | 1 | | | |
| ROA | −0.1052*** | −0.0086 | −0.0501*** | −0.0505* | 0.1272*** | 0.0962*** | 0.0393*** | 1 | | |
| BS | 0.0185 | −0.0028 | −0.0754*** | 0.2463* | 0.2131** | 0.1234*** | 0.4700*** | 0.0459*** | 1 | |
| GRO | 0.0649*** | 0.0110 | −0.0091 | 0.0227** | 0.0359** | −0.0021 | −0.0073 | 0.0243** | 0.0056 | 1 |
| | | GS | RS | OS | ISR | MSR | ID | ROA | BS | GRO |
| VIF | | 1.060 | 1.100 | 1.360 | 1.840 | 1.770 | 1.290 | 1.080 | 1.390 | 1 |

*Note*: Significant at the * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$ level.

ples by the Pearson correlation analysis. As can be seen, government subsidies (GS), property rights (PR), institutional shareholding ratio (ISR), management shareholding ratio (MSR), return on assets (ROA), and growth (GRO) are significantly correlated with the investment efficiency (IE) of companies, with $r = .0371$, $r = .0993$, $r = .1176$, $r = −.0972$, $r = −.1052$ and $r = .0649$, respectively, at a 1% or 5% level. In addition, rent-seeking (RS) and government subsidies (GS) are significantly correlated ($r = .2429$, $p < .05$). They support the hypotheses of this paper. All independent variables have coefficient correlations lower than 0.8 and higher than −0.8, and the VIF of them is lower than 2, which indicates weak multicollinearity between variables.

The Hausman specification test is used to choose between fixed-effects (FE) and random-effects (RE) in this paper. As Table 3 shows, the initial hypothesis is resoundingly rejected when the p-value, Prob > chi2 is less than 0.05 for all the models. Thus, based on this statistical result, fixed-effects models are chosen.

Finally, multiple regression analysis is used to test if government subsidies, return on assets, growth, board size and independent directors on board

significantly predict the reduction of investment efficiency. The results of Model I in Table 4 indicate these predictors explain 7.85% of the variance ($R^2 = .0785$, $F(51,6032) = 10.08$, $p < .01$). It shows a positively significant relationship between government subsidies and inefficient investment (i.e., $\beta = .138$, $p < .01$). That is to say, an increase in government subsidies will affect the drop in investment efficiency. Therefore H1 is supported. In addition, the coefficients of return on assets (ROA) are negative and statistically significant at $\beta = −.0865$ ($p < .01$), as does independent directors on board (ID) ($\beta = −.0606$, $p < .05$). Because investment efficiency is inversely measured, it indicates that companies with a better return on assets and a higher proportion of independent directors have better investment efficiency. The coefficient of growth (GRO) is significantly positive at 1% with a coefficient of .00000286, which means companies with good growth are more likely to engage in inefficient investment.

The regression results of Model II in Table 5 show that rent-seeking, return on assets, growth, board size, and independent directors on board significantly explain 6.67% of the reduction in investment efficiency ($R^2 = .0667$, $F(49,5165) = 7.53$, $p < .01$). It is found that rent-seeking significantly pre-

**Table 3.** Hausman test

| | Model I | Model II | Model III | Model IV | Model V | Model VI |
|---|---|---|---|---|---|---|
| Prob > chi2 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| H₀ | Rejected | Rejected | Rejected | Rejected | Rejected | Rejected |
| Model selection | FE model | FE model | FE model | FE model | FE model | FE model |

*Note*: $H0$: difference in coefficients not systematic.

**Table 4.** Regression for Model I

| Variables | Full sample | State-owned enterprise | Non-state-owned enterprise |
|---|---|---|---|
| GS | 0.138*** | 0.143* | 0.167** |
| | (2.77) | (1.80) | (2.48) |
| ROA | −0.0865*** | −0.168*** | −0.0490* |
| | (−4.23) | (−4.56) | (−1.92) |
| GRO | 0.00000286*** | 0.00000282*** | −0.000309 |
| | (5.93) | (6.08) | (−1.25) |
| BS | −0.00211* | −0.00336** | −0.00158 |
| | (−1.96) | (−2.19) | (−1.00) |
| ID | −0.0606** | −0.0793** | −0.0522 |
| | (−2.30) | (−2.10) | (−1.39) |
| Cons | 0.0837 | 0.0742 | 0.0820** |
| | (1.61) | (1.40) | (2.06) |
| Industry | Controlled | Controlled | Controlled |
| Year | Controlled | Controlled | Controlled |
| N | 6952 | 3073 | 3879 |
| $R^2$ | 0.0785 | 0.0426 | 0.1148 |
| F | 10.08 | 2.64 | 8.99 |
| Degrees of freedom | 51,6032 | 44,2616 | 48,3329 |
| Significance of F | 0.0000 | 0.0000 | 0.0000 |

*Note*: $t$ statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

dicts inefficient investment ($\beta = .915$, $p < .05$), indicating that rent-seeking is negatively related to investment efficiency. Thus, H2 is also supported. Model III shows an $R^2$ of .0846 and an F(48,6904) of 13.29 at the level of 1%. It presents a positively significant relationship between rent-seeking and government subsidies ($\alpha = .475$, $p < .01$). That is to say, the increase in rent-seeking costs will bring more government subsidies. Furthermore, Model III, together with Model II and Model IV, measures the mediating effect of government subsidies. Variables in Model IV also explain 6.67% of the reduction of investment efficiency ($R^2 = .0667$, F(50,5164)) = 7.5, $p < .01$). The coefficients of rent-seeking in both Model II and Model III are significant, and that of government subsidies in Model IV ($\gamma = .131$, $p < .05$) is also significant. Thus, the mediating effect of government subsidies exits and investment efficiency is negatively influenced by rent-seeking through government subsidies. The significant level shown, supports H3.

Variables in Model V and Model VI explain 6.78% ($R2 = .0678$, F(53,5161) = 7.08, $p < .01$) and 6.9% ($R2 = .069$, F(53,5161) = 7.22, $p < .01$) of the reduction of corporate investment, respectively. In Table 5, neither the shareholding ratio of institutional investors nor the shareholding ratio of the management is significant in Model V and Model

VI, indicating that they have no significant direct impact on the investment efficiency of enterprises. Also, the coefficient of GS×ISR in Model V is insignificant ($\beta = 0.0571$, $p = $ n.s), indicating that the moderating effect of institutional shareholding ratio is not significant. Therefore H5 is rejected. The coefficient of GS×MSR in model VI is significantly positive at 1.369 at 1%, indicating that the management shareholding ratio (MSR) has a strengthening effect on inefficient investment caused by government subsidies, which is opposite to what was hypothesized. Thus, H6 is also not supported.

To investigate the moderating effect of property rights (PR), that is, the influence of state-owned enterprises and non-state-owned enterprises' government subsidies on corporate investment efficiency, the paper first tests the effect by the full sample, and then divides listed companies into two groups of state-owned enterprises and non-state-owned enterprises, and uses Model I to run the regression, respectively. Model I reports an $R^2$ of .0426, an F(44,2616) of 2.64 at the level of 1% for the SOEs group, and an $R^2$ of .1148, an F(48,3329) of 8.99 at the level of 1% for the non-SOEs group. The results are shown in Table 4. As mentioned above, government subsidies (GS) are significantly positively related to inefficient investment with a coefficient of 0.138 for the full sample at the lev-

**Table 5.** Regression results for Model II to Model VI

| Variables | Model II | Model III | Model IV | Model V | Model VI |
|---|---|---|---|---|---|
| | IE | GS | IE | IE | IE |
| **Dependent variables** | | | | | |
| RS | 0.915** | 0.475*** | 0.858** | 0.854*** | 0.796** |
| | (2.29) | (4.89) | (2.14) | (2.13) | (1.98) |
| GS | | | 0.131** | 0.132*** | 0.155*** |
| | | | (2.40) | (2.42) | (2.81) |
| ISR | | | | −0.00841 | −0.00806 |
| | | | | (−0.72) | (−0.69) |
| MSR | | | | −0.00366 | −0.00436 |
| | | | | (−0.17) | (−0.20) |
| GS×ISR | | | | −0.0571 | |
| | | | | (−0.25) | |
| GS×MSR | | | | | 1.369*** |
| | | | | | (2.64) |
| **Control variables** | | | | | |
| ROA | −0.0781*** | | −0.0792*** | −0.0771*** | −0.0767*** |
| | (−3.48) | | (−3.52) | (−3.40) | (−3.38) |
| GRO | −0.000313 | | −0.000321 | −0.000312 | −0.000329 |
| | (−1.26) | | (−1.29) | (−1.25) | (−1.32) |
| BS | −0.00223* | | −0.00224* | −0.00221* | −0.00214* |
| | (−1.80) | | (−1.81) | (−1.79) | (−1.73) |
| ID | −0.0668** | | −0.0652** | −0.0657*** | −0.0645** |
| | (−2.23) | | (−2.18) | (−2.19) | (−2.15) |
| Cons | 0.0609 | 0.00702 | 0.0601 | 0.0615 | 0.0602 |
| | (1.61) | (0.52) | (0.88) | (0.90) | (0.88) |
| Industry | Controlled | Controlled | Controlled | Controlled | Controlled |
| Year | Controlled | Controlled | Controlled | Controlled | Controlled |
| N | 6083 | 6952 | 6083 | 6083 | 6083 |
| $R^2$ | 0.0667 | 0.0846 | 0.0667 | 0.0678 | 0.069 |
| F | 7.53*** | 13.29*** | 7.5*** | 7.08*** | 7.22*** |
| Degrees of freedom | 49,5165 | 48,6904 | 50,5164 | 53,5161 | 53,5161 |
| Significance of F | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

*Note*: Significant at the * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$ level.

el of 1%. The regression of state-owned enterprises shows a positive coefficient ($\beta = 0.148$) of government subsidies (GS) but is merely marginally significant at 10% level, while in the regression of the non-state-owned enterprises, the coefficient is 0.17 and is positively significant at 5%. Therefore, it suggests that government subsidies in non-state-owned enterprises show a stronger negative influence on investment efficiency, and this is also opposite to the hypothesis. Therefore, H4 is also rejected.

Finally, the study conducts regression estimation using the sample of companies in the manufacturing industry, which accounts for 63.64% of the total sample, because there are differences in the allocation of government subsidies in different industries. These results are similar to those report-

ed in previous tables and are consistent with the full sample. To save space, these results are available on request.

## 5. DISCUSSION

The role of asymmetric information in the investment decision process could explain the reason why government subsidies received damage corporate investment efficiency, and this is consistent with the study by Zhu and Liao (2019). Asymmetric information may cause companies to hide information and render the allocation of public funds sub-optimal, which may result in the under-investment of companies (Dimos & Pugh, 2016). Moral hazard issues caused by asymmetric information also seriously weaken the effect

of government subsidies. Managers will invest in negative net present value projects due to moral hazard, and government subsidies provide them more resources to expand their firms beyond the optimal size and create over-investment (Zhu & Liao, 2019).

The empirical result shows rent-seeking also reduces investment efficiency, which is supported by Cai et al. (2018), who proposed that although rent-seeking activities make obtaining subsidies easier, it lowers the utility of government subsidies because engaging in rent-seeking activities consumes a tremendous amount of valuable resources. Firms spend resources to convince the government on redistribution of rents generated by government policy and create negative average effects of rent-seeking. Such activities may lead to an inefficiency issue (Milgrom & Roberts, 1990), which explains the negative influence of rent-seeking on investment efficiency and the mediating effect of government subsidies in their relationship.

In contrast to the results of Jin et al (2018) and Arifin (2019), government subsidies received by SOEs have a weaker negative influence on investment efficiency than those received by non-SOEs. From the perspective of rent-seeking, SOEs' mo-

tivation for rent-seeking is not strong, because they have close ties with the government and can obtain government support more conveniently. On the other hand, non-SOEs are more active in rent-seeking to get the resources. Thus, SOEs spend less on rent-seeking than non-SOEs, and have a higher utility of government subsidies (Liang & Wang, 2017).

The result of the insignificant moderating effect of the institutional shareholding ratio is also different from the studies by Sakawa and Watanabel (2020) and Guoa and Platikanov (2019) but could be explained by the findings of Fan and Fu (2020). They propose that because most Chinese listing firms are highly controlled by the sole majority shareholders, institutional investors are impossible to win in a proxy fight and thus hold too small a stake to voice.

Management shareholding ratio (MSR) even has a strengthening effect on inefficient investment caused by government subsidies, which is opposite to the result of Vijayakumaran (2021). This is because Chinese controlling shareholders, who have excess control rights, collide with managers. They collectively deprived minority shareholders of their rights and there is rent-sharing between them (Zhang, Gao, et al., 2014).

## CONCLUSION

This paper aimed to clarify the relationship between government subsidies and corporate investment efficiency, and the effects of other influencing factors, such as rent-seeking and ownership structure.

Based on 2012–2020 data of A-share non-financial listed companies in China, the paper empirically finds a negative influence of government subsidies on investment efficiency. In addition, rent-seeking also damages investment efficiency. Through the mediating effect, the path of rent-seeking affecting investment efficiency is tested, and the results show that: In the negative influence of rent-seeking on the efficiency of the enterprise investment, one path is increasing the government subsidies received. Although the engagement of rent-seeking activities brings more government subsidies, it reduces corporate investment efficiency.

For the moderating effect of corporate ownership structure, the results show that non-state-owned enterprises show a stronger negative impact of government subsidies on investment efficiency than state-owned ones. Moreover, the level of management shareholding ratio aggregates the negative effect. However, the shareholding ratio of institutional investors has no significant effect on the relationship between government subsidies and investment efficiency.

A few conclusions have been drawn from the results. From the perspective of enterprises, on the one hand, they should remain objective and rational when seeking government subsidies, to prevent rent-seeking

activities from exacerbating inefficient investment. At the same time, corporate governance mechanisms should be further established by Chinese enterprises to monitor the use of subsidies and companies' investment, such as increasing the shareholding ratio of the state and management.

From the perspective of the government, it is necessary to gradually improve the corresponding government subsidy policies according to different micro-subjects. Under the correct guidance of policies, government subsidies will be provided to assist enterprises in need, with their production and operation activities and government intervention will play a better role. Secondly, the government and relevant departments need to strengthen supervision over subsidies to prevent misappropriation and misuse to improve the efficiency of use. In addition, when awarding subsidies, the rationality of ownership structure should be taken into account to ensure the reasonable and effective use of government subsidies.

Further study could bring a better understanding of the issue by expanding the scope of current research. First, the current study covers all listed companies in China's A-share non-financial industries, therefore, future research can focus on non-listed companies in China. Second, future studies may adopt different measurements for variables or change analysis tools to ensure the robustness of conclusions.

## AUTHOR CONTRIBUTIONS

Conceptualization: Xu Jiahui, Babak Naysary.
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Formal analysis: Xu Jiahui.
Investigation: Xu Jiahui.
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Resources: Xu Jiahui.
Software: Xu Jiahui.
Supervision: Babak Naysary.
Validation: Babak Naysary.
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