Government Subsidies and Inefficient Investment: Empirical Evidence Based on OLS Model

Haiwei Xu[(✉)]

Business School, Henan University, Kaifeng 475004, Henan, China
`xuhaiwei@henu.edu.cn`

Abstract. This paper takes China's A-share listed companies from 2015 to 2018 as research samples, uses OLS model to investigate the influence of government subsidies on inefficient investment of enterprises, and tests the moderating effect of executive stock ownership in the relationship between government subsidies and inefficient investment of enterprises. It is found that government subsidy can alleviate the problem of insufficient investment of enterprises, but it will aggravate the over-investment of enterprises. The increasing effect of government subsidies on over-investment of enterprises is significant when the shareholding ratio of executives is low, so increasing the shareholding ratio of executives can alleviate the increasing effect of government subsidies on over-investment of enterprises. This study has certain theoretical reference value for improving the corporate governance structure and improving the investment efficiency of enterprises.

Keywords: Government Subsidies · Executive Shareholding · Inefficient Investment

1 Introduction

Government subsidy is an important means for the government to regulate and control economic development, and it is also an important part of fiscal policy and industrial policy, which has a significant positive effect on enterprise production efficiency and social benefits. In recent years, the number of enterprises receiving government subsidies and the amount of government subsidies are increasing. Every year, hundreds of billions of subsidy funds flow into enterprises, and the effectiveness of government subsidies is getting more and more attention. However, at present, the awarding standards of government subsidies in China are still unclear, lacking clear regulations, and they are more inclined to be allocated to state-owned enterprises [7]. When enterprises receive subsidies, they may lead to rent-seeking behavior of executives [9], which disturbs the normal function of market resource allocation and leads to blind expansion of enterprises. Investment is an important activity of financial management of enterprises, an important way of resource allocation, and the main driving force of economic development. Investment efficiency directly affects the value of enterprises. Modigliani [5] think that there is the best capital allocation in a perfect capital market, and the company has

the greatest value. However, the real capital market is not a perfect capital market [10]. Due to the macro-economic influence, micro-corporate governance, personal cognitive level and experience of management, there is a certain degree of inefficient investment in enterprises [1]. At present, there is a widespread phenomenon of low investment efficiency in listed companies in China, which affects the healthy and stable development of market economy.

The principal-agent problem and information asymmetry problem are the main reasons for inefficient investment in enterprises [3]. Because shareholders can't effectively supervise the management in a timely and comprehensive manner, there is a deviation between the management's self-interest motivation and shareholders' goals, which leads to inefficient investment. The introduction of executive shareholding closely links the interests of shareholders and management, which can effectively reduce agency costs and conflicts of interest. There are many factors that affect the inefficient investment of enterprises, but there are few studies on the influence of government subsidies on the inefficient investment of enterprises at present. This paper combines the internal micro-factor of executives' shareholding ratio with the external influence of government subsidies to discuss the influence on the inefficient investment of enterprises and make a more comprehensive analysis on the effect of government subsidies.

2 Research Hypothesis

2.1 Government Subsidies and Inefficient Investment

The effects of government subsidies on enterprises are influenced by many factors. On the one hand, government subsidies can alleviate the financial pressure of enterprises to a certain extent through financial interest subsidies, tax rebates and other measures. When the government chooses subsidies, it mainly considers the growth of enterprises and the investment opportunities they face [8]. Because of lack of funds, enterprises have to give up even if they have better investment projects. The inflow of government subsidies brings more cash flow to enterprises and makes up for the funding gap. Compared with debt financing, government subsidies can alleviate the debt pressure of companies, thereby reducing financing constraints, effectively promoting enterprises to invest and reducing the problem of insufficient investment. On the other hand, due to the existence of information asymmetry, the inflow of government-subsidized funds into enterprises may increase the power of management to control the subsidized funds. The management may not really use the subsidized funds for reasonable investment projects, but blindly use the increased cash flow for investment expansion. Accordingly, this paper puts forward two hypotheses.

H1a: Government subsidies can alleviate the insufficient investment of enterprises.
H1b: Government subsidies will aggravate the over-investment of enterprises.

2.2 Executive Shareholding

Let the management of the company hold shares, which can link the interests of shareholders and management, and effectively alleviate the principal-agent problem. Equity

incentive can restrain inefficient investment of enterprises, and agency cost plays an intermediary role in it [4]. Due to the limited tenure of management, when making investment decisions, they tend to pay more attention to the short-term performance of enterprises at the expense of long-term interests. As a long-term incentive policy, management shareholding is closely related to the long-term profits of enterprises, which can effectively prevent the short-sighted behavior of management, encourage them to consider the long-term interests of enterprises more when making decisions, and invest cash flow into long-term profitable projects to improve investment efficiency. Accordingly, this paper puts forward the hypothesis:

H2: Executive shareholding can alleviate the aggravating effect of government subsidies on over-investment.

3 Research Design

3.1 Sample Selection and Data Source

This paper selects Chinese A-share listed companies receiving government subsidies from 2015 to 2018 as research samples, and makes the following treatments: (1) Excluding financial samples; (2) Excluding ST and *ST samples; (3) Delete missing samples of key variables. Finally, 2848 observations were obtained. Relevant data comes from CSMAR database.

3.2 Model Building and Variable Definition

3.2.1 Explained Variable

In this paper, Richardson [6] put forward the measurement model of enterprise expected investment for the measurement of inefficient investment degree of listed companies. Through the ratio of cash paid for the purchase and construction of fixed assets, intangible assets and other long-term assets to total assets at the beginning of the period, after eliminating the influence of different scale effects of companies, the normal investment level of enterprises is obtained. Then, the actual investment level is calculated in the same way, and the estimated investment level is subtracted from the actual investment level, and the degree of over-investment or under-investment of enterprises is measured by the obtained difference. Positive residuals represent over-investment and negative residuals represent under-investment. The smaller the absolute value of residuals, the lower the inefficient investment degree of enterprises.

$$\mathrm{Inv}_t = \beta_0 + \beta_1 \mathrm{Inv}_{t-1} + \beta_2 \mathrm{Growth}_{t-1} + \beta_3 \mathrm{Age}_{t-1} + \beta_4 \mathrm{Size}_{t-1}$$
$$+ \beta_5 \mathrm{Lev}_{t-1} + \beta_6 \mathrm{Fcf}_{t-1} + \beta_7 \mathrm{Roa}_{t-1} + \varepsilon_1 \tag{1}$$

Among them, Inv_{t-1} indicates the investment level of listed companies in various countries for t − 1 year, which is the same as Inv_t, that is, the ratio of investment scale to asset scale is the investment level after eliminating the scale effect; Growth_{t-1} is the growth rate of operating income of listed companies in various countries in t − 1 year;

Age$_{t-1}$ indicates that listed companies in various countries have listed years in t − 1 year; Size$_{t-1}$ represents the enterprise scale in t − 1 year, measured by the natural logarithm of total assets; Lev$_{t-1}$ represents the financial leverage ratio of the enterprise; Fcf$_{t-1}$ is the free cash flow of the enterprise; Roa$_{t-1}$ represents the net profit rate of total assets in t − 1 year; ε is the random error of the model.

3.2.2 Explanatory Variables

The data of government subsidy used in this paper comes from the amount disclosed in the notes to the financial statements of listed companies, and the natural logarithm of the amount of government subsidy is used to measure the intensity of government subsidy.

3.2.3 Control Variables

Referring to previous studies [2], this paper selects the listed years (Age), enterprise scale (Size), asset-liability ratio (Lev), free cash flow (Fcf), net profit margin of total assets (Roa) and equity concentration (Cr) as control variables.

3.3 Model Establishment

To test this hypothesis, the following model is established:

$$\text{Under/Over} = \beta_1 + \beta_2\text{Sub} + \beta_3\text{Age} + \beta_4\text{Size} + \beta_5\text{Lev} + \beta_6\text{Cr}$$
$$+\beta_7\text{Roa} + \beta_8\text{Fcf} + \sum Year + \sum Industry + \varepsilon \tag{2}$$

4 Empirical Results

4.1 Descriptive Statistics

Table 1 is descriptive statistics of each variable. The average value of inefficient investment is −0.023, the maximum value is 0.768, and the minimum value is −0.286, which shows that there is a certain gap in investment efficiency among listed companies in China. The minimum value of government subsidies is 9.425 and the maximum value is 20.169, and the distribution of government subsidies is uneven. The minimum shareholding ratio of executives is 0, and the maximum is 0.830, which shows that there are differences in the shareholding ratio of executives in listed companies.

4.2 Regression Result Analysis

Before regression, the model is tested by DW, in which the DW value is 1.9257, which is close to 2, indicating that there is no autocorrelation.

Table 2 shows the regression results. It can be seen from column (1) that the regression coefficient of government subsidies is −0.0039, which is significant at the level of 1%, indicating that the increase of government subsidies can alleviate the problem of insufficient investment of listed companies, so H1a is verified. It can be seen from column

Table 1. Descriptive statistics.

Variables	N	Mean	Std. dev.	Min	Max
Inv	2848	−0.023	0.115	−0.286	0.768
Sub	2848	15.663	2.084	9.425	20.169
Size	2848	22.544	1.199	19.205	28.252
Fcf	2848	0.177	0.135	−0.012	0.691
Roa	2848	0.032	0.059	−0.274	0.177
Lev	2848	0.429	0.190	0.067	0.852
Cr	2848	49.589	13.976	20.215	82.625
Age	2848	11.236	6.540	1.000	28.000
Hold	2848	0.139	0.181	0.000	0.830

Table 2. Regression results.

	(1)	(2)	(3)	(4)
	Under	Over	Low	High
Sub	−0.0039***	0.0101***	0.0109***	0.0094**
	(−7.98)	−4.7	(−3.53)	(−3.13)
Control	Yes	Yes	Yes	Yes
Year/Industry	Control	control	control	control
N	2848	2848	1424	1424
R2	0.0126	0.0125	0.0084	0.0124

Note: * * *, * * and * are significant at 1%, 5% and 10% respectively.

(2) that the regression coefficient of government subsidies is 0.0101, which is significant at the level of 1%, indicating that the increase of government subsidies will aggravate the over-investment of listed companies, so H1b is verified.

The dependent variable of columns (3) and (4) is overinvestment. They are divided into two groups according to the shareholding ratio of executives, that is, if the shareholding ratio of executives is Lower than the median, it is low, and if it is Higher than the median, it is high. It can be seen from column (3) and column (4) that in the low shareholding group, the regression coefficient of government subsidy is 0.0109, which is significant at 1% level. In the high shareholding group, the regression coefficient of government subsidy is 0.0094, which is significant at the level of 5%. The results show that, compared with enterprises with lower proportion of executives' shares, enterprises with higher proportion of executives' shares can alleviate the aggravating effect of government subsidies on over-investment, so H2 is verified.

5   Conclusions

This paper selects A-share listed companies from 2015 to 2018 as samples, explores the relationship among government subsidies, executive stock ownership and inefficient investment, and draws the following conclusions: (1) Government subsidies are negatively correlated with underinvestment of listed companies and positively correlated with overinvestment. (2) Heterogeneity analysis shows that the aggravating effect of government subsidies on over-investment has been alleviated in enterprises with high proportion of executives' shares.

The conclusions of this study have the following implications: First, we should refine the detailed rules of government subsidies, improve strict application conditions, pay attention to the problems of under-investment or over-investment of subsidized enterprises and conduct follow-up supervision, so as to better play the role of government subsidies in alleviating the under-investment of enterprises. Second, we should pay attention to bringing the internal governance structure of the company into the scope of investigation of granting government subsidies, especially the rationality of the shareholding ratio of executives, so as to promote the company to improve its governance structure, alleviate the intensification of government subsidies on over-investment of enterprises and improve investment efficiency.

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