

The equity pledge of major shareholders and innovation investment

-- Based on the empirical data of GEM listed companies

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Abstract: This paper takes China's GEM listed companies from 2007 to 2020 as the research object, and empirically tests the impact of equity pledge of major shareholders on enterprise innovation investment. It is found that the equity pledge of major shareholders will restrain the innovation investment of enterprises. Further research finds that enterprises with high internal control level, the inhibiting effect of equity pledge of major shareholders on innovation investment will be weakened, that is, internal control plays a negative regulating role.

1 introduction

Equity pledge of major shareholders means that major shareholders of an enterprise pledge their equity as the subject matter in a certain period, in exchange for cash at a certain pledge rate, in order to ease the situation of limited financing. At the same time, because stock prices fluctuate with the change of the market, the mass people reduce the risk of money back, set up a cordon and open line, in the stock price fell below open line, the people have rights to sell as the subject matter of the stake, thus on the major shareholder control the transfer of risk^[1]. In recent years, equity pledge has been widely accepted by listed companies due to its advantages of convenient and quick financing. The risk of control right transfer brought by the financing method also affects the major shareholders' attitude towards innovative investment with high risk to a certain extent. However, will enterprises really invest the funds invested after the equity pledge into the innovation activities of enterprises? Shanghai alex, for example, since it went public in 2008, the venture capital fund had pledged to almost all of the shares, and the equity pledge raise funds to buy assets, then money injected into the listed company acquisition target, achieve the expand business scale in a short period of time, to enhance the share price, and get a return on investment. In China's immature capital market, whether the equity pledge of major shareholders can provide value-added services to enterprises remains to be tested^[2].

As China's economic growth has entered a new normal, innovation has become the "engine" of the country's economic growth. According to Wind statistics, the ratio of R&D expenditure and revenue of listed companies is increasing year by year; There are a total of 61 enterprises whose R&D expenditure accounts for more than 20% of their operating revenue, of which 31 are engaged in software and services. Among these 31 enterprises, 8 enterprises' R&D expenditure exceeds 1 billion yuan,

which indicates that innovation investment has been regarded as the top priority by enterprises. Gem listed companies mostly high-tech enterprises, the demand for innovation than any other sector enterprises, its high risk, long capital recovery period, as well as the uncertainty of income instability makes the enterprise face the grim problem of financing constraints, coupled with the gem listed company information disclosure management has not been perfect, large shareholders are more likely to have after the equity pledge "hollowed out" motivation, Encroach on the rights and interests of minority shareholders. Existing literature on enterprise innovation investment mostly focuses on the macro aspects such as financial market and investor protection, or the internal governance aspects such as internal control, executive compensation and enterprise ownership structure. A few scholars have paid attention to the relationship between controlling shareholders' equity pledge and innovation investment, but no scholars have paid attention to the impact of major shareholders' equity pledge on enterprise innovation investment.

Based on the above analysis, this paper collected the relevant data of China's GEM listed companies from 2007 to 2020, and found that the equity pledge of major shareholders would inhibit the innovation investment of enterprises. Furthermore, we find that in enterprises with higher levels of internal control, this effect will be significantly weakened.

The research contributions of this paper are mainly reflected in the following aspects: First, previous studies on equity pledge are mainly focused on the perspective of controlling shareholders, and the role of equity pledge by major shareholders is rarely investigated. Secondly, previous researches on enterprise innovation mainly focus on the aspects of internal governance and macro environment. However, from the perspective of equity pledge of major shareholders, this paper provides a new way to study the influencing factors of enterprise

innovation. Thirdly, this paper analyzes the adjustment mechanism between the internal control level of major shareholders' equity pledge and enterprise innovation, which provides a certain reference for formulating policies to improve the level of enterprise governance.

2 Theoretical analysis and research hypothesis

Some scholars have pointed out that the equity pledge of major shareholders will increase the degree of separation between shareholder control rights and cash flow rights, and the larger the proportion of equity pledge, the greater the degree of separation between the two rights. The GEM listed companies are small in scale and have large investment risks, so they tend to choose relatively concentrated ownership structure in order to reduce risks. Therefore, in GEM listed companies with relatively concentrated ownership structure, because they cannot be effectively supervised, large shareholders will use their control rights to infringe on the rights and interests of small and medium-sized shareholders^[3]. Such fund hollowing behavior will weaken the innovation investment of listed companies because the capital is occupied by major shareholders. Compared with other enterprises' investment, enterprises' technological innovation requires long-term and stable huge investment to see the corresponding results, and the innovation benefits are characterized by large uncertainty and long lag period. Then, after the major shareholder pledges the equity, in order to ensure the security of the equity pledge, the controlling shareholder has the incentive to maintain the stock price by cutting the R&D investment.

On the one hand, cutting R&D spending can boost company performance and share prices in the short term. This is because according to China's current enterprise financial reporting standards, enterprise R&D investment can only be capitalized if it meets a series of strict conditions, and innovation investment that does not meet the conditions can only be expensed and included in enterprise management expenses, which may drag down the company's performance. Therefore, the impact of R&D investment on corporate value and corporate management decisions is affected by the investor structure. China's stock market has a short history of development and is dominated by retail investors, who may attach much more importance to short-term profits than the long-term value of the company's R&D investment, so that major shareholders can stimulate the stock price by cutting R&D investment.

On the other hand, the research and development activities are highly uncertain, and the failure of research and development will lead to the decline of stock price, which is what the major shareholders are trying to avoid after the equity pledge. Although on the surface, because the major shareholders have "cashed out" part of the "cash flow rights" through equity pledge, they are engaged in more risky activities at this time. However, in fact, the "warning line" and "pacifying line" are set in China's equity pledge business, which greatly increases the cost of the pledgee's breach of contract. Therefore, the failure of

research and development only requires the shareholders without pledge to bear the loss caused by the decline of stock price, but the major shareholders with equity pledge may result in the transfer of control, and thus bear the loss far more than the ordinary shareholders. Based on the above analysis, this paper proposes the following research hypotheses:

Hypothesis: With other conditions being the same, the equity pledge of major shareholders is negatively correlated with enterprise innovation input.

3 Research design

3.1 Sample selection and data sources

Because the GEM listed companies are mostly high-tech companies, there are strong research and development capabilities, but because the scale is small, the invest risk is higher, which might lead to financing difficulties. The relatively concentrated ownership structure makes the behavior of major shareholders unable to be effectively monitored, so that the motivation of "hollowing out" is stronger, and the impact on innovation investment may be greater. Therefore, this paper selects the GEM listed companies from 2007 to 2020 as the research objects, eliminates the annual observation data with missing key indicators, and further carries out the Winsorize treatment of 1% before and after the continuous variables. The data involved in the study are all from CSMAR database.

3.2 Variable selection

Based on the practice of Jiang Xueqin et al. (2021)^[4], the ratio of R&D expenditure to ending total assets is used to measure innovation investment.

In the study of Huang Suhua et al. (2020)^[5], the equity pledge ratio of the largest shareholder, that is, the ratio of the number of equity pledges and the number of shares held, is used as the standard for the equity pledge of major shareholders. At the same time, according to the research of Zhang Ruijun et al. (2014), ROA, Cash holding, asset tangible (PPE), Growth, company Size (SIZE), asset-liability ratio (LEV), executive compensation (PAY), management shareholding ratio (MANSHARE) are controlled. In addition, industry and annual effects were controlled. In addition, to ensure the robustness of the conclusion, the ratio of R&D expenditure to operating income is also used to measure the level of innovation investment in this paper. The variable definition is shown in Table 1.

3.3 Model construction

In order to test the hypothesis that the equity pledge of major shareholders is negatively correlated with innovation investment, the following regression model is established:

$$RD_{i,t} = \alpha_0 + \alpha_1 Pledge_{i,t} + \alpha_2 roa_{i,t} + \alpha_3 cash_{i,t} + \alpha_4 capital_{i,t} + \alpha_5 growth_{i,t} + \alpha_6 size_{i,t} + \alpha_7 lev_{i,t} + \alpha_8 pay_{i,t} + \alpha_9 manshare_{i,t} + \sum year + \sum industry + \varepsilon \quad (1)$$

Table1 Variable definition

symbols	Variable definition
RD_1	R&D/total asset
RD_2	R&D/operating revenue
$Pledge_{i,t}$	Equity pledge ratio
$roa_{i,t}$	EBIT/total asset
$cash_{i,t}$	Monetary capital/total asset
$PPE_{i,t}$	PPE/total asset
$growth_{i,t}$	Growth rate of total asset
$size_{i,t}$	Ln(total asset)
$lev_{i,t}$	Total liabilities/total asset
$pay_{i,t}$	Average remuneration
$manshare$	Managerial share ownership
$\sum year$	Year dummy variable
$\sum industry$	Industry dummy variable

	(-2.02)	(-0.31)
$PPE_{i,t}$	-0.289***	-0.367
	(-2.99)	(-0.40)
$growth_{i,t}$	-0.042**	-0.007**
	(-0.06)	(-0.06)
$size_{i,t}$	0.533***	0.569***
	(27.60)	(24.45)
$lev_{i,t}$	0.091**	0.007*
	(1.06)	(0.98)
$pay_{i,t}$	0.389	0.466
	(9.48)	(4.85)
$manshare_{i,t}$	0.161	0.156
	(0.041)	(2.56)
$year$	yes	yes
$industry$	yes	yes
Obs	4284	4284
Cons	0.18051	-0.16595
adjustedR²	0.08230	0.00590

4 Empirical results and analysis

4.1 Descriptive statistics

Table 2 is the result of descriptive statistics. As can be seen from Table 2, the minimum value of innovation input RD1 of enterprises from 2007 to 2020 is 0, the maximum value is 203.8, and the average value is 0.09, indicating that the level of innovation input of different enterprises is greatly different. The minimum value, maximum value and average value of equity pledge ratio of major shareholders are 0.000, 1.000 and 0.400, indicating that the situation of equity pledge of major shareholders in different enterprises is different.

Table 2 descriptive statistics

	N	mean	sd	min	max
RD1	4,284	0.0900	4.143	0	203.8
RD2	4,284	0.0174	0.0532	0	1.198
cash	4,284	2.126	100.2	3.06e-06	6,340
PPE	4,284	0.282	8.024	0	523.8
size	4,284	21.24	0.877	11.14	31.44
lev	4,284	1.038	35.97	4.69e-05	2,091
pay	4,866	13.10	0.623	10.93	16.50
Pledge	4,284	0.400	0.490	0.000	1.000

4.2 The empirical results and analysis

Table3 regression result

Variables	RD_1	RD_2
$Pledge_{i,t}$	-0.126*** (-2.46)	-0.134*** (-1.01)
$roa_{i,t}$	1.928* (-0.3.73)	1.8445*** (0.31)
$cash_{i,t}$	-0.027**	-0.005*

Table 3 reports the regression results of the main test in this paper. Can be seen in the first column (1) the result, when the r&d investment and the ratio of total assets as the proxy variable of enterprise innovation investment, major shareholders equity pledge is negatively related with enterprise innovation investment, coefficient is 0.126, and a significant at 1% significance level, support the main hypothesis of this article, the major shareholder equity pledge could suppress enterprise innovation investment. The first column (2) the results shows the r&d investment and the ratio of total operating income as the proxy variable of enterprise innovation investment, its coefficient is negative, and a significant at 1% significance level, also support the main hypothesis of this article, namely in the case of other conditions unchanged, major shareholders equity pledge could suppress the innovation of the enterprise investment.

4.3 Robustness test

4.3.1 Variable substitution

In order to improve the reliability of the results, this paper substituted the explanatory variable, which was the number of patent applications (LNPatent) of the company in that year for regression analysis. The results showed that the Pledge coefficient of major shareholders was -0.396, which was significant at the significance level of 5%, which was consistent with the previous conclusion. In other words, equity pledge of major shareholders will restrain innovation investment of enterprises.

4.3.2. Subsamples were selected for regression

According to Wind statistics, among the 61 companies whose R&D expenditure accounts for more than 20% of their operating income, 31 are engaged in software and service. Therefore, enterprises in the software and service industry are selected as samples for regression analysis. The coefficient of equity pledge rate of major shareholders is -0.016, which is significant at the significance level of 5%, consistent with the hypothesis.

5 Further analysis

The above research proves that the equity pledge of major shareholders does have a certain inhibiting effect on enterprise innovation. Therefore, in the further research, this paper investigates whether the level of internal control of enterprises can alleviate this adverse effect. In order to investigate the influence of internal control level on venture capital equity pledge and enterprise innovation, we divide the internal control level into two groups according to the median of internal control index: high internal control level and low internal control level. From the regression results, we can find that in the group with high internal control level, the coefficient between the equity pledge of major shareholders and firm innovation investment is negative, but not significant; thus it can be seen that a more perfect internal control governance environment can alleviate the negative impact caused by the equity pledge of major shareholders.

6 Conclusion

Based on the empirical analysis of the GEM listed companies from 2007 to 2020, this paper finds that the equity pledge of major shareholders has a significant inhibiting effect on innovation investment. (2) a high level of internal control can effectively suppress the adverse effects. At the same time, the author also puts forward some relevant suggestions for the development of small and medium-sized enterprises (SMEs) :(1) SMEs should strengthen corporate governance and supervision and take necessary measures to prevent the "hollowing out" behavior of major shareholders while conducting innovation research. (2) The government should increase the investment of small and medium-sized enterprises to solve their financing difficulties. There are some shortcomings in this study :(1) the universality is not high. The sample size is small, so it still needs to be tested whether the conclusion is applicable to all companies. (2) The robustness analysis is insufficient, and other methods are still needed to control endogeneity.

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