

## The Impact of Financing Choices on Innovation Activities

Lu Xu<sup>1, a</sup>, Qi Zhong<sup>2, b</sup>, Beinan Guo<sup>1, c</sup> and Xingyou Wang<sup>2, d</sup>

<sup>1</sup>School of Henan, Henan University, Kaifeng 475000, China

<sup>2</sup>School of Henan, Henan University, Kaifeng 475000, China

<sup>a</sup>15515650530@163.com, <sup>b</sup>1542820835@qq.com, <sup>c</sup>15738858985@qq.com,

<sup>d</sup>cc\_dilemma@163.com

### Abstract

**This paper uses the data of GEM listed companies in 2015-2017 to explore the impact of three financing options: equity financing, debt financing and government subsidies on corporate innovation activities. The study found that equity financing and government subsidies will promote innovation activities of enterprises, while debt financing will inhibit the innovation activities of enterprises. Therefore, improve the government's subsidy policy for enterprise innovation, improve the government's supervision, vigorously develop the equity financing market, reduce the level of leverage of enterprises, increase the innovation of listed companies on the GEM, improve China's independent innovation capability, and promote China's innovation drive. Implementation of the strategy.**

### Keywords

**Equity Financing, Debt Financing, Government Subsidy, Enterprise Innovation.**

## 1. INTRODUCTION

China vigorously advocates the construction of an innovative country. At the same time, in the report of the 19th National Congress of the Communist Party of China, "innovation" has also been mentioned many times, and innovation is the driving force for China's development. To this end, we must comprehensively enhance the independent innovation of enterprises ability. And in the current new normal of the Chinese economy's overall turn to innovation-driven development, innovation is the basis for enterprises to maintain sustainable development in the fierce market competition, but enterprise innovation is inseparable from the support of funds. The financing channels for independent innovation of Chinese enterprises mainly include: internal financing, equity financing, debt financing and government subsidies. Since most of the endogenous capital enterprises are used for main business turnover, and the scale of internal financing is limited, even if internal fund accumulation and working capital management can continue to innovate, innovation activities require sustained huge amounts of capital, taking into account the GEM. Most of the listed companies are emerging industries, and the profit is not very stable. It cannot guarantee the continuous investment of innovation. Therefore, the internal financing has a lot to do with the innovation activities of the company, taking into account the costs, benefits and risks of different financing methods, and combining with the GEM. The characteristics of listed companies, this paper will focus on the relationship between the choice of external financing channels and the innovation activities of listed companies on the GEM, and examine the impact of corporate external financing options on corporate innovation activities from the perspective of financial mismatch. The GEM listed companies are high-tech, high-growth and high-risk. The innovation activities are relatively frequent and have higher difficulty factors than other companies. The characteristics of the GEM make the GEM

market a platform to support the core strategy of national independent innovation. Therefore, research based on China's GEM listed companies is relatively representative.

## 2. REVIEW OF RELEVANT LITERATURE

The external financing channels for corporate innovation activities in China mainly have the following three options: equity financing, debt financing and government subsidies. According to Myers and Majluf 's theory of "food-by-food", enterprises often follow the order of internal financing, debt financing, and equity financing, while some scholars combine foreign financing options with independent innovation to study the innovation activities of enterprises. There is no consistent conclusion on the order of source financing options. Atanassov, Nanda, and Seru (2005) argue that the formation of equity and debt contracts through the open market can provide management with more discretion to promote corporate innovation and use data from US companies from 1974 to 2000 this view [1]. Later, Viral Acharya and Zhaoxia Xu (2016) conducted research on US listed companies and non-listed companies, and found that in industries with higher dependence on external financing, research shows that listed companies are more frequent than non-listed companies in their innovation activities. More, but no similar results were found in industries with high internal financing dependence. It can be inferred that the impact of corporate listing on innovation depends on the demand for external financing [2]. Domestic scholars have different views on the impact of financing choices on innovation activities. Li Huidong et al. (2013) used 2006 to 2010. During the year, the empirical data of listed companies in China was sampled. Empirical research found that both internal financing and external financing can have a significant positive impact on innovation investment, but the impact of external financing is greater than that of endogenous financing. Further research on different forms of external financing, it is found that the positive impact of government subsidies, equity financing, and debt financing on enterprise innovation decisions is reduced in turn, and the role of debt financing is not significant [3]. However, Zhong Tianli, Hu Yanbin, and Zhang Tianyu (2013) used the GEM companies from 2009 to 2011 to conduct an empirical analysis of the sample, and studied the relationship between the financing structure (ie debt financing ratio) and innovation investment, confirming the Negative correlation [4]. In summary, the order of financing channels for innovation activities has not reached a consistent conclusion. This paper empirically analyzes the financing order of GEM listed companies for innovation activities based on the empirical analysis of GEM listed companies.

## 3. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

According to Kochar (1997), debt financing is a contract that is based on market trading rules and is market governance. Equity financing is a contract from within the enterprise and is a bureaucratic governance. According to the analysis of transaction cost economics, the higher the level of corporate asset specificity, the stronger the willingness of asset investment to use for innovation activities, then the more enterprises tend to equity financing (grass governance), the only way to save transaction costs and reduce transaction costs. To ensure the efficiency of the contract. The theory of priority financing believes that the higher income expectation and risk inclusiveness of equity investors make equity financing have a positive effect on innovation activities, and the risk aversion characteristics of creditors lead to the negative correlation between debt financing and innovation. And equity investors pay more attention to the growth of enterprises. Most of the listed companies on the GEM are fast-growing small and medium-sized enterprises or emerging enterprises. They are small in scale and high in risk. Compared with debt investors who expect stable investment income, equity investment will pay more attention to the growth value of R&D investment for the company, and therefore are willing to take on higher risks. The non-physicalization of innovation results in the formation of intangible

assets, so that it is difficult to provide mortgage guarantee for loans, and it is difficult to obtain bank loans. Even if enterprises can obtain credit funds through bank loans, etc., high interest expenses and principal. The repayment pressure and the uncertainty of the income of the innovation project will also cause the company to face greater financial risks, which will further amplify the business risk, which is not conducive to the company to control the risk within the safe range.

Government subsidies are generally regarded as a special external financing channel that contains almost no cost. Government subsidies can not only provide great financial assistance to enterprises' technological innovation activities, but also bring other financing sources to enterprises. The financing channels of enterprises have been broadened, the investment in innovation activities has been increased, and the level of innovation of enterprises has been enhanced. The process of government subsidies for innovation is called "stimulating effect". The government subsidy will also have a "crowding out effect" on technological innovation. This effect means that the government will reduce the investment in technological innovation activities of enterprises after subsidizing enterprises, thus reducing the level of technological innovation of enterprises. Some scholars have separately studied the relationship between government subsidies and independent innovation, and verified that government subsidies have the effects of "stimulating effect" and "crowding out effect" in terms of independent innovation input, although the views are different, but in general R&D investment has positive externalities, so government subsidies are needed to increase corporate income or reduce corporate costs, and to increase corporate enthusiasm for innovation activities. And Li Huidong (2013), based on the sample of Chinese listed companies, found that the biggest impact on corporate innovation investment is government subsidies. Some studies have also found that government subsidies can be used not only for R&D expenditures, but also that the favorable signals of competitive innovations in corporate innovation projects can further help enterprises obtain external financing. Therefore, government subsidies are positively related to corporate R&D expenditures, Duan Haiyan (2016) [5] [6].

Financing behavior can introduce the funder into the enterprise decision-making system through contractual means, and it will have an impact on many innovative decisions including innovation investment. With the increase of the proportion of equity financing, the bargaining power of equity investors in the process of enterprise innovation decision-making is enhanced. Equity investors with strong innovation preferences will use the corporate governance mechanism to improve the innovation investment of enterprises by controlling the decision-making of the board of directors. Ensure the continuity of innovation activities and gain innovative benefits. In terms of government subsidies, because the government will track and supervise the use and effect of subsidies, enterprises that receive government subsidies have a strong incentive to promote innovation output by enhancing innovation input, so as to maintain good government-enterprise relations and obtain continuous subsidies. However, the risk aversion characteristics of creditors make them more inclined to use free cash flow constraints, supervision and other means to reduce corporate innovation investment, and thus avoid excessive innovation risk threatening their fixed income claims.

Based on the above theoretical analysis, the following assumptions are made:

H1: The impact of equity financing, debt financing and government subsidies on innovation output is different due to differences in risk appetite and value expectations.

H2: The high risk and high growth of GEM listed companies match the preferences of equity investors, which has a significant positive correlation between equity financing and corporate innovation;

H3: Government subsidies as a special financing option have a positive effect on government subsidies and innovation;

H4: The risk aversion of creditor investors has a significant negative correlation between the debt financing options of GEM listed companies and corporate innovation activities.

## 4. RESEARCH DESIGN

### 4.1. Sample Selection and Data Sources

This paper selects the data of the GEM listed companies in 2015-2017 as the research sample, and excludes the companies with missing data and unreasonable data during the analysis period. After the elimination, the total number of samples is 1256. The data is mainly from the Guotaian database. The statistical analysis software used in this paper is Excel and Stata14.0.

### 4.2. Variable Definition

1. The variable being interpreted. Referring to the existing literature, enterprise innovation is usually measured from the perspective of innovation input and innovation output, because the innovation results are less comparable and highly susceptible to exogenous variables, and the company's innovation activities need financial support. innovation and investment may well reflect an increased preference for innovation activities, so this select R&D to measure corporate innovation activities, in order to make the model better fit, better show the mathematical nature of the data, so the R&D logarithmic, The interpreted variable is represented by RD .

2. Explain the variables. For the core explanatory variables, this paper mainly studies the impact of the three financing channels of the GEM companies on the innovation activities. Therefore, the equity financing is measured by the ratio of paid-in capital to total assets, and the asset-liability ratio is used to measure debt financing. Government subsidies are measured by government agencies' ratio of government subsidies to total assets.

3. Control variables. In addition, taking into account the interference of other factors, by referring to the existing literature, the following variables reflecting the characteristics of the company are selected for control: enterprise scale, enterprise growth, equity structure, product competitiveness, product demand, R&D personnel input intensity and year. As a control variable.

**Table 1.** Variable definition

Variable type	Variable name	Variable code	Meaning and description of the variable
Explained variable	Innovation	RD	Ln ( R&D )
Explanatory variables	Equity financing	Stake	Paid-up capital / total assets
	Debt financing	Debt	Total liabilities / total assets
	government subsidy	Gov	Government subsidy/total assets
Control variable	Scale	Size	Ln (total assets)
	Growth	Growth	
	Equity structure	Percent1	Operating income growth rate
	Product competitiveness	Compete	The shareholding ratio of the largest shareholder
	Product demand	Demand	Sales expenses/operating income Operating income / total assets at the beginning of the year (R&D staff / staff total) *100%
	R&D staff input intensity	Labor	Virtual variable
	Years	Year	

### 4.3. Model Settings

In order to verify the impact of the external financing channels on innovation activities, this paper constructs the following measurement model to test the relationship between the two.

$$(1)RD=\alpha+\beta_1Stake+\beta_2Size+\beta_3Growth+\beta_4Percent1+\beta_5Compete+\beta_6Demand+\beta_7Labor+Year+\varepsilon$$

$$(2)RD=\alpha+\beta_1Debt+\beta_2Size+\beta_3Growth+\beta_4Percent1+\beta_5Compete+\beta_6Demand+\beta_7Labor+Year+\varepsilon$$

$$(3)RD=\alpha+\beta_1Gov+\beta_2Size+\beta_3Growth+\beta_4Percent1+\beta_5Compete+\beta_6Demand+\beta_7Labor+Year+\varepsilon$$

Where  $\alpha$  is the constant term on the right side of the equation,  $\beta$  represents the regression coefficient, and  $\varepsilon$  is the residual term.

## 5. EMPIRICAL ANALYSIS

### 5.1. Descriptive Statistical Analysis

**Table 2.** Variable descriptive statistics

Variable symbol	Maximum	Minimum value	average value	Standard deviation	median
RD	21.344	12.813	17.686	0.919	17.664
FM	10.282	0.00003	0.978	0.835	0.868
Stake	0.695	0.016	0.183	0.098	0.161
Debt	1.037	0.041	0.346	0.164	0.324
Gov	0.144	0.00006	0.015	0.016	0.010
Size	24.616	19.569	21.572	0.801	21.516
Growth	16.908	-0.680	0.366	0.726	0.240
Percent1	74.856	4.151	29.609	12.194	27.890
Compete	0.683	0.683	0.088	0.088	0.061
Demand	22.064	22.064	0.654	0.867	0.542
Labor	92.220	0.550	24.598	90.381	17.885

Table 2 reflects the descriptive statistics of each empirical variable. Among the three financing options, the credit financing channel showed strong volatility, with a maximum of 1.037, a minimum of 0.041, and a median of 0.324. Followed by the equity financing channel, the maximum value is 0.695, the minimum value is 0.016, and the median is 0.161. Government subsidy this financing channel has the least volatility and is the most stable with a standard deviation of 0.016 and a median of 0.01. Among the selected control variables, R&D personnel accounted for the largest volatility, with a maximum of 92.220, a minimum of 0.550, and a standard deviation of 90.381, while the average R&D investment accounted for only 24.598. Followed ownership structure, the selected stake the largest shareholder volatility followed, standard deviation of 12.194, a maximum of 74.856, the minimum is 4.151, median 27.890. Other control variables are more stable in volatility.

## 5.2. Data Analysis

**Table 3.** Differences in financing options for innovation activities

VARIABLES	(1) Model1 RD	(2) Model2 RD	(3) Model3 RD
Stake	0.539** (0.217)		
Debt		-0.333** (0.134)	
Gov			13.32*** (1.165)
Size	0.752*** (0.0270)	0.755*** (0.0274)	0.766*** (0.0247)
Growth	-0.0281 (0.0285)	-0.0333 (0.0284)	-0.0177 (0.0271)
Percent1	-0.00206 (0.00165)	-0.00205 (0.00165)	-0.00143 (0.00157)
Compete	1.494*** (0.227)	1.463*** (0.229)	1.277*** (0.217)
Demand	0.0291 (0.0235)	0.0343 (0.0238)	0.0284 (0.0224)
Labor	0.000457** (0.000218)	0.000456** (0.000218)	0.000336 (0.000208)
Constant	1.205** (0.605)	1.354** (0.586)	0.821 (0.543)
Year	control	control	control
Observations	1,256	1,256	1,256
R-squared	0.431	0.431	0.482

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 3 shows the main regression results. Through the model1 and model3 of Table 3, it can be found that the GEM listed companies have positive impact on the innovation activities of enterprises through the two financing channels of equity financing and government subsidies, but the impact of debt financing on corporate innovation activities is negative. The regression coefficient of equity financing (Stake) is 0.539, and it is significant at 5% level, indicating that the financing channel of equity financing has a positive effect on innovation activities, and H2 can be proved. The government subsidy (Gov) has a regression coefficient of 13.32, and has passed a significant test at a significant level of 1%, indicating that government subsidies have a positive effect on innovation activities. This financing channel can effectively promote business-to-innovation activities. The input, H4 is proved. From model1 and model3, it can be seen that the regression coefficient of government subsidies is significantly greater than the regression coefficient of equity financing. For every percentage point increase in government subsidies, Ln ( R&D ) will increase by 13.32 , and the proportion of equity financing will increase by one percentage point, Ln ( R&D)) can only increase by 0.539 , so the positive effects brought by equity financing and government subsidies are different, and the government subsidies are more effective. Corporate financing is more inclined to choose government subsidy channels for innovation activities. The debt financing (Debt Total) regression coefficient of -0.333, and 5% on the level of significance by the significance test, indicating that debt financing for corporate innovation activities play an inhibitory effect, validate the H3 hypothesis. Through the above analysis, the impact of the three financing options on innovation activities is different, and H1 is proved.

## 6. CONCLUSIONS AND RECOMMENDATIONS

This paper analyzes the relationship between the external financing options of GEM listed companies and corporate innovation activities, indicating that the three channels of external financing have different effects on innovation activities due to different risk preferences and income expectations. Although GEM listed companies have frequent innovation activities, the high risk of innovation makes debt investors discouraged, so debt financing has a negative effect on innovation activities. However, the GEM listed companies have high growth through independent innovation of the company. For shareholders, they are more concerned about the long-term development of the company, and the risk is more inclusive than the debt investors. Therefore, equity financing can promote the innovation activities. The state has initiated an innovation-driven strategy and has given many preferential policies to encourage independent innovation. It has provided financial support to enterprises through government subsidy channels, showing the government's emphasis on innovation and good expectations for the country's future. Therefore, government subsidies can stimulate enterprises to carry out innovation activities.

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