Financing Constraints, R&D Investment and Enterprise Performance

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Abstract. This paper selects the data of A-share listed companies in Shanghai and Shenzhen stock markets from 2015 to 2019, combined with the actual situation of financing constraints faced by listed enterprises in China, and studies the correlation among financing constraints, R&D investment and corporate performance. to explore the impact of financing constraints on corporate performance and whether there is an intermediary effect of R&D investment. It is found that: (1) there is a negative correlation between financing constraints and corporate performance; (2) there is a negative correlation between financing constraints and R&D investment; (3) there is a positive correlation between R&D investment and corporate performance; (4) R&D investment plays an intermediary role in the relationship between financing constraints and corporate performance.

Keywords: Financing Constraints · R&D · Investment and Enterprise Performance

1 Introduction

In the report of the 19th CPC National Congress, General Secretary Xi Jinping laid out a blueprint for building a world scientific and technological power. China will be in the forefront of innovative countries in 2030 and become a world power in scientific and technological innovation by 2050. According to the data released by the China Science and Technology Statistical Yearbook and the National Bureau of Statistics, the total R&D investment in China has ranked second in the world, but there is still a large gap compared with the United States, Germany, Japan, South Korea and other developed countries. As an important support of technological innovation, R&D activities are very important to consolidate and enhance the core competitiveness of enterprises. The R&D investment of enterprises needs a lot of financial support, and the external financing cost is large, so it is highly dependent on internal funds, and there are widespread financing constraints, which to a certain extent leads to the impact of R&D investment on enterprise performance [4]. The lack of R&D investment and the lack of independent innovation ability of enterprises are still the key factors restricting the upgrading of industrial structure and the transformation of economic growth mode. Through the analysis, we can find that there is a certain internal relationship among financing constraints, R&D investment and enterprise performance. Therefore, in order to achieve the long-term development of enterprises, we should pay attention to the correlation between the three.

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2 Theoretical Analysis and Research Hypothesis

2.1 Financing Constraint and Enterprise Performance

Although some scholars believe that financing constraints can promote corporate performance, there is still a negative correlation between the two as the mainstream in academic circles. In the study of negative correlation, Ayyagari [1] found that if enterprises want to develop rapidly, they can not do without external financing. If enterprises are constrained by financing, it will certainly limit the rapid development of enterprises and affect their performance.

Financing constraints will have an impact on corporate performance to a large extent. The emergence of financing constraints is due to the fact that the integrity and authenticity of external information is worse than that of internal information, and external investors are facing higher investment risks [2]. In order to obtain the income matched with the risk, external investors usually demand a higher return on investment, resulting in higher external financing costs than internal financing costs, resulting in the plight of expensive financing and difficult financing. To a certain extent, this restricts the investment behavior of enterprises and harms the performance of enterprises. Therefore, hypothesis 1 is proposed:

H1: There is a negative correlation between financing constraints and enterprise performance.

2.2 Financing Constraints and R&D Investment

R&D investment activities have high confidentiality, because if the disclosure of information will cause other enterprises to imitate the loss of competitiveness, so enterprises will relatively keep the specific information about R&D projects confidential. Information asymmetry and the particularity of R&D activities make it difficult for enterprises to obtain external financing. When internal funds can not meet the needs of R&D investment, financing constraints will be formed. When the external financing cost of the enterprise is too high and the R&D funds are very scarce, it will cause the enterprise to be unable to invest in R&D due to lack of funds. Therefore, the problem of financing constraints will make the enterprise lack of funds, and then restrain the enterprise's R&D investment. Therefore, hypothesis 2 is proposed:

H2: There is a negative correlation between financing constraints and R&D investment.

2.3 R&D Investment and Enterprise Performance

According to the resource view, enterprises are the collection of resources, and the differences in resource endowment and utilization efficiency will make the competitiveness of different enterprises at different levels. Intangible resources are important factors for enterprises to achieve distinctive performance, and enterprise R&D activities are the main way to obtain valuable, difficult to imitate and substitute intangible assets. Enterprises can develop and utilize existing resources through innovative activities, broaden the utilization channels of existing resources, explore the potential utilization value of

resources, and build competitive advantages. Hu and Jefferson [3] found that R&D investment has a significant positive impact on corporate performance. Therefore, hypothesis 3 is proposed:

H3: There is a positive correlation between R&D investment and enterprise performance.

2.4 Financing Constraints, R&D Investment and Enterprise Performance

When the financing constraint of the enterprise is too high and it is difficult to raise funds, there may be problems in the operation and development of the enterprise, and the enterprise that can not get the capital turnover will fall into the difficult situation of operation. The excessive financing constraints make the enterprise funds too tight, make the management face the pressure from the rational use of funds, do not dare to carry out innovative activities rashly, and will choose low-risk projects to invest, which may lead to the waste and improper use of funds, reduce the efficiency of R & D investment and affect the performance of enterprises [5]. Based on the analysis, it can be inferred that R & D investment plays an intermediary effect in the role of financing constraints on corporate performance. Therefore, hypothesis 4 is proposed:

H4: R&D investment plays an intermediary role between financing constraints and corporate performance.

3 Research and Design

3.1 Sample Selection and Data Sources

The samples of this paper are selected from Shanghai and Shenzhen A-share listed companies in 2015 and 2019. In terms of screening data, we follow the following criteria:

(1) excluding the listed companies in the financial industry, financial companies are generally not included in the study sample because of the particularity of the industry.
(2) excluding ST and * ST companies that appear in any year during this period.
(3) excluding companies with abnormal data and other missing financial data.

The above sample company data are all from CSMAR database, and the data are analyzed by statistical software Stata16.0.

3.2 Variable Definition

ROA can reflect the overall profitability of enterprise assets and is an important index to evaluate the operating efficiency of all enterprise assets. Therefore, this paper chooses to use the net profit margin of total assets (ROA) for the main test. This paper takes the financing constraint (SA) as the explanatory variable. The common indexes to measure financing constraints are KZ index, WW index and SA index. In order to avoid the influence of endogenous financial indicators and the error of Tobin Q value, this paper

Table 1. Variable definition.

Variables	Variable definition
ROA	Net profit / total assets
SA	$0.737\text{Size} + 0.043Size^2 - 0.04Age$
R&D	R&D expenses / operating income
Size	Ln(total asset)
Age	Number of years of establishment
Share	The largest shareholder's ratio
LDR	Long-term liabilities / total assets
$\sum$ ***Year***	Year dummy variable
$\sum$ ***Industry***	Industry dummy variable

will draw lessons from the research method proposed by Hadlock and Pierce and use SA index to measure the financing constraints faced by enterprises. $SA = 0.737\text{Size} + 0.043Size^2 - 0.04Age$. The higher the value of SA index, the higher the degree of corporate financing constraints. The measurement of R&D investment can be divided into absolute index and relative index. This paper uses the relative index of R&D expenditure rate to measure the intensity of R&D investment. In this paper, company size, company age, equity concentration and long-term debt ratio are selected as control variables. See Table 1 for details.

3.3 Model Construction

$$\begin{aligned} ROA_{i,t} &= \beta_0 + \beta_1 SA_{i,t} + \beta_2 Size_{i,t} + \beta_3 Age_{i,t} \\ &+ \beta_4 Share_{i,t} + \beta_5 LDR_{i,t} + \beta_6 Year + \beta_7 Industry \\ &+ \varepsilon_{i,t} \end{aligned} \tag{1}$$

$$\begin{aligned} R\&D_{i,t} &= \beta_0 + \beta_1 SA_{i,t} + \beta_2 Size_{i,t} + \beta_3 Age_{i,t} \\ &+ \beta_4 Share_{i,t} + \beta_5 LDR_{i,t} + \beta_6 Year + \beta_7 Industry \\ &+ \varepsilon_{i,t} \end{aligned} \tag{2}$$

$$\begin{aligned} ROA_{i,t} &= \beta_0 + \beta_1 R\&D_{i,t} + \beta_2 Size_{i,t} + \beta_3 Age_{i,t} \\ &+ \beta_4 Share_{i,t} + \beta_5 LDR_{i,t} + \beta_6 Year + \beta_7 Industry \\ &+ \varepsilon_{i,t} \end{aligned} \tag{3}$$

$$\begin{aligned} ROA_{i,t} &= \beta_0 + \beta_1 SA_{i,t} + \beta_2 R\&D_{i,t} \\ &+ \beta_3 Size_{i,t} + \beta_4 Age_{i,t} + \beta_5 Share_{i,t} + \beta_6 LDR_{i,t} + \beta_7 Year \\ &+ \beta_8 Industry + \varepsilon_{i,t} \end{aligned} \tag{4}$$

4 Empirical Results and Analysis

4.1 Descriptive Statistics

We have made a descriptive statistical analysis of the variables. See Table 2 for details.

As can be seen from the results of Table 2: first, in terms of the explained variables, the average value of corporate performance is 0.12 and the standard deviation is 0.15, indicating that there is little difference in revenue of the selected sample companies. Second, in terms of explanatory variables, the average value of financing constraints is 3.51, the standard deviation is 0.30, the maximum is 4.32, and the minimum is 2.86, indicating that there are indeed differences between the selected companies, but the overall difference is not significant. The average R&D investment is 5.29 and the standard deviation is 4.61. According to the gap between the maximum value and the minimum value, we can see that there are great differences in the R&D situation between enterprises, and each enterprise pays different attention to R&D investment projects and innovation activities. The standard deviation of enterprise size and enterprise age is 1.86 and 5.69 respectively, which shows that there is a big difference in enterprise size and its maturity is also different. The standard deviation of the shareholding ratio of the largest shareholder is 16.83, the minimum is 11.87, and the maximum is 83.01. There is a great difference in ownership structure. The average long-term debt ratio is 0.08, and the capital structure of enterprises is still relatively conservative.

4.2 Regression Analysis

We carry on the regression analysis according to the model established above. See Table 3 for details.

As shown in column (1), R^2 is 0.569, and the regression coefficient between financing constraints and corporate performance is −0.012, which is significantly negatively correlated at 1% level, that is, H1 is established.As shown in column (2), R^2 is 0.287, and the regression coefficient between financing constraints and R & D investment is

Table 2. Descriptive statistics.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
ROA	5967	0.12	0.15	−0.04	0.37
SA	5967	3.51	0.30	2.86	4.32
R&D	5967	5.29	4.61	0.25	48.62
Size	5967	23.56	1.68	20.34	27.98
Age	5967	18.31	5.69	5	36
Share	5967	40.52	16.83	11.87	83.01
LDR	5967	0.08	0.11	0	0.49

Table 3. Regression result

	(1)	(2)	(3)	(4)
VARIABLES	ROA	R&D	ROA	ROA
SA	−0.012***	−0.005***		−0.008***
	(−10.37)	(−3.84)		(−8.77)
R&D			0.274***	0.124**
			(4.07)	(2.67)
Size	0.007**	−0.008***	0.007***	0.009***
	(3.88)	(−4.67)	(4.03)	(3.21)
Age	0.003***	−0.006	0.005	0.004***
	(4.16)	(−1.52)	(5.67)	(4.21)
Share	0.021	−0.003**	0.001***	0.025
	(1.38)	(−2.63)	(2.64)	(1.43)
LDR	−0.062***	0.058***	−0.128***	−0.069***
	(−4.51)	(3.83)	(−10.51)	(−4.87)
R^2	0.569	0.287	0.367	0.571

−0.005, which is significantly negatively correlated at 1% level, that is, H2 is established.As shown in column (3). R^2 is 0.367, and the regression coefficient between R&D investment and enterprise performance is 0.274, which is a significant positive correlation at the level of 1%, that is, H3 is established. Variable financing constraints, R&D investment and corporate performance are put into the regression equation at the same time, as shown in column (4), R^2 is 0.571, and the regression coefficient of financing constraint is −0.008, which is significantly negative at 1% level and less than −0.012 in (1). The intermediary effect test is passed, that is, H4 is established.

5 Conclusion

The main results are as follows: (1) there is a negative correlation between financing constraints and corporate performance. The higher the financing constraints, the more difficult it is for enterprises to obtain the funds they need, and it will not be able to meet the needs of enterprises to expand their business scale, so it will reduce the income of enterprises, reduce the profits of enterprises, and ultimately reduce the performance of enterprises. (2) there is a negative correlation between financing constraints and R&D investment. The financing constraints of enterprises will make it more difficult for enterprises to obtain funds. if it is difficult to obtain funds from the external market, it will be very difficult for enterprises to have sufficient funds to guarantee R&D investment, which will reduce their willingness to innovate. Will only maintain the most basic operation. (3) there is a positive correlation between R&D investment and enterprise performance.

Enterprises should increase investment in R&D, improve the ability to transform innovative achievements, improve the level of innovation output, and gradually form the core competitiveness, so that enterprises can occupy a dominant position in the market competition and greatly improve the level of profitability. And then promote the improvement of enterprise performance. (4) R&D investment plays an intermediary role in the relationship between financing constraints and corporate performance. Financing constraints lead to the shortage of R&D investment, hinder the effective development of enterprise innovation activities, cause insufficient R&D investment, restrict the improvement of enterprise science and technology innovation ability, and finally lead to the decline of market competitiveness and hinder the growth and development of enterprises. Reduce the level of enterprise performance.

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