Study on the Impact of Innovation Inputs on Firms' Debt Repayment

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Abstract

Under the condition that the stock capital of enterprises remains unchanged, increasing innovation investment means decreasing debt repayment capital, which has an impact on debt repayment. The article screens 2124 listed companies in Shanghai Stock Exchange and Shenzhen Stock Exchange as the research objects to construct multiple regression model and conduct empirical research on the relationship between company's innovation investment and company's debt repayment. Conclusion: 1, innovation investment has a negative correlation effect on the company's debt repayment; 2, the company's innovation investment has a greater negative effect on its debt repayment under the state support. It enriches the theory of the influence of company innovation input on debt repayment and provides reference for company innovation input.

Keywords

Innovation Input, Debt Repayment, Policy Support.

1. Introduction

Innovation is the driving force of enterprise development, and according to the Global Innovation Index Report 2021 released by the World Intellectual Property Organisation, China has risen from the 14th place in 2020 to the 12th place, keeping rising for nine consecutive years. The growth rate shows that the growth of innovation investment expenses of Chinese enterprises is significantly higher than that of most countries. The 21st century is the era of knowledge economy, and the Chinese economy has entered the stage of high-quality growth. In the context of the Chinese government's strong support for technological innovation, the introduction of a series of support for "speciality, speciality, speciality and new" enterprises to reduce taxes and fees, revitalise the stock of capital, reduce the risk of corporate innovation, and promote the growth of the company's innovation investment funds, and the increase in investment in innovation in turn will have an impact on the repayment of its own debt. The large investment of innovation capital may not bring returns, or even bring financial debt repayment risk, the current stage of China's company R & D innovation investment will increase the impact of corporate debt repayment has become a research proposition. In order to supplement the empirical study of the impact of the company's investment in science and technology innovation on its debt repayment under the perspective of the epidemic, this paper screens the data of 2124 companies in Shanghai Stock Exchange and Shenzhen Stock Exchange in 2021, constructs a multiple regression model, analyses the relationship between the company's investment in science and technology innovation and debt repayment, and provides data support and references for the company to further improve its innovation mechanism.

2. Research Objectives

The intensity of companies' willingness to invest in innovation varies in different economic environments, and the size of the investment in corporate innovation depends on the

management's view of the financial risk posed by future debt repayment and the degree of future cash flow security. To study the impact of listed companies' innovation investment on debt repayment under the background of epidemic impact in Chinese enterprises from 2020 to 2021, to test whether the impact of companies' innovation investment on debt repayment deviates from the theoretical predicted trajectory under the normal market economy conditions in the special economic and social stage, and what role it plays in this impact under the conditions of enjoying government support policies, so as to provide data support and reference for the formulation of enterprise support policies and fund supervision by local governments. This will provide data support and reference for local governments to formulate enterprise support policies and fund supervision.

3. Literature Review and Research Assumptions

Regarding the relationship between corporate innovation R&D investment and corporate solvency, many scholars have studied it from different levels in the previous period. Pan Ruiting (2022) points out that R&D investment has a negative impact on the long-term solvency of enterprises, due to the difficulty of forming profits during the R&D period and the unpopularity of R&D products, it is difficult for the company to obtain a large amount of cash inflow, resulting in the weakening of long-term solvency. Guo Liting (2020) pointed out that there is a negative relationship between gearing ratio and innovation expenditure, that is, the higher the corporate gearing ratio, the lower the probability that the company will make innovation investment. Xiao Hailian (2014) pointed out that basic innovation investment is significantly constrained by debt scale financing, and general innovation expenditure has no significant impact on debt financing scale. Wang Yufeng,Zhang Na (2014) pointed out that both long-term borrowing and short-term borrowing have influence on innovation expenditure, and at the same time showed that long-term borrowing has a greater effect on innovation expenditure than short-term borrowing. Han (2017) argued that financing constraints are inversely proportional to corporate innovation investment. The empirical results, such as Liu Tu (2015), show that the overall debt level of the company can promote the innovation input and output of the enterprise. Zeng Lingling (2016) argues that the higher the gearing ratio of manufacturing companies, the smaller the innovation input of the enterprise; the more short-term liabilities the smaller the innovation input. From the above scholars' discussion, it can be seen that Chinese and foreign scholars have different or even opposite views on the relationship between innovation input and debt repayment. Enterprises in different economic and social environments, the same question can be answered from different perspectives, the current business in the epidemic under the influence of the number of intellectual transformation in the stage of high-quality development, empirical testing of this proposition is of practical significance.

3.1. The impact of innovation inputs on corporate debt repayment

Into the 21st century, the development of science and technology, such as big intelligence, mobile cloud and other rapidly changing, the only way to make the enterprise invincible under the current century has not seen a major change in science and technology innovation, the only way to develop innovation has become the consensus of the enterprise. To innovate we need capital investment, high-tech talent and high-tech equipment require large-scale capital, when the enterprise has more surplus funds when the debt ratio is low, the enterprise is more inclined to R & D innovation investment, the enterprise's debt ratio is high and its R & D investment is less. When a company wants to carry out economic activities such as innovation and R&D investment, the level of gearing ratio is particularly important. In the case of the company's stock of capital to maintain a stable situation, innovation investment in more funds means that the solvency of the debt service capacity of the weakening, in summary of the discussion of the article puts forward the following hypotheses:

H1: Innovation input has a negative impact on the company's debt repayment.

3.2. The impact of innovation input on company debt repayment under policy support.

Government policy support encouragement is the catalyst of science and technology innovation, policy encouragement and support measures to promote the recombination of production factors and production conditions. Due to the externality and high risk of innovation inputs, the enthusiasm of enterprises for innovation inputs is greatly reduced, which inhibits enterprise innovation to a certain extent. In order to reduce the uncertainty in the process of R&D and ensure the normal supply of working capital, the supportive and encouraging policies formulated by the government have an important tendency to guide the innovation investment of enterprises. Based on the above theory this paper first analyses the relationship between innovation investment and corporate debt repayment, on this basis, the government policy support factors to join the model, the study of policy support in the context of listed companies' innovation investment and the relationship between corporate debt repayment. Therefore, the following hypothesis is proposed:

H2: Company innovation input in the context of government policy support has a greater negative impact on debt repayment.

4. Research Methods

4.1. Sample selection and data sources

Screening the data of listed companies in China's Shanghai Stock Exchange and Shenzhen Stock Exchange, using EXCEL and SPSS software to clean and process the data, deducting companies with incomplete and missing data, and deducting companies with risk warnings in the ST category; and ultimately obtaining the 2021 statements and related data of 2124 companies. All data were obtained from the database of Cathay Pacific (CSMAR). The article has applied EXECL for data collation and SPSS software for empirical analysis and research.

4.2. Variable Setting

Explained Variables. The financial indicator of the dependent variable of corporate debt repayment used in this paper is the gearing ratio. According to existing scholars' research, it is common to use the company's gearing ratio, equity ratio, shareholders' equity ratio, interest coverage multiple to evaluate the company's debt repayment ability, the gearing ratio can more intuitively reflect the enterprise's capital structure, and measure the enterprise's solvency is also more significant, so this paper uses the total gearing ratio (TDR) to measure the enterprise's solvency. Its calculation formula is: gearing ratio = total liabilities at the end of the year / total assets at the end of the year × 100%.

Explanatory variables. The explanatory variable of this paper is the level of innovation input, and this paper uses the amount of innovation input/operating income to calculate the annual innovation input level of the enterprise, which is expressed by the symbol R&D.

Control variables. Due to the existence of the return on total assets, size and other variability among enterprises, this paper selects enterprise size (the natural logarithm of total assets), return on total assets, the company's solvency as the control variables.

4.3. Model construction

In summary, the theoretical assumptions, in order to distinguish whether the company enjoys policy support, to construct the model without policy support(1) and enjoy policy support model (2):

$$TDR=\alpha 0+\alpha 1R\&D+\alpha 2SIZE+\alpha 3ROA+\alpha 4LDR+\varepsilon \qquad (1)$$

$$TDR=\beta 0+\beta 1R\&D+\beta 2ZCFC+\beta 3SIZE+\beta 4ROA+\beta 5LDR+\varepsilon \qquad (2)$$

Where α0 and β0 are constant terms, αi and βi (i=1,2,3,4,5) are coefficients, and ε is a random error term.

Model (1) tests the impact of H1 innovation input on enterprise solvency; model (2) tests H2 enjoyment of policy support the impact of innovation input on enterprise debt service capacity.

4.4. Descriptive statistics

Depicts the overall status of corporate solvency of the sample. From the sample as a whole, the corporate solvency of China's listed companies in Shanghai and Shenzhen in 2021 ranges between (0.032, 3.648), with a mean value of 0.471 and a standard deviation of 0.187, and through the data table, it is known that the company's balance sheet ratio is less than 1, which indicates that most of the companies' total assets are greater than their total liabilities. The operating condition is good, but the ROA indicator in Table 3 is minimum -0.57, which indicates that there are still some companies with low net profit.

Table 1 Explanatory variables control variables overall descriptive statistic

	N	Minimum value	Maximum values	Average value		Standard Deviation
	Statistic			Statisticians	Standard Error	
R&D	2124	.0	5712.9	9.661	3.2468	149.6363
LDR	2124	.1	37.3	1.831	.0369	1.7004
ROA	2124	-.574	.530	.03177	.001556	.071693
SIZE	2124	10	19	13.57	.030	1.376
Effective number of cases (in columns)	2124					

(1) From Table 1, we can see that the mean value of R&D is 9.661, its maximum value is 5712.9, and the minimum value is 0, which indicates that there is a big difference in the innovation investment of different companies, which also indicates that there is a difference in the degree of reliance on technological innovation of companies in different industries in Shanghai and Shenzhen Stock Exchanges and thus they do not pay the same attention to the innovation investment, and it may be possible that the companies lack of awareness of scientific and technological innovation, which leads to the lesser funds invested in innovation. The standard deviation of innovation investment is 149.63, which reflects that the R&D investment intensity of listed companies as a whole is at an unstable level.

(2) Generally speaking, the current ratio is healthy for the enterprise when it is equal to 2. The mean value of LDR is 1.831, which reflects that the short-term solvency of listed companies in China's Shenzhen and Shanghai is currently stronger, and its maximum value is 37.3, the minimum value is 0.1, and the standard deviation is 1.7, which reflects that short-term solvency is at a more stable level among the companies.

(3) The difference between the maximum and minimum values of ROA is relatively large, the average is 0.032, and the standard deviation is 0.072, which indicates that most of the companies' profitability is weak and the overall return on total assets of China's listed companies in Shenzhen and Shanghai is at a more stable level.

(4) The average level of SIZE company size reaches 13.57, and the standard deviation is 1.376, which indicates that the size difference between China's Shenzhen and Shanghai listed companies is relatively small.

4.5. Correlation Analysis

(1) Relationship between innovation input and corporate debt service. The data show that the correlation coefficient between innovation input and enterprise debt repayment ability is - 0.048, and it is significant at the level of 5%. According to the sign of the correlation coefficient between innovation investment and enterprise debt service capacity can judge that there is a negative correlation between the two, thus initially proving the first hypothesis proposed by the article H1, therefore, the relationship between the two can be regression analysis, but also for the further study of the government support policy in the R & D investment and enterprise debt servicing capacity has a moderating role between the laying of the foundation. Among them, the correlation coefficient between the enterprise's debt repayment ability and enterprise scale SIZE is 0.375, significant at the 1% level, indicating that the enterprise scale is an important indicator to measure whether the enterprise can repay the debt, and there is a greater impact on the company's solvency; and vice versa the level of the enterprise's debt repayment reflects the size of the company's scale.

(2) The significance level between the explanatory variable (R&D) and the control variable LDR is 0.09, which is greater than 0.05 indicating that there is a non-significant relationship between the two, and there is a significant relationship between the explanatory variable (R&D) and the control variable SIZE, with a significance coefficient of 0.018, which is less than 0.05, and is significant at the level of 5 per cent. It indicates that the impact of innovation inputs on the debt service capacity of the firms in addition to the impact between innovation inputs and the size variable SIZE is also taken into account.

4.6. Regression analysis

The model was subjected to multiple regression analysis. As can be seen from the model summary in Table 3, the adjusted R-squared is 37.2%, which indicates that the predictor variables of the model, the independent factors are able to explain 37.2% of the variation in the dependent variable TDR to an acceptable level. Durbin. Watson value of 1.922 is close to 2 indicating that the samples are each independent.

Table 2 Summary of modelsb

Model	R	R-square	Adjusted R-square	Error in standard estimation	Durbin-Watson
1	.610a	.372	.372	.148585	1.922

a. Predictor Variables:(Constant), LDR, R&D, ROA

b. Dependent variable: TDR

Table 2 shows that the significance of R&D investment R&D is 0.003, which is less than 0.05 and has a significant effect, similarly ROA and LDR are significant. And the expansion coefficient VIF of variables R&D, ROA and LDR are less than 5, respectively 1.01, 1.05 and 1.04, which indicates that there is no multicollinearity between the variables, and the coefficient of R&D expenditures is -6.52, which indicates that R&D expenditures have a negative impact with the company's debt repayment, thus proving the hypothesis H1. the total net asset ratio and the company's debt repayment TDR also have a negative impact, and the current Debt ratio LDR has a negative effect with the executive repayment, that is, the higher the current debt ratio, the lower the debt

repayment ability, also in line with the theory of debt repayment. The multiple regression model is as follows: R&D investment TDR=0.593-6.515R&D-0.720ROA-0.054LDR

The relationship between enterprise R&D investment and corporate debt repayment under policy support is verified.If the government support policy variables are added to the linear model, re-multiple linear regression is shown in Table 8, the model summary after the addition of government support policy variables and the regression coefficients after the addition of government support policy variables in Table 9, it can be seen that after the addition of the policy support ZCFC variables, the adjusted R-squared change is 37.1%, which is 0.1% less than the R-squared 37.2% without the addition of the variable, and the model of the addition of the policy supportThe explanatory strength of the model with the addition of policy support is weakened, and the value of the coefficient of the ZCFC variable with policy support is -0.004, and the coefficient of the innovation input is changed from -6.52 to -6.55, with a larger negative coefficient, i.e., under the condition of policy support, the investment in innovation and R&D has a negative effect on the debt repayment of the company and the effect is stronger, proving the hypothesis H2.The model after the addition of the variable of policy support is as follows: the investment in research and development TDR = 0.596-6.554R&D-0.722ROA-0.054LDR-0.004ZCFC.

5. Conclusion and Recommendation

This paper selects 2124 listed companies in Shanghai and Shenzhen in 2021 as statistical samples to empirically test and analyse the impact of innovation input on corporate debt repayment under policy support.Conclusion: (1) innovation input has a negative impact on corporate debt repayment; (2) the existence of policy support under the company's innovation input has a stronger negative impact on debt repayment.In order to test the robustness of the model, this paper makes further judgments through residual statistics as well as regression standardised residual plots to verify that the hypotheses and the model are robust. The results of the study show that even under the large impact of the epidemic on China's economy, the innovation investment of the sample firms has a negative impact on corporate debt repayment, which supports the hypothesis of normal market conditions; in addition, it also verifies the hypothesis that the innovation investment of the firms under the existence of policy support has a stronger negative impact on debt repayment. It illustrates the applicability of the hypothesis in different economic situations, enriches the theory related to corporate innovation input, and provides data reference for improving the mechanism of corporate innovation input.

Based on the above findings, we propose the following recommendations: 1. Innovation investment should be carried out under the premise of guaranteeing the repayment of debt when it is due.Innovation investment is the company's survival and development of the magic weapon, but based on the uncertainty of the risk of innovation, a large amount of capital investment may not be returned, and reduce the company's long-term and short-term debt repayment ability, so innovation investment to ensure that the capital turnover to be able to repay the maturing debt under the premise of the amount of money. 2, the policy support conditions, to increase the company's support for subsidies to monitor the funds.Support subsidies to support the enterprise to rationally allocate funds, the establishment of a special account to increase supervision, rational use to prevent waste, reduce non-essential costs and expenses, improve the use of efficiency, and promote high-quality development of enterprises.

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