



Fintech, High-Tech Enterprises and Debt-Financing Costs—Evidence from Chinese a Stock Market

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Abstract. Based on the 2015–2019 data of high-tech companies listed in Shanghai and Shenzhen A stock market, this paper empirically examines the causes and solutions of high debt-financing costs for high-tech enterprises. The results show that the cost of debt financing would be higher if high-tech enterprises have a higher proportion of intangible assets and face a more severe problem of information asymmetry. Fintech could significantly reduce the cost of debt financing for high-tech enterprises through alleviating internal and external financing constraints, this effect would vary with different natures, economic environment, growth rates and company sizes. These conclusions provide empirical evidence and new ideas for the interpretation improvement of the high financing cost of high-tech enterprises.

Keywords: Fintech · High-tech Enterprises · Big Data · Financing Cost

1 Introduction

After the revolution of computer and information technology, the development of high-tech industries, which could reshape the global economic structure, is vital to the prospects of a country. Cause the core of the competitions across a range of sectors of the economy and the politics is technological competition. The country with tech prowess is going to win the 21st-century economy.

Given the fact that enterprises in China are highly dependent on the traditional financial system, whose evaluation criteria for credit granting is created for those common industries which usually own more tangible asset and face less information asymmetry. Most empirical studies show that high-tech enterprises always suffer from severe financing constraints for their high-risk features [7]. To release themselves from the constraints and raise sufficient funds, the high-tech enterprises often turn to short-term borrowing [5]. Would these high-risk features lead to higher debt financing cost? With the integration of computer science into the financial sector, fintech has developed rapidly, leading to the majorization of the financial system structure and alleviation of financing constraints [6]. Would these effects be further reflected in the reduction of the debt financing cost of high-tech enterprises?

In this passage, we examine whether the particular high-risk features of Chinese high-tech enterprises are causes of high debt financing cost. We also exert empirical test to examine the effect and mechanism of Fintech towards debt financing cost.

Section 2 presents the analysis and hypotheses; Sect. 3 presents the data and methodology; Sect. 4 presents our empirical findings; Sect. 5 is the conclusions.

2 Theoretical Analysis and Research Hypotheses

High risk is the main bottleneck of high-tech firms' financing problems. It is mainly reflected in two aspects, one of which is the risk which derives from high-tech enterprises themselves. Zhao et al. (2015) find that the special nature of high-tech enterprises, such as the high proportion of intangible assets due to the possession of a large number of technological intellectual property rights, has led to financing constraints for their lack of tangible assets and overpricing problems. The high proportion of intangible assets of high-tech enterprises deviates them from the credit evaluation system of the traditional financial industry. They have to compensate for the high risk (high proportion of intangible asset) which is not recognized by the traditional financial institute with higher debt financing costs to alleviate the financing constraints. From the above analysis, we could assume that:

H1: The higher the proportion of intangible assets the high-tech enterprises have, the higher the cost of debt financing the enterprises would face.

The second aspect is the high risk of information asymmetry of high-tech enterprises. Due to the "technological" feature of high-tech enterprises, it is difficult for the information disclosure policy based on conventional measurement indicators to fully reflect the operational conditions of high-tech enterprises. Also, traditional financial institutions often lack experts who can accurately judge high-tech firms' conditions. As a result, high-tech enterprises would face a higher risk of information asymmetry. Jaffee and Russell (1976) [4] find that information asymmetry is the main cause of credit mismatch in the credit market, resulting in financing constraints, and may further increase debt financing costs. From the above analysis, we could assume that (Table 1).

H2: The more severe the information asymmetry between high-tech enterprises and banks is, the higher the cost of debt financing the enterprises would face.

After examining the causes of high cost, we would start to analyze the effect and mechanism of Fintech towards debt financing cost. Huang et al. (2015) find that the development of fintech can significantly alleviate corporate financing constraints. It could also present a long-term mitigation effect [3]. We could infer that the development of fintech may further reduce the debt financing cost through revolutionizing enterprises' use of internal and external financing. From the above analysis, we could assume that:

H3: Fintech could significantly reduce the cost of debt financing for high-tech enterprises.

Table 1. Descriptive statistics

Variables	Mean	Sd	Min	Med	Max
Cost	0.008	0.031	-0.121	0.012	0.084
Intan	0.044	0.036	0.000	0.036	0.355
Synch	-0.161	0.838	-2.472	-0.100	1.589
Index	5.511	0.152	5.103	5.525	5.773
Markets	-0.161	0.838	-2.472	-0.100	1.589
Ppe	0.214	0.138	0.003	0.188	0.717
Lev	0.376	0.183	0.063	0.360	0.884
Turnover	0.613	0.333	0.091	0.544	2.311
Liquidity	2.576	2.138	0.291	1.856	12.034
Free	19.132	1.499	15.288	19.073	23.769
Top1	33.272	13.776	9.330	31.400	74.180
Salary	14.513	0.641	12.960	14.478	16.407

3 Data and Methodology

3.1 Data

We examine 6852 observations listed on the Chinese A stock market between 2015 and 2019. The data of the firms are collected from the China Stock Market & Accounting Research (CSMAR) Database. The fintech index is measured and calculated by the Institute of Digital Finance Peking University. The enterprises which belong to manufacturing, information technology, scientific research and technical service industry are defined as high-tech firms according to Chinese Industry Classification Guidelines for Listed Companies.

3.2 Benchmark Regression Analysis

Using a fixed effects model for benchmark regression based on panel data, we test the causes and solution of high debt financing cost:

$$H1: Cost_{i,t} = \partial_0 + \partial_1 Intan_{i,t} + \sum controls + \varepsilon \tag{1}$$

$$H2: Cost_{i,t} = \partial_0 + \partial_1 Synch_{i,t} + \sum controls + \varepsilon \tag{2}$$

$$H3: Cost_{i,t} = \partial_0 + \partial_1 Index_{i,t} + \sum controls + \varepsilon \tag{3}$$

Concepts of variables:

Cost: Financial cost for the next year/total liability; Intan: intangible asset/total asset; Synch: using stock price synchronicity [1] to measure information transparency; Index:

calculated by Institute of Digital Finance Peking University; Σ controls: a series of control variables, including PPE, Leverage, Turnover, Liquidity, Cashflow, Top1, Salary, Year and Industry.

3.3 Extended Empirical Test

After the benchmark empirical test, we would test the heterogeneity and the mediating effect of fintech towards high-tech enterprises' debt financing costs.

Considering the debt financing costs may vary as a result of the differences among enterprises themselves. We divide the observations into six groups based on three standards separately to take the heterogeneity into account: whether the enterprise is state-owned or not; whether the degree of marketization of the provinces in which the high-tech enterprises are located is high or not; whether the size of the enterprise is large or not.

In order to find out how the effect of fintech is conducted on the debt financing costs of high-tech enterprises, we test the mediating effect of fintech. We select internal and external financing constraints as mediating variables for Sobel tests.

4 Empirical Findings

This section tests the causes and solution of high debt financing costs of high-tech enterprises.

Table 2 shows the results of three benchmark regressions for hypotheses H1-H3. A significant negative correlation was found between information transparency and debt financing costs, also between the fintech index and debt financing costs. While significant positive correlation could be seen between the proportion of intangible assets and debt financing costs.

Table 2. Benchmark regression

Var	Cost		
	(1)	(2)	(3)
Intan	0.037*** (3.59)		
Synch		-0.002*** (-3.80)	
Index			-0.016** (-3.37)
Controls	Yes	Yes	Yes
Constant	0.0664*** (9.09)	0.0687*** (9.41)	0.120*** (5.31)
N	6671	6671	6671
R ²	0.377	0.374	0.376

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 3 shows the results of the first extended empirical test—heterogeneity test. From the results, we could tell that the effect of fintech is obviously different towards high-tech enterprises with different natures, different degree of marketization and company sizes. The development of fintech would exert a more effective influence on not state-owned and small-sized enterprises which are registered in provinces with lower degree of marketization. For an enterprise like this, it is more challenging to finance itself

Table 3. Heterogeneity test

Var	Cost					
	SOE	Non SOE	HMarkets	LMarkets	LSize	SSize
	1	2	3	4	5	6
Index	0.020*** (3.27)	-0.028*** (-4.88)	-0.030*** (-3.60)	-0.008 (-1.29)	0.002 (0.50)	-0.024*** (-3.25)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Interclass difference	31.96***		4.62**		9.01***	
Constant	-0.062** (-2.07)	0.215*** (7.29)	0.303*** (6.62)	0.034 (1.21)	0.072*** (2.80)	0.192*** (4.97)
N	1789	4422	3108	2998	3225	2986
R ²	0.415	0.344	0.399	0.372	0.299	0.361

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 4. Mediating effect test

Var	Cost	SA	Cost	Internal	Cost
	1	2	3	4	5
Index	-0.010** (-2.34)	-0.170 (-1.26)	-0.010** (-2.30)	2.267*** (2.96)	-0.009** (-2.05)
SA			0.001*** (3.03)		
Internal					-0.001*** (-8.29)
CVs	Yes	Yes	Yes	Yes	Yes
Mediator	External financing constraints (SA)			Internal financing constraints (Internal)	
Sobel test	-1.935*			-2.189**	
Conduction	Effective negative conduction			Effective negative conduction	
N	6671	6671	6671	6671	6671
R ²	0.376	0.685	0.377	0.203	0.376

Notes: * p < 0.1, ** p < 0.05, *** p < 0.01.

because it is not so competitive and promising in its payback. What is more, its financial environment is not developed enough to provide it with various source of finance. As a result, the development of fintech would serve as more significant mitigating factors.

In Table 4, we display the outcome of the second extended empirical test—Mediating effect test. We could infer that the effect of fintech could be passed to debt financing costs negatively through enterprises' use of internal or external finance. With the development of fintech, the enterprises would have more cashflow to alleviate the internal financing constraints measured by the cashflow ratio [8]. They would face fewer external financing constraints as well, for the SA index [2] is lowered with the development. Debt financing costs could be reduced with the release of financing constraints and the finance raised by the use of fintech tools.

5 Conclusions

We exert empirical tests to examine the causes and solutions of expensive debt financing cost in high-tech enterprises. Our results indicate that a high proportion of intangible asset and serious information asymmetry which are typical signs of high risk are two significant causes for high debt financing costs. The development of fintech could significantly reduce the costs by enabling high-tech enterprises to alleviate internal and external financing constraints, and the reducing effects vary from one enterprise to another due to their diverse nature, financial environment, growth rates and company sizes.

Based on the results of the empirical test, we make the following suggestions. Firstly, attach great importance to and vigorously promote the development of fintech systems based on digital infrastructure construction. Secondly, gradually generate a finance risk evaluation system based on the characteristics of high-tech enterprises to relieve them from severe information asymmetry. Thirdly, pay attention to the heterogeneity in the effect mechanism of fintech, correct the financing preferences of the existing financial system, thereby enhancing the inclusiveness of fintech.

References

1. Gul, F.A., Kim, J.B., Qiu, A.A.. (2010) Ownership Concentration, Foreign Shareholding, Audit Quality, and Stock Price Synchronicity: Evidence from China. *J. Journal of Financial Economics*, 95, 425–442.
2. Hadlock, C.J., Pierce, J. R..(2010) New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index. *J. The Review of Financial Studies*,23, 1909–1940.
3. Huang, R., Lai, X.B., Tang, S..(2020) How Does Fintech Affect Corporate Financing Constraints? —Dynamic Effects, Heterogeneity Characteristics, Macro and Micro Mechanism Tests. *J. Studies of International Finance*, 6, 25–33.
4. Jaffee, D., Russell, T..(1976) Imperfect Information, Uncertainty and Credit Rationing. *J. The Quarterly Journal of Economics*,4, 651–666.
5. Mao, D.W.. (2014) The Logic and Prospect of Chinese Fintech. *C. China Fintech Annual Conference*.
6. Yao, W.X., Xia, J., Sun, T.T.. (2017) Research on Financing Constraints and Mitigation of High-tech SMEs From the Perspective of Supply Chain Finance. *J. Science & Technology Progress and Policy*, 4, 105–110.

7. Zhao, C.W., Chen, C.F., Tang, Y.K..(2009) Fintech. Science Press. Beijing.
8. Zhao, J.F., Yi, H.. (2006) Analysis of Internal Financing Constraints, Cash Flow and Investment Behavior of Shanghai-listed Companies. J. Productivity Research, 8, 66–68.

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