A study of the impact of financialization of enterprises on their innovative capacity

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Abstract. Based on the financial data of A-share non-financial listed enterprises from 2007 to 2019, this paper empirically examines the impact of corporate financialization on the innovation ability of enterprises. It is found that corporate financialization will have an inhibitory effect on the innovation ability of enterprises. Through further research, it can be seen that corporate financialization of non-state-owned enterprises has a more obvious inhibitory effect on the innovation ability of enterprises, and the inhibitory effect of financialization on the innovation ability of low-competitive industries is more obvious than that of high-competitive industries. The study concludes that non-financial enterprises should focus on improving their own innovation ability to achieve long-term development rather than seeking short-term profits by financializing a large amount of their assets through corporate financialization.

Keywords: corporate innovation; financialization of firms; nature of property rights; degree of competition.

1. Introduction

As China's economic development enters a new normal and a new stage, and in the face of the new situation of complex changes at home and abroad, innovation plays an important role in the process of enterprise development. The report of the 19th Party Congress points out that "China's economy has shifted from the stage of high-speed growth to the stage of high-quality development, and innovation is the first driving force to lead the development, and it is the strategic support for the construction of a modernized economic system". The improvement of the independent innovation ability of the enterprise will have a great promotion effect on the development of the enterprise, so as to improve the quality of economic growth. [1] At this critical stage, enterprises, as the most basic subject of market activities, contribute the main force for the realization of R&D innovation and achievement transformation. Since the innovation development strategy was formally written into the Several Opinions of the State Council of the Central Committee of the Communist Party of China on Deepening the Reform of Institutional Mechanisms and Accelerating the Implementation of the Innovation-Driven Development Strategy in 2015 (hereinafter referred to as the Opinions), the country's level of corporate innovation investment has shown a clear growth trend. According to the data statistics, the level of corporate innovation investment from 2013 to 2015 showed a downward trend, while R&D funding after the introduction of the Opinions in 2015 realized rapid growth in the short term, and showed steady growth in the long term, with the growth rate of R&D funding basically maintained at 11%. It is worth noting that although the innovation level of domestic enterprises is steadily improving, there is still a distance compared with developed countries. According to the Wind database and the World Bank released relevant data show that the R&D intensity of Chinese enterprises grew from 1.2% in 2010 to 3.6% in 2020 (R&D intensity refers to the proportion of R&D expenditures to sales revenues), but it is still not as strong as that of the developed countries, and the R&D intensity of the U.S. enterprises today is as high as 7.8%, which is still more than twice as high as that of China's. Compared to the enterprise Compared with the level of innovation in developed countries, China still has a certain gap.

With the development of the capital market, the phenomenon of enterprises' lack of willingness to innovate and increased willingness to make financial investments has become more and more obvious. The financial investment activities of enterprises are more active, and the phenomenon of financialization is widespread among listed companies. On the one hand, it is due to the rapid development of China's financial industry since the reform and opening up, the rapid development of

the banking industry and real estate industry, which have become two major profiteering industries; on the other hand, in recent years, the development of China's enterprises are faced with the problems of overcapacity and products at the bottom of the industrial value chain, which directly lead to the compression of the profits of enterprises' real business activities and are far lower than the excess return of investment in the financial market, which leads to the Imbalance between the real economy and the virtual economy. This phenomenon is manifested at the macro level by the deepening of the financial sector and the increase in the influence of the financial sector, i.e., the economy has "devalued the real to the virtual". [2]At the micro level, this phenomenon is manifested in the fact that real enterprises are more and more active in financial investment, and non-financial enterprises tend to become financialized. And there are two main views about the impact of enterprise financialization on enterprise innovation ability: positive and negative. On the one hand, enterprise financialization provides liquid financial assets for enterprises, eases financing constraints, and helps to continuously inject necessary capital into enterprise innovation (Bonfiglioli, 2008) [3] Some scholars in China recognize this point of view, and believe that idle funds can be preserved and appreciated through financialization, and can be used to invest in enterprise innovation when necessary (Yang Songling et al., 2019) [4]. On the other hand, the enterprise innovation ability is linked to the long-term development of the real economy, and enterprises may deposit a large amount of company capital in the financial field in order to pursue short-term financial benefits, while reducing the long-term capital injection to achieve the development of the real economy of the enterprise, which indirectly leads to a reduction in the amount of capital investment required for enterprise innovation, so the financialization of the enterprise is a negative impact on the development of the enterprise's innovation ability. Those who hold this view are Seo et al. (2012) [5], Xie Jiazhi et al. (2014) [6], Duan Junshan et al. (2021) [7]. When the profit of the enterprise depends more on financial assets, the company pays less attention to the innovation ability of the enterprise, and more funds are also allocated to the allocation of financial assets for a long time, which is unfavorable to the improvement of the innovation ability of the enterprise.

It can be seen that financialization is a double-edged sword, its active enterprise capital, mobilize enterprise investment enthusiasm, reduce the degree of financing constraints at the same time there will be certain disadvantages. Then, under the new situation, what kind of impact will the financialization of enterprises have on enterprise innovation? Based on this idea, this paper conducts an empirical study based on the relevant data of Chinese A-share listed enterprises to explore the relationship between the phenomenon of financialization and innovation at the micro level.

2. Theoretical analysis and research hypotheses

Holding an appropriate amount of financial assets has become the norm for most firms, and according to the theory of financial sustainability, financial resources should be utilized and developed in the long term on the premise of rationality. Through an in-depth reading of the literature on corporate financialization and corporate innovation, it can be seen that corporate financial allocation is mainly based on both precautionary and speculative motives. The theory behind the precautionary motive is precautionary savings, and static indicators, such as the proportion of financial assets, are mostly used to measure the degree of financialization. While speculative motives aim at obtaining high returns, the measurement mostly uses dynamic indicators, such as the size of profits generated by financial assets per unit of time. Based on this, this paper proposes two mechanisms of corporate financialization on corporate innovation as follows.

2.1 The financialization of firms acts as a disincentive to corporate innovation.

The financialization of enterprises has a "crowding out" effect, whereby a large allocation of financial assets tends to crowd out the level of innovation in enterprises. [8] First of all, based on the theory of market arbitrage motive, in the case of limited resources, the enterprise financial investment itself will take up a certain amount of innovation research and development funds. And because

financial investment has the advantages of high yield and high liquidity, it will increase the management's dependence on financial investment, which will reduce the willingness and motivation of the enterprise's innovation activities, and induce the management to overcrowd the innovation R&D funds. The further development of financialization will make the management produce a strong short-term profit-seeking mentality, so the enterprise will rely more on financial investment to obtain income, allocate a large number of assets to short-term financial investment activities, and give up long-term innovation and R & D investment. Secondly, the theory of interest game shows that enterprises are generally influenced by management, shareholders and investors in the process of business decision-making. In the case of the separation of enterprise ownership and operation, when executives are faced with the decision of whether to maximize operating profits or shareholders' interests, they are often forced by their principal-agent duties to pay attention to the interests of shareholders and ignore the interests of the long-term development of the enterprise, which results in a less willingness to bear the risks of innovative activities. As a result, management will be more willing to make a large number of high-yield financialized investments, thereby crowding out investments in innovative activities with high costs and uncertain returns.

2.2 Financialization of enterprises as a catalyst for enterprise innovation.

Enterprise financialization has the function of reservoir, enterprises can obtain excess return rate through the allocation of financial assets [9], broaden the financing channels, alleviate the financing constraints, and create a sufficient capital base for enterprises to carry out innovative activities. In addition, innovation activities have the characteristics of high adjustment cost and long return cycle, contrasting with the "short-term" characteristics of financial investment, enterprise financialization behavior has the characteristics of short return cycle and high return rate. Enterprises through the allocation of financial assets will produce the cost of capital effect, on the one hand, to ensure the value of capital, on the other hand, to realize the appreciation of capital, access to more funds, thereby reducing the cost of external financing of the enterprise [10], smoothing out the defects of the high adjustment cost of innovation activities. Ju and other scholars found that in order to mitigate the risk, enterprises will choose the innovation activities with low adjustment cost as much as possible to reduce the loss of adjustment cost. Plus, cash is where the guarantee for enterprises to achieve sustainable development lies, but cash itself cannot realize capital appreciation. Therefore, enterprise financialization can smooth out the defects of enterprise innovation in financing constraints, high adjustment costs, and high return cycles, thus promoting the level of enterprise innovation.

Based on the previous discussion, it has been shown that there are two opposing results on the impact of financialization of firms on the level of innovation of firms. Based on this, this paper proposes the following competing hypotheses:

H1a: Other things being equal, financialization of firms suppresses the level of firm innovation.

H1b: Other things being equal, financialization of firms promotes the level of firm innovation.

3. Research design

3.1 Sample selection

In this paper, the financial data of A-share non-financial listed companies from 2007 to 2019 are selected as samples, and after removing the data of abnormal companies such as ST, financials and data with missing values, the final observable sample data of 31,056 is obtained, and all the data samples are from CSMAR database. In order to reduce the effect of extreme data, the continuous variables in the model were Winsorize shrink-tailed at the 1% and 99% levels.

3.2 Selection and description of variables

3.2.1 Explained variable: firm innovation

Enterprise Innovation (Inno). Enterprise innovation can start from the enterprise's annual R & D investment and innovation from the patent achievements in two aspects, this paper chooses to use the total number of invention patents, utility models and design patents to empower the value to measure enterprise innovation, the specific calculation formula is:

Inno=ln($1+\frac{1}{2}$ Number of patents for inventions +$\frac{1}{3}$ Number of Utility Models + Number of $\frac{1}{6}$Number of design patents)

3.2.2. Explanatory variables

Degree of corporate financialization (Fin1). According to Du Yong et al. (2019) [11] and Wu Jun et al. (2018) [12], the degree of financialization of enterprises is measured by using the proportion of financial assets to total assets to measure the degree of financialization of enterprises. Drawing on the study of Wang Xinyuan (2020) [13], this paper defines the degree of corporate financialization as (trading financial assets + derivative financial assets + net loans and advances issued + net available-for-sale financial assets + net held-to-maturity investments + net investment real estate) / total assets.

3.2.3 Control variables

Based on the existing literature, net asset profitability (roa), firm size (size), firm age (age), growth rate of operating income (growth), the sum of the shareholding ratio of the firm's top 3 largest shareholders (board), KZ index, Tobin's Q value, the firm's debt ratio (det), and the administrative expense ratio (adm) are set as control variables. The meanings and symbols of the variables are shown in Table 1.

Table 1. Definition of variables

Variable category	variable name	variable symbol	Description of variables
implicit variable	Enterprise Innovation	*Inno*	*Ln* ($1+\frac{1}{2}$ Number of patents for inventions +$\frac{1}{3}$ Number of Utility Models +$\frac{1}{6}$ Number of design patents)
independent variable	Degree of financialization of enterprises	*Fin1*	(Trading financial assets + Derivative financial assets + Loans and advances, net + Available-for-sale financial assets, net + Held-to-maturity investments, net + Investment properties, net)/ Total assets
control variable	Net profit margin on assets	*roa*	Net profit/average balance of owners' equity x 100%
	Enterprise size	*size*	Total assets of *Ln* firm at the end of the period
	Age of business	*age*	Number of years the company has been listed
	Revenue growth rate	*growth*	(Increase in operating income for the current year/total operating income for the previous year) x 100%
	shareholding concentration	*board*	Sum of shareholdings of the company's top 3 largest shareholders
	Enterprise debt ratio	*det*	Total by item of liability/total by item of asset
	management cost ratio	*adm*	Administrative expenses/main operating income x 100%

4. Analysis of empirical results

4.1 Modeling and testing steps

The basic regression model constructed in this paper is as follows:

$$\text{Inno}=\beta_0+\beta_1\ fin1+\sum control\ +y_i+I_t+\varepsilon_1$$

In the model, i,t denotes industry and time, respectively. The explanatory variable is Inno, which denotes the innovation level of the firm, and the core explanatory variable is fin1, which denotes the

degree of financialization of the non-financial firm, and the coefficientβ_1 denotes the effect of the degree of financialization of a firm on the innovation level of that firm.

4.2 Regression analysis

There is an effect of financialization of firms on firm innovation. As can be seen from the first column, the Fin1 coefficient is -4.191, which is significant at 1% level. After adding control variables in the second column, the equation fits better, indicating that corporate financialization has a substantial negative impact on corporate innovation, and this result verifies Hypothesis H1a that non-financial firms chasing short-term high returns and investing their capital in financial industries with high rates of return have a negative impact on the innovative output of firms.

Table 2. Correlation analysis

	Inno *(1)*	*Inno* *(2)*	*Inno* *(3)*
Fin1	-4.191***	-3.469***	-0.755***
	(-18.703)	(-14.934)	(-3.799)
roa		-0.001	0.017
		(-0.099)	(1.056)
size		0.612***	0.637***
		(60.710)	(76.617)
age		-0.423***	-0.178***
		(-27.974)	(-13.895)
growth		0.000	-0.000
		(0.357)	(-0.218)
board		-0.016***	-0.007***
		(-16.165)	(-8.280)
kz		-0.080***	-0.034***
		(4.255)	(-2.102)
Q		0.003**	0.002***
		(-0.027)	(3.957)
Det		-0.001	0.016
		(-0.027)	(1.556)
adm		-0.000	0.001
cons	2.814***	-8.923***	-12.526***
	(234.328)	(-44.152)	(-69.631)
year	No	No	Yes
industry	No	No	Yes
N	31056	31056	31056

Note: ***, **, * indicate significant at 1%, 5%, and 10% statistical levels, respectively; t-values in parentheses, same below.

4.3 Robustness tests

4.3.1 Substitution of explanatory variables

Firm innovation can be measured in terms of both inputs and outputs. In terms of inputs, the share of R&D expenses can be used as an alternative measure of firm innovation. On output, there is still a difference between the number of patents applied by the company and the number of patents actually adopted, which can also be used as a replacement value for the explanatory variables. Therefore, in order to ensure the reliability of the empirical results, this paper replaces the innovation measures with the company's annual R&D outlay as a percentage of operating revenue and the total number of invention, utility model and design patents granted plus the natural logarithm of one, respectively.

4.3.2 Reduction of sample time

The development of China's financial system was late and the control of financial risks was more stringent. In the 1990s, urban credit cooperatives were reformed and transformed into commercial

banks, and a large number of urban commercial banks sprang up, and China's multilevel and diversified financial system was initially formed. It was not until after the global financial crisis that China's economic structure as a whole began to become more and more capital-intensive, and many industries or technologies entered the world's forefront. Therefore, this paper reduces the sample time to after 2008, according to the table results can be seen that the regression results are still robust.

4.3.3 One period behind

The level of corporate innovation is affected not only by the level of corporate financialization in the current period, but also by the loss of earnings from the financialization of the company in previous periods. A firm's current period financial activity losses and gains tend to have an impact on the company's budget in the following year, while corporate innovation requires long-term support of funds, losses in financial activities will make the later period of the company's investment in innovation decrease, while good financial activities will promote the increase of the investment in corporate innovation funds or to maintain stability. Therefore, corporate financialization affects corporate innovation through the lagged impact on corporate funding. In this paper, the difference model is used to regress the current and lagged values of all variables, and the regression results are still negative as shown in the third column, which proves that hypothesis 1 still holds.

Table 3. Robustness test

	(1)	(2)	(3)
	Inno	*Inno*	*Inno*
Fin1	-0.571***	-0.755***	-0.669**
	(-3.444)	(-3.80)	(-3.19)
Roa	0.016	0.0173	0.100***
	(1.176)	(1.06)	(3.57)
Size	0.561***	0.637***	0.658***
	(75.704)	(76.62)	(69.79)
Age	-0.133***	-0.178***	-0.260***
	(-12.065)	(-13.89)	(-16.32)
Growth	-0.000	-0.000	-0.000
	(-0.452)	(-0.22)	(-0.93)
Board	-0.005***	-0.007***	-0.008***
	(-9.144)	(-10.47)	(-10.93)
KZ	-0.029***	-0.034***	-0.047***
	(-8.274)	(-8.28)	(-9.45)
Q	0.002***	0.002***	0.015***
	(3.377)	(3.96)	(4.05)
Det	0.019***	0.0163	0.035***
	(2.685)	(1.56)	(4.80)
Adm	0.001	0.001	0.005
	(0.804)	(0.43)	(0.96)
cons	-11.194***	-12.53***	-12.48***
	(-70.315)	(-69.63)	(-61.76)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
N	31,056	31056	26779

5. Heterogeneity analysis

5.1 Distinguishing the nature of different enterprises

Due to the previous incentives and constraints of the mechanism is not sound, the state-owned enterprises debt is too heavy, some of the enterprises long-term losses. 9 December 2015 the state council executive meeting pointed out that the central enterprises should be recognized for their achievements, the difficulties faced should not be underestimated, or adhere to the deepening of the

reform to improve the quality of the efficiency as the center of a comprehensive approach, to promote the central enterprises to alleviate the difficulties of difficulties in the market fight to improve the quality of the upgrading, and to play a better role in the backbone of economic and social development. Play a backbone role in economic and social development. However, compared to strengthen innovation, promote advantageous industries penalty station "Internet +" and other new business, through the financialization of enterprises to achieve debt-to-equity conversion, short-term rapid profits on the agents of state-owned enterprises is more attractive, and the way will reduce the incentive for innovation of state-owned enterprises. Compared to state-owned enterprises, non-state-owned enterprises, for one thing, lack of state funds to support the company's debt is more cautious, in the enterprise financialization of the scale is relatively small; Secondly, the need for the main business of the company's operations to support the possibility of the funds put in the financialization of the relatively small.

This paper adopts the method of dummy variables to measure the nature of the enterprise, taking 1 if it is a state-owned enterprise and 0 if it is a non-state-owned enterprise. The group regression is conducted according to the nature of the enterprise, and the results are shown in the table below. It can be seen that compared with state-owned enterprises, the financialization of enterprises in non-state-owned enterprises has a more obvious inhibitory effect on the innovation ability of enterprises. Unlike non-state-owned enterprises that seek to maximize profits, the financialization of state-owned enterprises is more of an attempt to increase the diversity of assets than a choice of insufficient funds. Therefore, the inhibitory effect of financialization on the innovation ability of SOEs is relatively low. On the other hand, non-state-owned enterprises may invest less in innovation after gaining excess returns through corporate financialization. Because the way of obtaining profits by financialization has the effect of investing less and harvesting faster, the inhibitory effect of corporate financialization on corporate innovation is thus more obvious.

Table 4. Heterogeneity analysis (distinguishing between nature of enterprises)

	(1)	*(2)*
	Inno	*Inno*
Fin1	-1.016***	-0.726*
	(-3.95)	(-2.35)
Roa	0.0667**	0.123
	(2.65)	(0.53)
Size	0.627***	0.688***
	(49.82)	(48.55)
Age	-0.191***	-0.163***
	(-11.06)	(-6.92)
Growth	0.0000224	-0.000145***
	(1.86)	(-14.62)
Board	-0.00665***	-0.00804***
	(-7.89)	(-7.64)
KZ	-0.0290***	-0.0121
	(-5.79)	(-1.00)
Q	0.00162***	0.0547***
	(8.40)	(4.70)
Det	0.0325***	-0.516***
	(4.93)	(-5.45)
Adm	-0.00105	-0.0277**
	(-1.36)	(-3.02)
cons	-12.157***	-13.68***
	(-43.652)	(-45.06)
N	18292	12324
r2_a	0.415	0.532
F	1101.545	428.444

5.2 Distinguishing between the competitive capabilities of different enterprises

The competitive environment of an enterprise has an impact on its ability to innovate and the ease of financing; for highly competitive industries, enterprises need to continuously improve their technology level to avoid the possibility of banning and elimination, thus requiring a higher level of innovation, while low-competitive enterprises have lower requirements for innovation and inherit more of the original technology. In terms of financing, high-competition enterprises have a high demand for capital, and more enterprises seek capital, so the loan review process in this industry is more complicated, and it takes longer to obtain capital, so enterprises are more likely to choose to use financial asset allocation to provide themselves with a long-term stable flow of funds.

Referring to the literature of Jiang Lingduo and Lu Yi, the Herfindahl-Hirschman index (i.e., HHI index) is used to measure the degree of competition in the product market. [14] In this paper, firms are categorized into high and low competition through the HHI index of operating income, and those with operating income above the median are low competition firms and those below the median are high competition firms, and the results are shown in the following table. It can be seen that the financialization of low-competitive firms has a more significant impact on corporate innovation compared to high-competitive firms. Low-competitive firms have relatively fewer financial activities, and the benefits from their financialization will make low-competitive firms, which have no need for innovation, invest more in financial activities. On the other hand, high-competitive industries have to continuously improve their innovation ability due to competitive pressure on the one hand, and on the other hand, financialization has become more popular due to capital demand, so the inhibitory effect of financialization on innovation ability of low-competitive firms is more obvious than that of high-competitive firms that are quick to replace their existing firms.

Table 5. Heterogeneity analysis (ability to differentiate firms' competitiveness)

	(1) *Inno*	*(2)* *Inno*
Fin1	-0.599* (-2.36)	-0.903** (-2.81)
Roa	0.00796 (0.75)	0.0558** (2.77)
Size	0.734*** (59.80)	0.579*** (49.25)
Age	-0.209*** (-11.76)	-0.147*** (-7.97)
Growth	0.0000159 (1.47)	-0.0000868*** (-4.19)
Board	-0.00757*** (-8.22)	-0.00611*** (-6.79)
KZ	-0.0151* (-2.20)	-0.0462*** (-7.55)
Q	0.00309*** (4.03)	0.00354* (1.97)
Det	-0.0662 (-1.00)	0.0333*** (4.64)
Adm	-0.000253 (-0.36)	-0.0863** (-3.06)
cons	-14.50*** (-53.53)	-11.33*** (-45.11)
N	15805	14939
r2_a	0.446	0.507
F	-	472.901

6. Conclusions and insights

Using the financial data of Chinese A-share non-financial listed firms from 2007 to 2019 as a sample, this paper examines the relationship between corporate financialization and corporate innovation, and finds that (1) there is a negative correlation between corporate financialization and corporate innovation capability, and a high degree of corporate financialization inhibits the innovative capability of firms. After a series of robustness tests, the conclusion still holds. (2) Compared with state-owned enterprises, the financialization of non-state-owned enterprises has a more obvious inhibitory effect on corporate innovation capacity. (3) Relative to high-competitive firms, low-competitive firms' financialization has a more pronounced effect on firms' innovation capability.

The findings of this paper confirm that financialization of firms has a dampening effect on firms' innovative capacity, and also find the effects of the nature of property rights and firms' competitiveness on the relationship between the two. Based on this, the policy implications of this paper are as follows.

For enterprises: (1) The input of financial activities should be controlled, and a cautious attitude should be adopted in holding financial assets, focusing more on the long-term benefits of the enterprise's innovation ability rather than the short-term excess benefits of the enterprise's financialization. (2) Enterprise shareholders should pay more attention to the source of income on the balance sheet, rather than simple changes in profit and loss values, and be alert to the high degree of financial activities will be placed at high risk of corporate assets, and the relevant departments should do a good job of internal supervision and inspection. (3) Pay attention to the rationality of the enterprise's own asset allocation, avoid the transfer of the business center to the financial activities, timely adjustment of their own investment strategy, the allocation of funds needed for the main business in the first place, and pay attention to the enterprise's innovation ability to achieve long-term growth and development.

For the State: (1) Strengthening strict supervision of financial activities to prevent the suppression of investment in the real economy and the increase in the debt burden and property price bubbles caused by enterprises investing large amounts of assets in financial activities. (2) Create a favorable investment environment to guide the benign development of enterprises, and adopt encouraging policies and appropriately relax the loan threshold for the innovative achievements of small and medium-sized enterprises with financing difficulties. (3) Improve relevant laws and regulations to avoid the possibility of unreasonable financial activities of enterprises, reduce the possibility of damage to enterprise assets, and weaken the adverse impact of enterprise financialization on the real economy.

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