

Impact of Digital Finance on Corporate Efficient: Evidence from Empirical Research in China

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Abstract. Based on the annual corporate data of Shanghai and Shenzhen A-shares from 2011 to 2018 and the Digital Financial Inclusion Index of Peking University, this paper empirically examines the impact of China's digital finance development on the investment efficiency of enterprises. The research finds that: the development of digital finance reduces the investment efficiency of enterprises. This may be due to the development of digital finance leading to the financialization of enterprises. This paper puts forward how to guide digital finance in a good direction to influence the investment efficiency of enterprises.

Keywords: Digital Finance; Enterprise Investment Efficiency; Financialization of Enterprises.

1. Introduction

Since the advent of the 4G, digital finance has been developing with each passing day. The emergence of financial services such as Internet payment, online banking, outsourcing services, online loans, and online funds has sprung up like mushrooms, for the development of the economy has brought a breakthrough.

Looking at the development of China's digital finance in recent decades, China's digital finance has occupied a countable position in the world. According to the theory presented by Huang Yiping in 2018 China's digital finance can be traced back to the launch of Alipay's account system in 2004, although the industry generally regards the opening of Yu EBAO in 2013 as the first year of China's digital finance development. Ant Financial, JD Finance, Lufax, and Zhong An Insurance are among the top five digital finance companies in the world, and the scale of third-party payment, online loans, digital insurance, and digital currency is far ahead in the world. In the domestic financial industry, the new financial institutions have caused some impact on the traditional financial institutions by increasing the competitive pressure, accelerating the process of digitalization of traditional financial institutions at the same time, and significantly improving the service efficiency and quality of financial institutions.[1]

Traditional physical financial services mainly rely on business outlets for transactions, but now digital financial services can bring more convenient services without leaving home. Digital finance has not only promoted the development of many emerging industries, such as e-commerce and express delivery. More importantly, it has brought considerable development to the labor market and increased many new jobs. The development of digital finance in China drives the development of the whole economic system. Digital finance has also solved the problem of credit funds and credit problems, the realization of the credit process is a simple, fast, convenient service concept. According to the theory presented by Huang Yiping in 2018 So far, the biggest advantage that digital finance has shown is in supporting the development of inclusive finance. Since 2006, the Chinese government has vigorously promoted the development of inclusive finance, taken measures such as the establishment of microfinance companies, the establishment of "inclusive finance Business department" in financial institutions, and in rural areas to carry out "two rights" mortgage pilot measures. However, it often gets half the result with twice the effort and lacks commercial sustainability. But digital technology offers a possible solution to overcome the natural difficulties of financial inclusion, on one hand, Internet platforms stick to tens of millions or even hundreds of millions of mobile terminals by establishing some "scenes" such as Taobao or WeChat, and on the other hand, analyze big data from social media and online shopping platforms to do credit evaluation.

[1] For example, Zhima Credit, launched by Alipay, conducts monthly credit assessments to adjust the loan limit.

In the Chinese capital market, enterprises face the shortage of investment leads to bankruptcy phenomenon is very common, because the small and medium-sized enterprise itself inherent condition is relatively weak, and large enterprises in the market on a variety of factors, such as making enterprise external financing is restrained, resulting in the development of enterprise because of lack of funding and give up the high-quality project. Without the development of digital finance, it's difficult for small and medium-sized enterprises to raise funds successfully. But for now, it seems that the government's aggressive support policies and the Internet's small loans and loans have brought capital to funds.

According to the research [2] the commercial banks under the background of digital finance are characterized by new technology, large amounts of information and platform, its relationship between the enterprise based on big data, information transparency, intelligent operation, are an organic whole and enterprise ecosystem. In the new era of the digital economy, most especial micro, small and medium enterprises accelerate the digital transformation of enterprises, which not only adapt to the needs of the development of the digital economy, but also build a harmonious relationship between banks and enterprises, to achieve the optimal financial service quality and the premise of financial resources allocation. Therefore, enterprises should start to realize online platform management and actively embrace the digital financial management platform of banks. Choose the right digital breakthrough, to take the lead to realize the digitization of financial information; Comprehensively introduce digital technology and integrate it into the whole process business; Overall planning of digital management to realize the digitization of non-financial information. [2]

Not only that, enterprises in the improvement of profitability, but also to maintain good credit. In this way, it can not only increase the business quota but more importantly, realize more rapid and convenient successful financing under the development of digital finance. Digital finance not only drives the development of enterprises but also supervises every aspect of enterprises. Therefore, this paper will study the impact of the development of digital finance in China on the investment efficiency of enterprises, and give reasonable guidance through calculation and research.

The following parts of this paper are organized as follows: Part 2 is research design, introducing data source, model specification, and estimation methods; Part 3 is analysis, descriptive statistics, benchmark regression; Part 4 is heterogeneity analysis; Part 5 is the conclusion.

2. Research Design

According to the paper, Digital finance generally refers to traditional financial institutions and Internet companies using digital technology to realize financing, payment, investment, and other new financial business models.[3] Digital finance, based on emerging technologies such as cloud computing, big data, and artificial intelligence, has improved the constraints of traditional finance, broadened the coverage of financial services, reduced time, and lowered the cost of the financial industry.

Therefore, this paper makes the following assumption: It is assumed that digital finance can improve the investment efficiency of enterprises.

2.1 Data Sources

This paper discusses the impact of digital finance on the investment efficiency of enterprises by using the enterprise data of Shanghai and Shenzhen A-shares from 2011 to 2018 (annual data). On this basis, the sample data are screened as follows :(1) the samples of companies in the financial industry are excluded. (2) Remove the samples of ST and *ST. The data queried in this paper comes from the CSMAR database. China Stock Market & Accounting Research Database is based on the academic research needs of Shenzhen CSMAR Data Technology Co., LTD., referring to CRSP, COMPUSTAT, TAQ, THOMSON, and other authoritative professional Databases standards. And

combined with China's actual national conditions to develop the economic and financial field research-based accurate database.

This paper adopts The Peking University Digital Financial Inclusion Index of China (PKU-DFIIC) involves coverage breadth, usage depth, and digitization level; usage depth involves sub-indexes such as payment, credit, insurance, credit, investment, and money funds, reflecting the development level of digital inclusive finance in each province. Index range is 31 provinces (and municipalities directly under the Central Government and autonomous regions, referred to as “provinces”), 337 cities above the prefecture-level (and regions, autonomous prefectures, alliances, etc., referred to as “cities”), and nearly 2,800 counties (and county-level cities, banners, municipal districts, etc., referred to as “counties”). The data of some regions are lacking, for example, Hong Kong SAR, Macao SAR, and Taiwan province. [4]

2.2 Model Specification

The following model is used to calculate the investment efficient:

$$\text{Investit} = \beta_0 + \beta_1 \text{Investit-1} + \beta_2 \text{Sizeit-1} + \beta_3 \text{Levit-1} + \beta_4 \text{Growthit-1} + \beta_5 \text{Ageit-1} + \beta_6 \text{Retit-1} + \beta_7 \text{CFOit-1} + \sum \text{Industry} + \sum \text{Year} + \varepsilon_{it} \quad (1)$$

The subscript *i* and *t* represent the enterprise and year respectively. In model (1), Invest in the current investment size, Size is the enterprise size, Lev is the capital structure, Growth is the growth rate of main business revenue, Age is the age of the enterprise, Ret is the stock return, and CFO is the net cash flow from operating activities, and the industry and time fixed effects are considered. In this study, model (1) is used to measure the optimal investment size in the current period, and then the actual investment size is subtracted from the optimal investment size, and the residual is the inefficient investment level of the firm. In particular, we treat the absolute value of the residuals, which indicates the level of inefficient investment, if the residuals are greater than 0, it means over-investment, and if the residuals are less than 0, it means under-investment.

The specific variables are as follows:

Table 1. Variables' definition

Variable	Definition
Digital Finance	Digital financial development, Aggregate index
Age	Listed age
Age-sq	The square of listed age, to investigate whether there is a non-linear relationship between age and investment efficiency
Ln asset	The total assets of the enterprise in the current year plus 1, and then taking the natural log
Ln debt	The total corporate liabilities plus 1, and then taking the natural log
Top1	Ownership concentration, with the shareholding ratio of the largest shareholder as a proxy variable
SOE	Dummy variable, =1 when the enterprise is state-owned, otherwise is 0
Foreign	Dummy variable, when the foreign-funded enterprise =1, otherwise is 0
Board Size	Size of the board
No. of Independent Director	Number of independent directors
Ln salary	Executive compensation plus 1, and then taking the natural log
ROA	Return on Total assets, a measure of net income generated per unit of assets

3. Analysis

3.1 Descriptive Statistics

The number of samples we took is 18854. through the data in the table, the minimum value of Residuals is 0 and the maximum value is 37.021, with a large gap and a standard deviation of 5.6641. The minimum and maximum values of the Aggregate Index are 23.1 and 302.9827, respectively, with a huge gap and a standard deviation of 64.495. These basic conditions indicate that there are large regional differences in digital finance in China. The minimum value of Ln asset is 19.0444 and the maximum value is 26.8421, the gap between the two numbers is small and the standard deviation is 1.3355, which indicates that the gap between the assets of enterprises is small. The minimum and maximum values of top1 are 0.29 and 99 respectively, this gap is quite large with a standard deviation of 15.2319, which indicates that there is a considerable gap in the percentage of the first largest shareholder leading to a large degree of difference in decision making. The maximum and minimum values of Ln salary are 11.9685 and 16.9982 respectively, this gap is smaller with a standard deviation of 0.7844. this data indicates that there is not much gap in the compensation given to the executives by the companies.

Table 2. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Residuals	18854	2.7092	5.6641	0	37.021
Aggregate Index	18854	193.9067	64.4954	23.1	302.9827
Age	18854	9.5128	7.2835	0	25
Age-sq	18854	143.5399	163.6142	0	625
Ln asset	18854	22.0782	1.3355	19.0444	26.8421
Ln debt	18854	21.045	1.7434	17.4067	26.5411
top1	18854	35.082	15.2319	0.29	99
SOE=1	18854	0.3766	0.4845	0	1
Foreign=1	18854	0.0482	0.2141	0	1
Board Size	18854	8.6247	1.7189	5	15
No. of Independent Director	18854	3.1852	0.5694	2	5
Ln salary	18854	14.8103	0.7844	11.9685	16.9982
ROA	18854	.0441	.0635	-.3281	0.2342

3.2 Benchmark Regression

The results of the benchmark regressions show that digital financial development reduces the efficiency of firms' investments, and the coefficients in the table are significantly significant at the 1% level of data.

The reasons why the development of digital finance reduces the investment efficiency of enterprises are considered in this paper as follows:

Aggregate Index significantly affects investment efficiency. Liu Fengqin calculating the investment efficiency of private enterprises in the east, central, west, and northeast, it is found that the investment efficiency of private enterprises in the east is the highest, followed by the central region, and the investment efficiency in the northeast and west is lower. In addition, the problem of overinvestment is the most serious in northeast China, and the problem of underinvestment in west China is prominent. [5] According to the research, the investment efficiency of listed enterprises varies greatly in different provinces, industries, and years. Compared with the limited influence of institutional factors on the capital investment efficiency of listed companies in various provinces, the influence of internal factors and industry factors is greater. [6]

According to the research [7], the financial background of the CEO has a significant positive impact on the financialization of enterprises, among which the non-bank financial background has a stronger positive effect. The financial background of the CEO promotes the financialization of enterprises mainly by improving CEO confidence and alleviating financing constraints. In state-

owned enterprises and enterprises with a better institutional environment, the positive impact of CEO financial background on corporate financialization is more obvious. Although the financialization of real enterprises will aggravate the operating risk of enterprises, the existence of the CEO's financial background will weaken the effect of the financialization of enterprises on the risk of enterprises.[7]

The financialization of the firm leads to more financial investments or dependence on financial markets, resulting in a change in the source of profit for the firm. Digital finance has led to over-investment in companies resulting in less efficient investment. It is due to the relatively few sources of financing for the emerging capital industry that the borrowing rates are relatively high to finance. Even if the financialization of the enterprise makes the enterprise's resources achieve reallocation, improve the utilization of resources to alleviate the problem of financial liquidity difficulties of the enterprise. The high cost of borrowing interest rates discourages investment in new industries. Although corporate financialization can solve the financial difficulties of enterprises in the short term, in the long term, corporate financialization not only increases the debt burden of enterprises but also raises the financial risk. Therefore, to maximize profits, many enterprises dominate the market and thus lead to the financialization of the real economy and excessive financial investment, resulting in the phenomenon of de-realization of enterprises.

Table 3. Benchmark Regression

	(1)	(2)
	OLS	OLS
VARIABLES	Efficient	Efficient
Aggregate Index	0.0016** (0.0006)	0.0016** (0.0006)
Age		0.1452*** (0.0235)
Age-sq		-0.0022** (0.0011)
Ln asset		-0.2864** (0.1155)
Ln debt		0.2413*** (0.0869)
top1		0.0006 (0.0031)
SOE=1		0.1313 (0.1249)
Foreign=1		-0.3090** (0.1490)
Board Size		-0.1039*** (0.0381)
No. of Independent Director		0.3511*** (0.1166)
Ln salary		-0.3171*** (0.0702)
ROA		-4.8462*** (0.9970)
Constant	2.1055*** (0.4681)	7.4291*** (1.3346)
Observations	18,854	18,854
R-squared	0.0347	0.0608
Industry Effect	Yes	Yes

The development of digital finance makes enterprises think that investors can make profits more easily. However, the excessive investment will not only lead many enterprises to be heavily in debt, but more importantly, it will disrupt the entire economic market.

4. Heterogeneity Analysis

As enterprises are in different characteristic states, the above tests are difficult to avoid heterogeneity bias, and the impact of digital finance development on enterprise investment efficiency may be different. To check whether the results of each independent study are confusable, this paper will further decompose the heterogeneity characteristics of enterprises.

Table 4. Heterogeneity Analysis

	(1)	(2)
	OLS	OLS
VARIABLES	Efficient	Efficient
Aggregate Index	0.0017** (0.0007)	0.0020*** (0.0007)
Dummy	-0.0854 (1.2842)	-1.4048 (1.3011)
Dummy # Aggregate Index	0.0001 (0.0048)	0.0040 (0.0048)
Age		0.1439*** (0.0235)
Age-sq		-0.0021** (0.0011)
Ln asset		-0.2695** (0.1161)
Ln debt		0.2413*** (0.0869)
top1		0.0004 (0.0031)
SOE=1		0.1244 (0.1250)
Foreign=1		-0.3115** (0.1490)
Board Size		-0.1036*** (0.0380)
No. of Independent Director		0.3484*** (0.1166)
Ln salary		-0.3159*** (0.0702)
ROA		-4.8587*** (0.9970)
Constant	2.0886*** (0.4695)	7.0069*** (1.3489)
Observations	18,854	18,854
R-squared	0.0347	0.0611
Industry Effect	Yes	Yes

Dummy is a dummy variable that takes 1 when the firm's total assets for the year are above the 50th percentile and 0 otherwise.

In terms of the coefficient of the interaction term, the distinction between the impact on large and small firms can be omitted because the coefficient is not significant. Digital financial development does not have a heterogeneous effect on the efficiency of business investment.

5. Conclusion

This paper provides an in-depth interpretation of the current corporate investment efficiency from the perspective of digital financial development. This paper investigates the impact of digital financial development on the efficiency of corporate financial investment using the Peking University Digital Inclusive Finance Index and annual corporate data from Shanghai and Shenzhen A-shares from 2011 to 2018. The results found that digital financial development reduced the efficiency of corporate financial investment.

The key to improving corporate investment efficiency is to alleviate underinvestment and inhibit overinvestment. Underinvestment is not only that the difficulty of financing SMEs raises the external financing constraint of enterprises and causes a capital shortage. Over-investment, on the other hand, is due to enterprises' over-reliance on the profits brought by the virtual economy.

It is precise because digital finance will lead to the financialization of enterprises and then produce the phenomenon of de-materialization to de-materialization, so it is necessary to grasp the future development direction of digital finance and make digital finance achieve better development of resources.

For regulated industries, we should relax the industry access policies, promote the competitiveness of the industry, improve the vitality of state-owned capital; For the economically less developed areas in the central and western regions, relevant policies should be formulated to not only improve the external environment but also fundamentally improve the corporate governance structure and promote the improvement of investment efficiency by introducing more qualified enterprises, to enhance the value of enterprises.

We will accelerate the reform of the financial sector, reduce monopoly profits and curb speculative demand in the corporate finance market. At present, the main motive of corporate financial investment in China is still to pursue profit, and the best way to restrain corporate financial investment is to eliminate the monopoly profit of the financial industry. Therefore, in the context of high-quality development of the Chinese economy, we should actively attract private capital into the financial industry, deepen the reform of interest rate liberalization, develop a direct financing market and other measures to reduce the degree of a financial monopoly, enhance the degree of competition in the financial market, only by continuously promoting the development of digital finance and reshaping the ecological pattern of the financial industry can we provide continuous financial support for enterprises' innovation investment and realize the healthy development of micro-enterprises and macro economy.

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