The Depth Usage of Technology Big Data and Enterprises' Inefficient Investment: An Empirical Evidence

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Abstract-The rapid growth of digital technology and inclusive finance in the Chinese has filled the coverage gaps of traditional financial institutions. This paper explores the relationship between the extent of digital finance use and the ineffectiveness of business investment. Empirical evidence detailed illustrates that the extent of digital finance reduces the effectiveness of the investment. On average, an increase of 1 unit in the depth of digital finance will increase the ineffective level of investment by 0.48 units. Furthermore, analysis of heterogeneity shows that digital finance has a greater influence on the effectiveness of corporate investments. The research of this paper shows that we should prevent the excessive financialization of enterprises from affecting investment efficiency and make the real economy operate in a reasonable range. According to the empirical results, this paper suggests that policymakers should pay due attention to the negative effects of digital finance while promoting the development of the digital economy to avoid inefficient investment caused by excessive financialization.

Keywords-digital finance; enterprises' inefficient investment; empirical research.

1 INTRODUCTION

Under the joint action of insufficient supply of traditional finance, moderate tolerance of regulatory authorities, and late development advantages of technology, digital finance characterized by sharing, convenience, low cost, and the low threshold has made significant progress, especially with the help of the traditional finance solving inequality of information [1-2].

Although there is no doubt about the role of digital finance in improving the external governance environment, whether this role can optimize enterprise investment decisions and reduce its inefficient investment level is still constrained and disturbed by the impact path of the external governance environment on the internal governance mechanism and the interaction between various internal governance mechanisms [3]. It is thus of great academic and workable importance to study the functional stream of inclusive digital finance. Development on ineffective business investment and the pathway for transmitting internal and external factors.

Digital finance focuses on solving the high-risk premium caused by the lack of risk screening ability in traditional finance and the high transaction cost caused by the lack of cost control ability. On the one hand, the popularity of mobile communication terminals embeds various application

scenarios and penetrates various fields to strengthen the supply capacity of financial services. However, in the other way, it uses the accumulation of extensive data information and algorithms to continuously improve the risk control scheme and high marginal cost to enlarge the demand scale of financial services. Taking this as an opportunity, in recent years, digital finance has increased the risk identification efficiency and disposal efficiency of financial enterprises at the micro-level, enriched the supply and availability of financial products, and promoted the continuous progress of the depth and breadth of the financial market at the macro level, to continuously improve the financial ecology of the real economy, tiny, medium-sized and micro-enterprises.

Firstly, digital finance develops the availability of cost financing to improve actual enterprise development [4-5]. By decreasing the service block and increasing the method to real enterprise financing cost, Digital finance effectively solved the limitations of the real enterprise, making the weak running real enterprise could quicker gain the assets required to research, develop, and manage. Digital could help the real enterprise. High-quality development has an important effect.

Secondly, digital finance enhances companies' ability to gain information quickly and conveniently. Following the internet connection, the platform increases the business, technology, and services factors in spreading the enterprise information. Digital finance could use the platform and digital technology to manufacture finance service methods, using payment, credit sales, and other services to spread information and connect with social media. This could make the enterprise better understand the enterprise's situation activities and changes. The enterprise could digit more information which is useful and helpful for them to side their cooperation way and enhance the social relationship. Help the real enterprise develop a high quantity [6-7].

Thirdly, digital finance helps society have digit payment and enhances enterprise development. The appearance of digital finance created a high-efficiency payment method. It helps the seller and the buyer transfer from offline trading to online trading. It effectively pushes the development of a real enterprise. It effectively decreases the real enterprise trade cost and expands the real enterprise sales market.

Lastly, the digital market provides enterprise digital insurance services and promotes real enterprise development. Digital finance could also hedge risks when running the company. This can be seen. Digital finance could use effectively hedging risk to improve product efficiency. To boost enterprise to have a better investment, develop better.

However, there are also a series of problems in the development of digital finance. For example, digital finance may encourage enterprises to improve the degree of financialization and lead to "disenchantment from reality to emptiness". Based on the above background, this paper constructs an empirical model and illustrates the affected areas, from the usage depth of digital finance to enterprise investment efficiency. Furthermore, it also studies the depth of digital finance's any change will affect the investment efficiency.

Definition explanation is the following area, arrangement, and data source of the model; The third part reports the benchmark regression results and heterogeneity analysis; The fourth component is the robustness test; The last element is the conclusion.

2 RESEARCH DESIGN

2.1 Data Source

The data used here are broken down into two parts. One amount from "The Wind". There is a provider called The wind, and the company's service includes data and analysis in the financial area.

A Chinese financial, information, and software services company headquartered in the Lujiazui Financial Center in Shanghai. Wind data customers occupy more than 90% of Chinese securities companies in the analyses market. Their services include management enterprises for funds, insurance companies, banks, investment departments, and other financial enterprises. In the other country's marketplace, 75% of the Chinese Securities Regulatory Commission, shortly written as (CSRC) qualified foreign institutional investors (QFII), are wind energy customers. Simultaneously, most well-known financial, scholarly, and study institutions and regulatory authorities in China are also their clients. Many aboard and abroad media, study reports, and scholarly literature frequently acquire digit information from the "The Wind". In financial data, the information from the company "The Wind" has created an engineering and database in a financial area that occupied most of the market in the finance repository in Canada with data on financial securities as a foundation. "The wind" has also included many data contents, some well-known finance tools, and many affected fields. The data is always refreshed immediately to the needs of institutional investors. For the data area in finance, the organization's information has an engineering and database in the finance area with a large scale in Canada's financial data on the securities area as a foundation. The information includes funds, insurance, financial derivatives, international exchange operations, spot trading, futures, macroeconomic and financial information, and other areas. The recently reported content is, for the immediate time, available to institutional investors.

Secondly, another digital inclusive finance index comes from the Peking University Digital Inclusive Finance Index (phase II, 2011-2018) compiled by the digital finance research centre of Peking University; The data of real enterprises are from the economic indicators of Shanghai and Shenzhen enterprises from 2011 to 2018.

2.2 Model Specification

The model in this paper is set to focus on the connection between the usage depth of digital finance and enterprises' inefficient investment, and the formula is as follows:

$$Inefficient\ investment_i = \alpha_0 + \alpha_1 \times Usage\ depth\ of\ digital\ finance_c + x_i'\beta + \varepsilon_i \quad (1)$$

The dependent variable is the degree of inefficient investment. The usage of digital finance is the core explanatory variable. x_i' is the control variable, including the main factors that have been identified in the previous literature. Control variables contain asset, debt, listing age, the shareholding ratio of the largest shareholder, nature of ownership (state-owned enterprise and foreign-funded enterprise, dummy variables), the board size, number of independent directors, and executive salary. The definition of control variables shows in table 1.

Table 1 Variable definition

variables	Variable types	definition
Usage depth	Core explanatory variable	Peking University Digital inclusive financial index 2018
Inefficient investment	dependent variable	Please see references [8-10]
Asset, unit: 10000 Yuan		Total assets at the year-end.
Debt, unit: 10000 Yuan		Total liabilities at the year-end.
Age		Length of time for enterprises to go public
top1		The shareholding ratio of the largest shareholder (%)
SOE=1	Control variable	State-Owned Enterprise (SOE) = 1, otherwise 0
Foreign=1		Foreign funded enterprise = 1, otherwise 0
Board Size		Board size
No. of Independent Director		*Number of independent directors*
Salary, unit: 10000 Yuan		Director's compensation
ROA, %		Return on assets

Contingent on the existing literature [8-10], this article sets the following model to measure inefficient enterprise investment:

$$Invest_{it} = \beta_0 + \beta_1 Invest_{it} + \beta_2 Size_{it-1} + \beta_3 Lev_{it-1} + \beta_4 Growth_{it-1} + \beta_5 Ln\,Age_{it-1} + \beta_6 Ret_{it-1} + \beta_7 CFO_{it-1} + \sum \beta_i Industry + \sum \beta_i Year + \varepsilon_{it}. \quad (2)$$

In this model, invest in the current investment scale of the enterprise, size is the enterprise-scale, and Lev is the capital structure. Growth means the growth rate of main business income, age also reminds the enterprise age, RET is the stock return, The CFO is the net cash flow named NCF from operating systems, and the industry's fixed effect at the same time is taken into account. This study uses model (2) to calculate the optimal investment scale of the enterprise in the current period and then subtracts the optimal investment scale from the actual investment scale. The residual part (absolute value) represents the inefficient investment level of the enterprise, in particular. The balance's entirety value indicates how the extent the investment is inefficient for the enterprise. If the higher amount of the remaining is indicated, the inefficiency of corporate funding is reduced. However, this is the enterprise's inefficient investment procedure.

2.3 Summary Statistics

The descriptive statistics of variables are explained clearly in a data way in Table 2. The mean value of the inefficient investment in listed companies is 2.7092 standard deviation is 5.6641, which is not difficult to find the significant difference in inefficient numerical investment among enterprises. The average listing age is 9.5128, while the shareholding ratio of the largest shareholder is 35%. The average group number of directors is 8.6247, and the average number of directors is 3.1852. Regarding the nature of ownership, 37.66% of enterprises are state-owned enterprises, and 4.8% are foreign-funded enterprises.

Table 2 Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Usage Depth	191.3561	70.1565	12.49	325.6791
Inefficient investment	2.7092	5.6641	0	37.021
Asset, unit: 10000 Yuan	1309503	4177095.3	18657.975	45434239
Debt, unit: 10000 Yuan	802120.3	2967420.7	3627.572	33624640
Age	9.5128	7.2835	0	25
top1	35.082	15.2319	.29	99
SOE=1	.3766	.4845	0	1
Foreign=1	.0482	.2141	0	1
Board Size	8.6247	1.7189	5	15
No. of Independent Director	3.1852	.5694	2	5
Salary, unit: 10000 Yuan	370.8776	357.9202	15.7712	2411.08
ROA, %	4.4138	6.3487	-32.8121	23.4179

3 EMPIRICAL RESULTS

3.1 Benchmark regression

Benchmark regression is shown in table 3. Groups (1) and (3) have no control variables, while groups (2) and (4) have no fixed effect on time and industry.

As seen from the statistical relationship in column (1), an important relationship exists between the digital finance applied and ineffective investment, and the factor is significant at 1%. However, when the model contains control variables, the coefficient changes only slightly, and the significance remain unchanged. Since column (4) is a complete model including all control variables and fixed effects, the analysis of this paper is based on this estimation result. The coefficient number shows 0.0048, which should focus on a 1% significant level, which means for every improvement in the depth usage of finance in the digit area, ineffective degree investment increases by 0.0048. This figure shows that growth in digital finance has reduced the investment business's effectiveness. From the contents of the results of the estimation of control variables, there is a reverse U-relationship between the age of enrollment and ineffective business investment. In other words, the effectiveness of business investment decreases first with the increase in the age of enrolment. And then increases as the age of enrollment increases after crossing the axis of symmetry. In addition, total assets, the board size, executive compensation, and ROA are negatively correlated with inefficient investment, and total liabilities are positively correlated with the number of independent directors and inefficient investment. Regarding the nature of ownership, the investment efficiency of foreign-funded enterprises is higher than that of Chinese-funded enterprises, with a factor of -0.3085, which is significant at the 5% level.

Table 3 Benchmark Regression

VARIABLES	(1) OLS Inefficient Investment	(2) OLS Inefficient Investment	(3) OLS Inefficient Investment	(4) OLS Inefficient Investment
Usage Depth	0.0006***	0.0008***	0.0055***	0.0048***
	(0.0002)	(0.0002)	(0.0009)	(0.0012)
Age		0.1269***		0.1414***
		(0.0229)		(0.0237)
Age-sq		-0.0007		-0.0020*
		(0.0010)		(0.0011)
Ln asset		-0.3949***		-0.2772**
		(0.1117)		(0.1157)
Ln debt		0.4200***		0.2380***
		(0.0828)		(0.0870)
top1		0.0043		0.0004
		(0.0029)		(0.0031)
SOE=1		0.0554		0.1227
		(0.1166)		(0.1249)
Foreign=1		-0.3284**		-0.3065**
		(0.1480)		(0.1487)
Board Size		-0.1396***		-0.1054***
		(0.0372)		(0.0380)
No. of Independent Director		0.3688***		0.3433***
		(0.1158)		(0.1166)
Ln salary		-0.2265***		-0.3065***
		(0.0668)		(0.0705)
ROA, %		-0.0546***		-0.0497***
		(0.0098)		(0.0100)
Constant	2.5888***	4.7941***	2.5639***	7.3209***
	(0.1149)	(1.1909)	(0.4960)	(1.3379)
Observations	18,854	18,854	18,854	18,854
R-squared	0.0001	0.0418	0.0369	0.0621
Data	Unbalanced	Unbalanced	Unbalanced	Unbalanced
Industry Dummy	No	No	Yes	Yes
Year Dummy	No	No	Yes	Yes

3.2 Heterogeneity Analysis

From the financial theory and the current empirical literature, it can be seen that financial institutions are usually more willing to provide services to large enterprises. The impact of financial institutions on enterprises usually has a scale effect. In this part, this paper makes a

heterogeneity analysis to investigate whether the impact of the finance digit usage depth on the effectiveness of corporate investment varies.

This paper constructs dummy variables through the total assets of enterprises. If the enterprise's total assets in the current year are above the 50th quantile, the enterprise is regarded as a large-scale enterprise, and the value of the dummy variable is 1. Otherwise, 0. The model will include the dummy variable, digital finance use depth, and their interaction terms in the heterogeneity analysis. To save the page, the estimation results of control variables will not be reported anymore. From the complete model in column (4), it can be seen that the interaction term coefficient is 0.0012, the 1% degree in the significant level, which means the depth of digit finance has a greater impact on the ineffective investment by big companies.

Table 4 Heterogeneity Analysis

VARIABLES	(1) OLS Inefficient Investment	(2) OLS Inefficient Investment	(3) OLS Inefficient Investment	(4) OLS Inefficient Investment
Usage Depth	0.0004***	0.0006***	0.0043***	0.0039***
	(0.0002)	(0.0002)	(0.0009)	(0.0012)
Dummy	-0.4558	-1.9558*	-1.2902	-0.7218
	(1.1440)	(1.1659)	(1.2570)	(1.2666)
Dummy × Usage Depth	0.0006***	0.0008***	0.0005***	0.0012***
	(0.0004)	(0.0003)	(0.0006)	(0.0006)
Constant	2.6306***	4.2755***	2.5979***	6.9244***
	(0.1189)	(1.2061)	(0.5005)	(1.3677)
Observations	18,854	18,854	18,854	18,854
R-squared	0.0002	0.0422	0.0370	0.0623
Data	Unbalanced	Unbalanced	Unbalanced	Unbalanced
Industry Dummy	No	No	Yes	Yes
Controls	No	Yes	No	Yes
Year Dummy	No	No	Yes	Yes

4 ROBUSTNESS TEST

In this part, this paper will adjust the estimation strategy and use the balanced panel data and fixed-effect model to investigate the robustness of the estimation results. Table 5 describes the estimated conclusion of the panel fixed-effect. It can be seen that after using the balanced panel data, the observation is 13344, and a total of 1668 enterprises were included in the analysis from 2011 to 2018. From the regression results, there is no significant change in the coefficient's size and significance, so this paper's conclusion is robust.

Table 5 Robustness Test

VARIABLES	(1) Panel FE Inefficient Investment	(2) Panel FE Inefficient Investment	(3) Panel FE Inefficient Investment	(4) Panel FE Inefficient Investment

Usage Depth	0.0039***	0.0028***	0.0017***	0.0018***
	(0.0008)	(0.0010)	(0.0007)	(0.0006)
Constant	2.0834***	2.1976	2.5253*	4.3523*
	(0.1444)	(1.9958)	(1.4170)	(2.4602)
Observations	13,344	13,344	13,344	13,344
Number of id	1,668	1,668	1,668	1,668
Data	Balanced	Balanced	Balanced	Balanced
Controls	No	Yes	No	Yes
Year Dummy	No	No	Yes	Yes

5 CONCLUSION

Established on the Digital Inclusive Finance Rate of Peking University and the publicly traded companies of Shanghai and Shenzhen A. To sum up, this report examines the depth effect of the extent of usage of digital finance and the efficiency of corporate investment. Baseline regression of the result shows that the depth of digital finance significantly reduces corporate investment efficiency. Furthermore, analysis of heterogeneity shows that the enhancement of digital finance has an effect of scale on the effectiveness of business investment. Furthermore, large companies are most affected by the scale of digital finance. From the empirical findings, this article gives the following suggestions:

At the front, further advocate the expansion of digital finance and provide practical financial support to enhance technology and business efficiency. Promote the combination of technological innovation such as Big Data Tech and Artificial Intelligence Tech with finance, promote the transformation of product achievements of digital finance, and optimize the mode and mechanism of digital finance serving the real economy. Furthermore, strengthening the training of financial technology professionals is required, especially those with compound professional backgrounds, to make the connection between the specific practical application of financial technology and relevant research more effective.

Second, we should further strengthen the inclusive characteristics of the development of digital finance, provide effective support for a large number of small, medium-sized, and micro-enterprises and even scientific and technological enterprises, and cover market areas beyond the reach of traditional finance. To establish the precise financial support orientation of digital finance. Fourth, we should improve the application of big data technology, effectively identify and predict the internal operation, external risks, and market technology succession path of small, medium-sized, and micro-enterprises and even scientific and technological enterprises to create a good survival and development environment for such enterprises and improve the operation efficiency of enterprises.

Third, we should further dredge the channel tool of finance in the digit area acting on enterprises, reduce the "real to virtual" behaviour of enterprises, and enhance the internal financial stability of enterprises. Guide digital finance to open up the financing channels of enterprises and change from simple financial resource support to diversified financial service support, to expand the

coverage of digital finance and provide guarantees for driving enterprises to improve production efficiency.

Fourth, digital finance should seek a certain balance between innovation and risk. Use the supervision sandbox plan and innovation centre to promote the effective supervision and guidance of digital finance, try the mode of scientific and technological supervision, and put forward certain requirements for the business standardization and standardized digital finance process, to further enhance the quality of digital finance development itself. Give effective support to the progress of the Chinese financial market and even publish the effectiveness of monetary policy tools. And then enhance the economic effectiveness of the micro-enterprise theme.

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