Research on the Impact of Digital Finance Coverage on the Investment Efficiency of SMEs

Tengfei Gao*

The School of Mathematics and Physics, University of Science and Technology Beijing, Beijing, China

*Corresponding author: 41821171@xs.ustb.edu.cn

Keywords: Digital finance Small; medium and micro enterprises; Investment efficiency.

Abstract: Digital financial inclusion, as an emerging form of integration of finance and technology, has had an important impact on the real economy. The article uses the data of listed companies on the A-share SMEs in China's Shanghai and Shenzhen stock exchanges as a research vehicle to explore the impact of the development of digital financial inclusion on corporate investment efficiency. The study found that the increase in the coverage of digital finance has promoted the improvement of the investment efficiency of small and medium-sized enterprises, and it can be seen that the coverage of digital finance does not have a heterogeneous impact on large and small enterprises, and digital finance is indeed more "inclusive". The research in this article shows that the development of digital finance is an important supplement to the traditional financial industry.

1. Introduction

Small and medium-sized enterprises occupy an important position in the modern market economy, and they are also an important source of promoting innovation, developing the economy, stabilizing society, improving people's livelihood, and increasing employment. SMEs have a broad socio-economic foundation, so whether they are in developed or developing countries, SMEs have complete advantages in terms of numbers. However, the financing methods of SMEs are relatively narrow, which leads to insufficient funds, lack of development enthusiasm, low competitiveness, and low impact on the market; SMEs cannot collect market information and are vulnerable to commercial fluctuations, financial conditions, and industries. Therefore, the life cycle is relatively short, and while a large number of enterprises are closing down, many new enterprises have emerged, and the speed of replacement is relatively fast. The difficulty of financing for small and medium-sized enterprises is mainly reflected in the following aspects: First, as a small and medium-sized enterprise, its scale is not large; secondly, the profitability of small enterprises is relatively low, which makes investors unable to see the development prospects and refuse to raise financing; then some small and medium-sized enterprises have a low reputation, such as arrears with employees' wages, and failure to pay off the loans owed to the bank in time; finally, the internal information of the enterprise was not disclosed, and the investors saw that the information of the enterprise was not transparent and believed that during the cooperation, there will be inconsistency or misunderstanding of how the company operates. These are important reasons for the difficulty of financing for small and medium-sized enterprises.

In recent years, with the rapid development of technologies such as mobile internet, big data, artificial intelligence, and block chain, digital finance has made considerable progress in China and has become a decisive force in promoting the transformation of traditional finance. Digital finance generally refers to the use of digital technology by traditional financial institutions and Internet companies to realize financing, payment, investment, and other new financial business models. Digital finance can reduce the operating costs of the financial market, expand the scope of financial services, optimize the value delivery links in the business model, and provide opportunities for enterprises. The role of digital finance in promoting enterprises is mainly manifested in the following aspects: First, from the supply side, the use of big data and artificial intelligence in digital finance can effectively integrate financial resources in the market and provide financial support for enterprises. In the financial

market, fund providers have the characteristics of "multiple, small, and scattered". The cost of attracting these fund providers by relying on traditional finance is relatively high. Digital finance uses big data, block chain, and other technologies to collect massive data and absorb and integrate more funds at low risk and low cost. At the same time, with the support of new technologies, digital finance can grasp massive amounts of information on both the supply and demand sides of funds, which can not only help financial institutions understand more financial and non-financial information on the demand side of funds, to use them in credit evaluation and credit decision-making, but also quickly find a suitable fund supplier for the fund demander, prompt the two parties to quickly match, and provide financial protection for the enterprise. Second, from the demand side, the use of new technologies in digital finance can effectively supervise the use and allocation of internal funds in enterprises, engage in pre-information understanding, to the credit evaluation of the demand side of funds, and then to post-information communication and effective supervision, which can reduce external factors. The enterprise risk is caused by the out-of-standard operation of the capital market and the imbalance of the internal capital allocation of the enterprise. At the same time, the use of new technologies in digital finance can promptly understand consumers' spending power and consumption tendency, tap market demand, and promote the precise combination of capital and business operations, thereby providing more opportunities for businesses. It can be seen that digital finance can alleviate corporate financing constraints through the above-mentioned methods, allowing companies too quickly, effectively, and low-cost access to more funds, thereby incentivizing companies. The development of digital finance has greatly improved the availability of financing for small and medium-sized enterprises, which will help enterprises optimize business activities, improve innovation capabilities, and promote enterprise transformation and upgrading, thereby affecting the upgrading of regional industrial structures and helping the country achieve industrial power and sustained economic growth.

How to make a large number of small and medium-sized enterprises achieve financial sustainability and provide effective support for high-quality development of enterprises and even high-quality macroeconomic development has become an important research topic at present. Based on this, this paper selects small and medium-sized listed companies as the research sample and builds a model to investigate the impact of digital financial coverage on the investment efficiency of small and medium-sized enterprises.

The contribution of this article is: First, it explores the relationship between the coverage of digital finance and corporate financial investment and its mechanism of action and fills in the importance of existing corporate financial investment literature for emerging financial formats represented by digital finance There is a gap in the research of influencing factors, and an in-depth analysis based on the heterogeneity (scale) of the enterprise provides empirical support for identifying the effects of the current emerging financial formats. Second, research-based on differentiated influence paths such as "cash", "leverage", and "financial ratio", aiming to identify the specific transmission mechanism through which digital financial inclusion affects corporate financial investment. In-depth research on this issue will not only help improve the targeting of digital financial inclusion but also provide practical references for enhancing the resilience and potential of China's economic development.

The following parts of this paper are organized as follows: Section 2 is literature review; Section 3 contains model specification, introducing the model, variables, and summary statistics; Section 4 contains empirical results; Section 5 is heterogeneity analysis; Section 6 is the conclusion.

2. Literature Review

Digital financial inclusion, as a new era product of inclusive finance and emerging technologies such as big data, cloud computing, and block chain, which mesh with each other at the genetic level, can expand the reach of finance and achieve inclusive coverage of financing groups and reduction of financing. Double fitting of cost [1]. Although this concept has not been in existence for a long time, the academic research on the economic effects of digital finance has also achieved certain results: digital finance has improved the transparency of information inside and outside the enterprise,

increased the cost of violations, and shortened the time of violations of the benefits, thereby prompting companies Improve the quality of information disclosure. The high-quality information disclosure of companies allows investors to better understand the company's situation, which helps to reduce the cost of capital of the company, thereby alleviating the problem of low corporate innovation capabilities caused by insufficient funds [2]. Zou Wei and Ling Jianghuai [3] show that the development of inclusive finance can ease the financing constraints of small, medium, and micro enterprises and increase the availability of financing for small, medium, and micro-enterprises. Wu Qingtian and Wang Qian [4] believe that compared with traditional inclusive finance, the development quality of inclusive finance can more effectively improve the financing efficiency of SMEs. Compared with state-owned SMEs, the quality of inclusive finance development has a more significant impact on the financing efficiency of non-state-owned SMEs. At the same time, compared with large enterprises, digital finance plays a more significant role in small and medium-sized enterprises that have widespread "financing difficulties" [5]. Wang Xiao and Zhang Jie [6] believe that small and medium-sized enterprises are vulnerable to credit rationing due to their small size, lack of collateral, or low value; in contrast, large enterprises can use their scale advantages or other capabilities to reduce information asymmetry. The degree to obtain various financial support [7]. The research of Xie Xueyan and Zhu Xiaoyang [8] confirmed that the promotion of technological innovation by digital finance is more significant in the samples of smaller enterprises, state-owned and private SMEs. It can be seen that the role of digital finance in improving business efficiency is stronger for smaller SMEs.

3. Research Design

3.1 Data Sources

This article focuses on the impact of the breadth of digital coverage on corporate investment efficiency and mechanism issues, using the data of listed companies on the A-share SMEs in Shanghai and Shenzhen stock exchanges (2011-2018) and the digital financial inclusion index for research. The financial data of the enterprise comes from the Choice database. The index of digital finance is compiled by a joint research group composed of Peking University Digital Finance Research Center and Ant Financial Services Group. Before performing regression analysis, this article cleans up the original data: first, delete all financial companies; second, delete companies that are delisted during ST and the period and samples with missing financial data; third, to reduce the influence of extreme values, this paper has carried out 1% and 99% tailing treatments on the continuous variables needed in the analysis; fourthly, all non-ratio continuous variables are logarithmized.

3.2 Model Setting and Definition of Main Variables

To study the impact of the breadth of digital coverage on corporate financial investment, the following empirical research model is constructed:

$$\begin{aligned}\mathrm{Invest}_{it} = \beta_0 + \beta_1 Invest_{it-1} + \beta_2 Size_{it-1} + \beta_3 Lev_{it-1} + \beta_4 Growth_{it-1} + \beta_5 LnAge_{it-1} \\ + \beta_6 Ret_{it-1} + \beta_7 CFO_{it-1} + \sum \beta_i Industry + \sum \beta_j Year + \varepsilon_{it} \quad \text{model}\end{aligned} \tag{1}$$

In the model, invest in the current investment scale of the company, Size is the size of the company, Lev is the capital structure, Growth is the income growth rate of the main business, Age is the age of the company, ret is the stock yield, and CFO is the net cash from operating activities. Flow, taking into account the fixed effects of the industry at the same time. This study uses model (1) to measure 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 absolute value of the residual represents the level of inefficient investment of the enterprise. If the residual is greater than 0, it means overinvestment, and if the residual is less than 0, it means underinvestment.

Table 1. Definition of main variables.

Variable name	Variable interpretation
Corporate investment efficiency	The explained variable, the calculation method is described in the text
Digital Finance Index	The breadth of digital finance coverage
The scale of the company	Expressed as the natural logarithm of the company's total assets at the end of the period
Asset-liability ratio	The ratio of total liabilities to total assets
The company's operating net profit ratio（ROA）	The ratio of the company's current net profit to the total assets at the end of the period
The proportion of fixed assets	The ratio of the company's net fixed assets to the total assets at the end of the period
Listing age	Data year minus the listing year
Ownership concentration	The ratio of the largest shareholder (Top1) Listing age Data year minus listing date
Nature of ownership	Private enterprise or state-owned enterprise
New capital investment volume	New capital investment = cash paid for the purchase and construction of fixed assets, intangible assets, and other long-term assets-cash received from the disposal of fixed assets, intangible assets, and other long-term assets
Net cash flow from operating activities	Gross operating cash flow after deducting the increase in networking capital The cash flow that the company can provide
Main business income growth rate	Current period's main business income-last period's main business income) / last period's main business income *100%

3.3 Descriptive Statistics

Table 2 lists the descriptive statistical results of the main variables and residual items. It is observed that the standard deviation of the digital coverage rate is 82.8741, the minimum value is 3.06, and the maximum value is 353.8671. There are large standard deviations and extreme deviations, but the average value is 189.2126, indicating that the level of digital finance development in each province is generally good. There is a big gap in individual provinces. In the financial data of enterprises, the standard deviation of equity concentration is very prominent, at 14.5869, indicating that the holdings of different enterprises are very different. The rest of the data shows that the left deviation and standard deviation are small, the situation is more uniform, and it is more inclined to the characteristics of small and micro-enterprises. The residual term is the mean value of the firm's inefficient investment level is 1.7172, the standard deviation is 4.0793, the minimum is 0.0006, the maximum is 36.6238, and the mean 1.7172 indicates that most firms' investment efficiency is relatively high, but the standard deviation of 4.0793 indicates that different firms' investment efficiency is high. The level of inefficient investment presents a large difference, and the gap between the minimum and maximum values shows that there is a big difference in investment efficiency.

Table 2. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Residuals	3896	1.7172	4.0793	.0006	36.6238
Coverage Breadth, province	3896	189.2126	82.8712	3.06	353.8671
Age	3896	5.799	3.07	0	14
Age-sq	3896	43.0511	39.3293	0	196
Ln asset	3896	21.893	.9503	19.1987	26.1516
Ln debt	3896	20.7332	1.3676	17.4067	25.9776
top1	3896	33.7036	14.5869	4.15	86.49
SOE=1	3896	.1822	.3861	0	1
Foreign=1	3896	.0511	.2202	0	1
Board Size	3896	8.4458	1.5004	5	15
No. of Independent Director	3896	3.114	.4768	2	5
Ln salary	3896	14.8055	.7443	11.9685	16.9982
ROA	3896	.0479	.0582	-.3281	.2342

4. Empirical Results

Table 3 reports the effects of digital financial indexes and various financial indexes on corporate investment efficiency. Among them, no control variables are added in the first column, which is only a simple correlation. It can be found that the coefficient of the regression of corporate investment efficiency to the digital coverage breadth index is positive, and it has passed the 1% statistical significance test, that is, the wider the coverage of digital finance, the lower the efficiency of the enterprise. It is because this column of results does not contain control variables, so there is a deviation of missing variables, so this column is just a simple correlation, not causality. So further, we have to eliminate the deviation of the missing variables, so the control variables are introduced. In the second column, control variables at the enterprise level have been added. From the results of this regression, it can be seen that the increase in the coverage of digital finance has promoted the improvement of the investment efficiency of small and medium-sized enterprises. The coefficient is -0.0141, which is within 5%. Significantly on the level.

Table 3. Benchmark regression.

VARIABLES	(1) Panel FE Efficient	(2) Panel FE Efficient
Coverage Breadth, province	0.0055***	-0.0141**
	(0.0009)	(0.0063)
Age		0.8917***
		(0.2879)
Age-sq		-0.0140**
		(0.0069)
Ln asset		-0.8103*
		(0.4828)
Ln debt		0.4082
		(0.2795)
top1		0.0065
		(0.0127)
SOE=1		1.3468
		(1.2439)
Foreign=1		0.7600*
		(0.4425)
Board Size		-0.2568
		(0.1852)
No. of Independent Director		0.6355*
		(0.3758)
Ln salary		0.0355
		(0.2147)
ROA		1.1455
		(1.4966)
Constant	0.6687***	8.2029
	(0.1767)	(6.3500)
Observations	3,896	3,896
R-squared	0.0150	0.0237
Number of ids	487	487
Year Dummy	Yes	Yes
Company Effect	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Heterogeneity Analysis

The above-mentioned empirical test is difficult to avoid heterogeneous bias. This is because the development of digital finance will inevitably have different effects on corporate financial investment for companies under different characteristics. Therefore, this article further decomposes the heterogeneous characteristics of enterprises: examines whether digital finance has different effects on large-scale and small-scale enterprises.

In the result, the coefficient of Dummy # Coverage Breadth is -0.0121 but not significant. It can be seen from this coefficient that digital financial coverage does not have a heterogeneous impact on large and small enterprises.

From a theoretical perspective, SMEs are easily excluded from the financial market or rationed by credit. This is reflected in the fact that traditional financial institutions are more willing to lend funds to large enterprises.

However, judging from the current regression results, there is no significant difference in the impact of digital finance coverage on the investment efficiency of large and small-scale enterprises, indicating that digital finance is indeed more "inclusive".

Table 4. Heterogeneity Analysis.

VARIABLES	(1) Panel FE Efficient	(2) Panel FE Efficient
Coverage Breadth, province	0.0063***	-0.0144**
	(0.0011)	(0.0063)
Dummy	2.9889	3.2360
	(2.7902)	(2.7933)
Dummy # Coverage Breadth	-0.0114	-0.0121
	(0.0087)	(0.0087)
Age		0.8924***
		(0.2881)
Age-sq		-0.0119*
		(0.0071)
Ln asset		-0.7711
		(0.4820)
Ln debt		0.4052
		(0.2788)
top1		0.0064
		(0.0127)
SOE=1		1.3945
		(1.2450)
Foreign=1		0.7550*
		(0.4399)
Board Size		-0.2617
		(0.1854)
No. of Independent Director		0.6411*
		(0.3761)
Ln salary		0.0382
		(0.2132)
ROA		1.0068
		(1.4762)
Constant	0.5693***	7.3857
	(0.2019)	(6.3117)
Observations	3,896	3,896
R-squared	0.0166	0.0251
Number of ids	487	487
Year Dummy	Yes	Yes
Company Effect	Yes	Yes

6. Conclusion

This article draws on the data of listed companies on the A-share small and medium-sized board of China's Shanghai and Shenzhen stock exchanges (2010-2018) and the digital financial inclusion index for research. A detailed examination of the breadth of digital coverage on the investment efficiency of small and medium-sized enterprises, and further classification of enterprise-scale, to comprehensively examine the differential effect of digital financial inclusion on enterprise investment, and the specific conclusions are as follows. First, the development of digital financial inclusion provides the possibility to improve the efficiency of corporate investment. The higher the degree of digital financial inclusion, the more conducive to the improvement of investment efficiency. Second, digital financial inclusion does not have a heterogeneous impact on the investment of enterprises of different sizes. Specifically, digital financial inclusion greatly eases the financing constraints of small businesses and high-tech enterprises. The research conclusions will help guide the development of digital financial inclusion and strengthen its ability to serve the real economy.

Reference

[1] YI Xingjian and ZHOU Li." Does Digital Financial Inclusion Significantly Influence Household Consumption? Evidence from Household Survey Data in China." Journal of financial research .11(2018):47-67. doi: CNKI: SUN: JRYJ.0.2018-11-004.

[2] LI Xiao-ling, CUI Shu-lin and LAI Xiao-bing. Can Digital Finance Increase the Value of Listed Companies? Theoretical Mechanism Analysis and Empirical Test [J]. Modern Finance and Economics-Fournal of Tianjin University of Finance and Economics, 2020, 40(09):83-95.

[3] ZOU Wei and LING Jianghuai." Inclusive Finance and the Financing Constraints of SMEs——Evidence from SMEs in China “Collected Essays on Finance and Economics. 06 (2018):34-45. doi: 10.13762/j.cnki.cjlc.2018.06.003.

[4] Wu Qingtian and Wang Qian." The Quality of Inclusive Financial Development and the Financing Efficiency of Small and Medium-sized Enterprises." JOURNAL OF Finance and Economics. 09 (2020):37-43+67.doi: 10.19622/j.cnki.cn36-1005/f.2020.09.005.

[5] Wan Jiayu, Zhou Qin and Xiao Yi." Digital Finance, Financial Constraint and Enterprise Innovation." Economic Review .01(2020):71-83. doi:10.19361/j.er.2020.01.05.

[6] Wang Xiao, Zhang Jie." On the Bank Credit Rationing and Loan of Small and Medium-Sized Enterprises (SMEs)." Economic Research Journa .07(2003):68-75+92. doi: CNKI: SUN: JJYJ.0.2003-07-008.

[7] Wei Zhihua, Zeng Aimin, and Li bo." Financial Ecological Environment and Corporate Financial Constraints——Evidence from Chinese Listed Firms." Accounting Research .05(2014):73-80+95. doi: CNKI: SUN: KJYJ.0.2014-05-009.

[8] Xie Xueyan,and Zhu Xiaoyang." Digital Finance and SME's Technological Innovation——Evidence from NEEQ Companies." Studies of International Finance. 01 (2021):87-96. doi: 10.16475/j.cnki.1006-1029.2021.01.009.

[9] Guo Jingyi, and Xie Ruifeng." Digital Financial Inclusion, Financing Constraints and Investment Efficiency of Environmentally Sensitive Enterprises: Based on the Panel Data of 1173 Listed Companies." Financial Theory & Practice .09(2021):51-61. doi:

[10] Reaching out: Access to and use of banking services across countries [J]. Thorsten Beck, Asli Demirguc-Kunt, Maria Soledad Martinez Peria. Journal of Financial Economics .2007(1)