Exploring the Impact of the Breadth of Digital Financial Coverage on the Financialization of Small and Medium-Sized Enterprises

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Abstract—Digital finance is of great significance to the Small and medium-sized enterprises (SMEs) development, and when Small and medium-sized enterprises no longer receive the constraints of traditional financial models, the financialization of enterprises will follow. This paper analyzes the financialization of listed SMEs in China through an empirical analysis using the coverage breadth of the Peking University Digital Financial Inclusion Index of China. The study finds that the breadth of digital financial coverage has a positive and significant effect on the financialization of SMEs. This paper examines the impact of the digital era on the financialization of SMEs, bringing some insight into the digital finance development and the study of the financialization of SMEs.

Keywords- Small and medium-sized enterprises; Digital Finance; Corporate Financialization

1 INTRODUCTION

As science continues to advance, more and more technology is being applied to various industries, resulting in the creation of many areas of research that did not previously exist, digital finance being one of them. The concept of financial inclusion has been pushed by the World Bank and the United Nations, with some success, to improve the financial infrastructure of developing countries and regions, and to increase the viability of financial services and their cost-effectiveness. The emergence of digital finance has made up for the shortcomings of traditional financial services and increased the efficiency of the financial market, as well as increasing the number of financial assets, improving the financing situation of enterprises, and making more funds available to them, while the introduction of inclusive finance has made it easier for more enterprises to access systematic financial services and more investment opportunities.

Many new technologies are being used in the financial industry, such as blockchain, cloud computing, and big data, resulting in a new financial model called digital finance. Digital finance through technology iterations on the original financial products, business processes and service boundaries have a greater impact, such as the use of big data in finance to reduce information asymmetry between borrowers and lenders and lower transaction costs [1], the use of electronic commerce and electronic payments to accustom businesses and individuals to simple, personalized services [2], the latest personal financial systems and digital currencies are also influencing the financial activities of businesses and investors [3]. Compared to traditional

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financial services, digital finance is more accessible, not limited by geography, and can provide a secure and affordable set of financial services to the poor or Small and medium-sized enterprises (SMEs) in need of them. Although the digital finance development has made it possible for businesses or individuals with low financial literacy to access simple, fast, and complex financial products and services, there may be unknown risks involved.

However, the emergence of digital finance can be of great help to individuals and businesses [4]. As the economy continues to develop and the financial market improves, many SMEs in China are not only applying their profits to real investments for business expansion but also investing part of their assets in the financial market, thus resulting in the financialization of many non-financial enterprises. Some researchers have argued that the financialization of the firm is the result of the firm's profits being primarily derived from financial investment activities [5], while Sen argues that it should not only focus on the financial aspects of the firm's investment [6], but also take into account the firm's investment, and suggests that the financialization of the firm should also include a greater reliance on external financing. In contrast, Wang et al. define the act of increasing the proportion of financial instruments and financial assets in a firm's operations as corporate financialization [7]. In addition, there are various reasons for the financialization of enterprises, one is to increase the risk resistance of enterprises so that they can operate better and avoid the risk of capital breakage. There are also macroeconomic changes that make financial investments more profitable than normal real business operations, so to obtain higher short-term returns, enterprises invest assets in financial markets [8]. In the past, small and medium-sized enterprises were easy to be neglected in financial services because it was difficult to judge what kind of financial services should be provided more appropriately. With the emergence and continuous improvement of digital finance, financial institutions can use big data to judge the situation of enterprises, to provide the most appropriate financial services. As a result, SMEs can access sufficient capital for business expansion, and the financialization of businesses as a way to be able to promote business development is also a good option for SMEs. However, corporate financialization can also face risks, as it is a speculative behavior, and excessive financialization of companies can cause them to deviate from the optimal investment ratio, thus reducing investment efficiency and limiting the normal operation of other sectors [9-10].

While previous studies have focused on some developments in digital finance and how to define the financialization of enterprises, they have not focused on the link between digital finance and the financialization of SMEs. Considering the digital finance development and financial inclusion in China, this paper will take Chinese SMEs as the research target and use the Peking University Digital Financial Inclusion Index in conjunction with data on SME financialization to conduct a quantitative study and discuss how the breadth of digital finance coverage affects the extent of SME financialization. The discussion in this paper helps the rest of the scholars and researchers to keep exploring the future development of digital finance and understand the digital finance development in China. Second, it facilitates financial institutions to understand the impact of digital finance on the financialization of SMEs.

The structure of this paper is as follows: firstly, the background and terminology of digital finance and financialization of SMEs are introduced, the second part will describe the research methodology and some data that will be used, the third party uses the collected data for research and discussion, the fourth part is a robustness test of the study, and the fifth part is a conclusion of the study on digital finance and financialization of SMEs.

2 RESEARCH DESIGN

2.1 Data sources

Firstly, the Digital Inclusive Finance Index used in this paper is prepared from a joint group formed by Ant Financial Services Group and the Institute of Digital Finance of Peking University, which uses data from Ant Financial Services Group's Digital Inclusive Finance Index for the seven-year period from 2011 to 2018. In addition to the overall index, the index also analyzes the digital inclusive finance index in three aspects: use depth, coverage breadth, and digitalization, in addition to the breakdown indices of payment, insurance and investment businesses. The index covers more than 3,100 cities of different levels in 31 provinces in China, depicting the digital inclusive finance development trend in different districts of China. However, limited by the availability of data, the business of traditional financial institutions was not counted, and the data only comes from the development provided by Internet companies.

Secondly, the data of listed companies are based on the data of Shanghai and Shenzhen A-share companies from WIND financial terminal, using the data for the seven-year period between 2011 and 2018. WIND financial terminal is a real-time online comprehensive financial analysis and business communication platform built by a Chinese company. WIND integrates more than 50 exchanges around the world, including a full range of multi-market legally authorized quotes, and will also push all kinds of news announcements in real-time. WIND also collects and collates all kinds of economic and financial data, with comprehensive information, providing multi-faceted decision support for research and investment.

In this paper, the data is filtered at the enterprise level based on the following 5 points: (1) the sample of companies in the financial sector was excluded; (2) the sample of companies that were ST and *ST were excluded; (3) the sample of variables with missing values was excluded; (4) considering the effect of extreme values, the main continuous variables were bilateral shrink tail by 1% using the method of winsorize; (5) retaining SMEs whose stock code is starting with 002.

2.2 Model Setting and Variable

OLS logistic regression analysis was utilized to perform regression analysis of the digital financial coverage breadth and corporate financialization to verify the impacts of the breadth of digital financial coverage and corporate financialization. This study uses the breadth of digital finance coverage as the explanatory variable and the corporate financialization as the dependent variable, and after adding a series of control variables, a fixed-effects model controlling for industry and time is used as the test, as equation (1).

$$\text{Degree of Financialization}_{i,t} = \alpha_0 + \alpha_1 \times \text{Coverage Breadth}_i + \Sigma\text{Control}_i + \varepsilon_{i,t} \quad (1)$$

Degree of Financialization is the degree of financialization of the firm, Coverage Breadth is the digital financial coverage breadth inclusion. Control denotes the control variable, ε represents the residual term, i denotes the enterprise, and t denotes the year.

This paper focuses on the explanatory variable of coverage breadth of digital finance, and the values used are from the Peking University Digital Financial Inclusion Index of China. The Digital Inclusive Finance Index was compiled by Institute of Digital Finance of Peking

University based on massive account and transaction data of Ant Financial, covering 31 provinces and more than 3,100 cities in China from 2011 to 2018. Digital finance differs from traditional financial because digital finance does not reach users in terms of the financial institution outlets number and the financial service personnel number. Since digital finance is not limited by geography, the number of e-accounts will reflect whether the user receives the appropriate services from digital finance (e.g., payment accounts on various platforms, the bank cards number linked to per account on average, and the proportion of users with bank cards linked to every account). The coverage breadth also reflects, to some extent, the extent of regional digital financial infrastructure coverage.

In this research, the dependent variable is the corporate financialization, and the measure of corporate financialization is adopted as the ratio between the financial assets held and the total assets at the year-end. Define financial assets as the sum of financial assets held for trading, net available-for-sale financial assets, derivative financial assets, net loans and advances granted, net held-to-maturity investments, and net investment in real estate.

Based on previous studies in the literature, the control variables selected in this paper include total assets at the year-end; total liabilities at the year-end; the length of time the enterprise has been listed; percentage of shareholding of the largest shareholder; state-owned enterprises; foreign-funded enterprises; board of directors size; the number of independent directors; executive compensation; and the return on assets. Table 1 shows the definition of control variables.

Table 1 Variable definitions

Variable	Variable Type	Definition
Coverage Breadth	Core explanatory variables	See *the Peking University Digital Financial Inclusion Index of China 2018*
Degree of Financialization	Dependent variable	The ratio of financial assets held by an enterprise to total assets at the year-end is used to measure the financialization of an enterprise. Financial assets are defined as the sum of financial assets held for trading, derivative financial assets, net loans and advances granted, net financial assets available for sale, net investment held to maturity, and net investment real estate.
Asset, unit: 10000 Yuan	Control variables	Total assets at the year-end
Debt, unit: 10000 Yuan		Total liabilities at the year-end
Age		Length of time that the enterprise has been listed
top1		Percentage of shareholding of the largest shareholder (%)
SOE=1		State-owned enterprises=1, otherwise 0
Foreign=1		Foreign-funded enterprises=1, otherwise 0
Board Size		Board of Directors Size

No. of Independent Director	Number of independent directors
Salary, unit: 10000 Yuan	Executive remuneration
ROA, %	Return on Assets

2.3 Descriptive statistics

The table 2 is the basic information collected at the enterprise level, from which it is seen that there are 5096 observations that have been filtered for statistical purposes. The mean value of digital finance coverage breadth index is 190.9901, -10.49 is the minimum value, the maximum value is 290.3175, the mean value of financialization of each enterprise is 0.0211. The mean value of the enterprises' total assets at the year-end is 511747.62, and the mean value of total liabilities at the year-end is 252928.61. The average age of enterprises in the statistics is 5.1517, the average value of the shareholding of the first largest shareholder is 34.2534, and there are more state-owned enterprises in the statistics (0.1648) compared to foreign enterprises (0.0555). The average value of the board size of each company is 8.3958, the average value of the number of independent directors is 3.0983, and the average remuneration of executives is 345.8397. The mean value of return on assets for each company is 4.708, the maximum value is 23.4179 and the minimum value is -32.8121, which indicates a large difference in the return on assets of each company.

Table 2 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Coverage Breadth	5096	190.9901	61.3586	-10.49	290.3175
Degree of Financialization	5096	.0211	.0468	0	.5748
Asset, unit: 10000 Yuan	5096	511747.62	1048682.1	18657.975	22776239
Debt, unit: 10000 Yuan	5096	252928.61	719779.93	3627.572	19140186
Age	5096	5.1517	3.2723	0	14
top1	5096	34.2534	14.6142	4.15	88.92
SOE=1	5096	.1648	.3711	0	1
Foreign=1	5096	.0555	.229	0	1
Board Size	5096	8.3958	1.461	5	15
No. of Independent Director	5096	3.0983	.4637	2	5
Salary, unit: 10000 Yuan	5096	345.8397	309.7526	15.7712	2411.08
ROA, %	5096	4.708	6.2585	-32.8121	23.4179

3 EMPIRICAL RESULTS

3.1 Baseline regression results

In this paper, OLS logistic regression analysis is used to regress the breadth of digital financial coverage on corporate financialization, and the results of the benchmark regression analysis of the digital financial coverage breadth on the degree of financialization of SMEs are given in Table 3. Observe Table 3, both columns (1) and (2) are results without controlling for industry and time, but (1) does not include control variables while (2) does. Columns (3) and (4) are

regression results controlling for industry and time, and there is no control variable added in column (3) and control variable added in column (4). The results all show a significant positive effect of digital financial coverage breadth on the degree of financialization of SMEs, with each unit increase in digital financial coverage breadth increasing the degree of financialization of firms by 0.01%. The results obtained from the regressions are in line with the expectations of the study. In addition, it is found that the amount of time a company has been listed on the market, total assets at the year-end, the percentage of shareholding of the largest shareholder, and quantity of independent directors are significantly and positively related to the degree of financialization. Total liabilities at the year-end of the period and whether the firm is a state-owned enterprise are negatively related to the degree of financialization.

Table 3 Benchmark regression

	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
VARIABLES	DoF	DoF	DoF	DoF
Coverage Breadth	0.0002***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Age		0.0033***		0.0035***
		(0.0007)		(0.0007)
Age-sq		-0.0001		-0.0001
		(0.0001)		(0.0001)
Ln asset		0.0088***		0.0070***
		(0.0022)		(0.0022)
Ln debt		-0.0073***		-0.0062***
		(0.0015)		(0.0016)
top1		0.0001*		0.0001**
		(0.0001)		(0.0001)
SOE=1		-0.0084***		-0.0091***
		(0.0014)		(0.0014)
Foreign=1		-0.0013		-0.0004
		(0.0029)		(0.0029)
Board Size		-0.0021***		-0.0021***
		(0.0006)		(0.0006)
No. of Independent Director		0.0067***		0.0062***
		(0.0019)		(0.0019)
Ln salary		-0.0007		-0.0001
		(0.0012)		(0.0012)
ROA, %		-0.0001		-0.0001
		(0.0001)		(0.0001)
Constant	-0.0119***	-0.0524***	-0.0126***	-0.0481**
	(0.0015)	(0.0198)	(0.0046)	(0.0191)
Observations	5,096	5,096	5,096	5,096
R-squared	0.0513	0.0861	0.1174	0.1480

Data	Unbalanced	Unbalanced	Unbalanced	Unbalanced
Industry Dummy	No	No	Yes	Yes
Year Dummy	No	No	Yes	Yes

Note: The numbers in parentheses are standard errors; *, **, *** represent significant at 10%，5%, and 1% respectively。

3.2 Heterogeneity Analysis

In the traditional financial market, SMEs are often neglected by financial institutions for various reasons, but there is a great influence of digital finance on financial services of SMEs through technology. To verify that digital finance affects the financialization of different firm sizes, the sample firms were grouped and analyzed for heterogeneity. According to the collected data, a variable Dummy is set and the total assets of enterprises in the year above the 50th percentile are counted as 1, otherwise 0. Those with a Dummy of 0 are considered as small enterprises and Table 4 shows the results of the analysis. Comparing the data in columns (2) and (4) of Dummy × Coverage Breadth in Table 4, the interaction results are positive, indicating a stronger impact of digital finance development on the financialization of large firms. However, the coefficients in all four columns of results are insignificant, indicating that the influence of digital finance development on the financialization of corporations is not scaled heterogeneous, and the coefficients are not statistically significant. The heterogeneity analysis indicates a greater effect of the current breadth of digital finance coverage on the financialization of large enterprises, and to contribute to the implementation of inclusive finance, more attention should be paid to the development of SMEs, and the financialization of SMEs should be properly promoted with the help of digital finance to avoid excessive financialization, which is beneficial to the development of SMEs.

Table 4 Heterogeneity Analysis

	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
VARIABLES	DoF	DoF	DoF	DoF
Coverage Breadth	0.0002***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Dummy	-0.0059	-0.0317	-0.0183	-0.0299
	(0.0223)	(0.0231)	(0.0222)	(0.0226)
Dummy × Coverage Breadth	0.0000	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	-0.0118***	-0.0594***	-0.0124***	-0.0579***
	(0.0016)	(0.0203)	(0.0048)	(0.0199)
Observations	5,096	5,096	5,096	5,096
R-squared	0.0513	0.0868	0.1175	0.1488
Data	Unbalanced	Unbalanced	Unbalanced	Unbalanced
Controls	No	Yes	No	Yes
Industry Dummy	No	No	Yes	Yes
Year Dummy	No	No	Yes	Yes

4 ROBUSTNESS TEST

To more accurately describe the relationship between digital finance and SME financialization, the study was re-estimated using smoothed panel data and Panel FE approach for robust type testing, and the results are shown in Table 5. From Table 5, a clear indication is that the coefficients and significance of key variables is not significantly from the results of Table 3. The coefficients in all four columns of data in Table 5 are significant at the level of 1% or less, and the positive and negative signs are consistent with those in Table 3, which indicates that digital finance covers a wide range of effects on the degree of financialization of SMEs, and this finding further confirms the robustness and reliability of the part of the empirical analysis of this paper.

Table 5 Robustness test

	(1)	(2)	(3)	(4)
	Panel FE	Panel FE	Panel FE	Panel FE
VARIABLES	DoF	DoF	DoF	DoF
Coverage Breadth	0.0002***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Constant	-0.0164***	0.0124	-0.0090	0.0158
	(0.0021)	(0.0470)	(0.0000)	(0.0466)
Observations	3,896	3,896	3,896	3,896
Number of id	487	487	487	487
Controls	No	Yes	No	Yes
Data	Balanced	Balanced	Balanced	Balanced
Year Dummy	No	No	Yes	Yes

5 CONCLUSION

This paper focuses on the effect that digital financial coverage breadth has on the financialization of SMEs. Using a sample of listed SMEs in China and data from the Digital Inclusion Index, the link between digital financial coverage breadth and the financialization of SMEs is explored and analyzed using empirical analysis. It was found that digital financial coverage breadth positively and significantly affects the financialization of SMEs. After heterogeneity analysis, it was found that the influence of the digital finance development was greater for larger firms, but the coefficient correlation is not significant so there is no size heterogeneity. Meanwhile, the study was tested for robustness and the findings still hold from the test results. The digital finance coverage breadth does affect the financialization of SMEs. The growth of digital finance enables SMEs to solve their financing problems and choose financial investments to maximize profits without affecting the normal operation of the enterprise to obtain maximum profit returns. Some things that affect business development in the traditional financial model will be solved with the growth of digital finance, and the financialization of SMEs will be one of the changes that will occur because of the digital finance development.

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