The Value of SMEs Being Affected by the Development of the Convergence of Digital Technology and Internet Financing: Evidence from China

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Abstract: This paper investigates the impact of the breadth of digital finance coverage on the value of Small and medium-sized enterprises (SMEs) in China by measuring the breadth of digital finance coverage using the Peking University Inclusive Digital Finance Index. It is found that the increase in the breadth of coverage of digital finance promotes the enterprise value of SMEs. And heterogeneity analysis was used to find that the breadth of digital finance coverage has a greater impact on the enterprise value of large firms compared to SMEs. Therefore, the state should give more attention and policy support to small enterprises. Finally, the robustness test verifies that the breadth of coverage of digital finance has a significantly positive impact on the value of SMEs. The policy implication of this paper is that the financial management needs to take measures to improve the breadth of coverage of digital finance and consider the variability of different firms and different regional firms when specifying policies.

Keywords: The breadth of digital finance coverage; Small and medium-sized enterprises; Enterprise Value

1 INTRODUCTION

As the fastest growing country in the world during the same period, China's economic development has made a historic breakthrough and has gradually established a socialist market economy with Chinese characteristics. With a stable political situation, the people's quality of life constantly improving and the fundamentals of China's economy looking good, China's financial market has also been developing rapidly. While traditional financial institutions continue to develop, digital finance is rapidly taking the country by storm with its ability to enhance the efficiency of financial services, greater coverage of financial services, and its advanced technology and techniques.

Digital finance is gaining momentum globally, especially in China. The breakthrough of information technology in financial industry has laid a foundation for the development of digital finance. WeChat Pay and Alipay Pay were the turning point of digital finance in China, which meant that Internet payments gradually entered people's lives. The development of Internet technology has promoted digital finance to take root and sprout in China's financial system and rapidly develop into all parts of the financial industry.

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Nowadays, digital finance mainly uses the Internet as a platform, through cloud computing, artificial intelligence, blockchain, big data, and other technologies. Different scholars have different perceptions of the models and applications of digital finance. D. (2021) believe that digital finance is new finance embodying digital representation made by joint design, joint optimization, and joint innovation of financial systems [1]. Digital finance is frequently used in the insurance, payment, supply chain, and currency, according to F. and W. (2020), to allocate financial resources in a reasonable and scientific way at a higher level [2]. Z. (2021) believe that digital inclusive finance can offer more diversified and easy financial services to better adapt to the development of SMEs, extend SMEs' financing channels, and assist SMEs in alleviating the problem of financing restrictions, thanks to sophisticated technology [3]. H. and H. (2018) believe that digital finance can supplement the shortcomings of traditional financial services, lower the financial services threshold and service costs, improve the financing environment for SMEs, and more effectively serve the main body of inclusive finance through scenarios, data, and innovative financial products [4].

A force to be reckoned with in China's economic market is SMEs, and with the increasing standardization of the economic market, the number of SMEs in China is also increasing. As an indispensable part of China's market economy, SMEs create a considerable number of job opportunities and contribute significantly to the economy's growth and social stability. However, SMEs also have many problems in their business process and management that limit their value. L. (2021) believe that due to the small scale of SMEs, their management system is not perfect and their business risks are relatively high [5]. As a result of such factors, the creditworthiness of SMEs has been significantly reduced and their creditworthiness level has been lowered. Traditional financial institutions have doubts about the stable operation of SMEs, and this distrust makes it difficult for SMEs to obtain funds of a certain scale. At the same time, although traditional financial institutions are trying to expand the coverage of financial services by creating institutional networks, the high cost makes it impossible for traditional financial institutions to cover many SMEs, which makes it impossible for the value of some SMEs to be well evaluated. Business value is directly tied to an enterprise's future, according to X. (2021), and three key aspects that define enterprise value are future value-added capability, enterprise risk, and longevity [6]. The future value-added capability refers to the enterprise's ability to make a sustainable profit in the future. To preserve its market position, the company must not only achieve its business goals, but also maintain its competitive advantages and continue to produce profits in a competitive market and a future expanding business environment. The capacity to create value in the future is a crucial consideration when analysis enterprise value from the standpoint of profitability. However, if we compare the value of an enterprise with comparable earnings capacity and asset size, we must also pay attention to the amount of enterprise risk. If the enterprise risk is too high, it can have a negative impact on the enterprise value. Business survival means that a business can only create value if it exists, and it is necessary to segment the cash flows and then assess the enterprise value by future cash flows.

Regarding the relationship between digital finance and SMEs, scholars have done a lot of research on the innovation incentives and financing of SMEs by digital finance. Scholars believe that the growth of digital inclusive finance can help businesses innovate. L. and Z. (2019) believe that the creation and promotion of digital inclusive finance can help encourage technological innovation among SMEs [7]. Its breadth of coverage, depth of use, and degree

of digital support services can help raise the level of innovation. W., Z. and X. (2020) believe that digital finance can help businesses overcome their financing restrictions, and that loosened financing constraints can help businesses innovate more effectively [8]. Innovation incentive effect of digital finance is stronger for SMEs and private firms. J. and J. (2022) believe that SMEs' technological innovation requires large, long-term, and stable capital investment [9]. Digital finance, through digital innovation of financial products and business models in the traditional financial market, can improve the matching of supply and demand between products and meet the continuous and high-frequency financing needs of SMEs' innovation activities with multi-species and personalized services, thus effectively alleviating innovation financing constraints. The impact of digital finance on enterprise value, on the other hand, is still in the exploratory stage of research. Given that China is at the forefront of digital finance growth, and SMEs are one of the most significant components of our economy, the introduction of digital finance has aided many SMEs in overcoming financing challenges. Through information technology and technological innovation, digital finance has decreased the cost of financial services, widened the scope of financial services, and efficiently assisted SMEs in realizing corporate value. This paper will discuss how to further strengthen the construction of digital finance and improve the breadth of digital finance coverage. This can help SMEs solve the problem of difficult financing and help them develop stably in the long run.

This paper is structured into five parts, the first part is introduction, the second part is research design, the third part is empirical results, the fourth part is robustness test, and the fifth part is Conclusion.

2 RESEARCH DESIGN

2.1 Data Sources

From 2011 to 2018, the data in this report comes from Peking University's Digital Inclusive Finance Index. Using the huge data from Ant Financial on digital inclusive finance, Peking University's Digital Finance Study Centre and Ant Financial Group developed a cooperative research group to construct the "Peking University Digital Inclusive Finance Index." The index represents many dimensions of digital inclusive finance, which is extremely authoritative, in addition to a vast range of time and space for data selection. In addition, the data of Shanghai and Shenzhen A-share companies from WIND financial terminals are also used, which from 2011 to 2018. The WIND database is the most widely used source of financial information in China. It has China's largest and most accurate large-scale financial engineering and data warehouse with financial securities data. The data are processed as follows in this paper: Companies in the financial industry are not included in the sample; the sample of companies that are ST and *ST is excluded; the sample of variables with missing values is excluded; in addition, considering the influence of extreme values, the main continuous variables are bilaterally shrunken by 1% using the method of Winsorize; and only the companies whose stock code starts with 002 (small and medium-sized board) are retained.

2.2 Model Specification

The purpose of this research is to examine how the breadth of digital financial coverage affects the value of SMEs. The value of SMEs as the independent variable is measured by the Tobin-Q value, defined as the ratio of the stock market value to the asset replacement cost. The model is shown in the following equation.

$$Tobin\ Q_{it} = \beta_0 + \beta_1 \text{Coverage Breadth}_{\ c} + \beta_2 Control_{it} + \theta_{it} \quad (1)$$

In equation (1), the subscripts i and t of the variables denote firms and years. The independent variable $Tobin\ Q_{it}$ is the value of SMEs, and the independent variable $\text{Coverage Breadth}_{\ c}$ is the digital financial coverage breadth of city c. $Control_{it}$ is a set of control variables that may have an impact on the value of SMEs.

According to the Peking University Digital Financial Inclusion Index 2018, the number of customer electronic accounts for Internet financial services reflects the breadth of digital financial coverage (e.g., the number of Internet payment accounts and their tied bank accounts). Peking University's Digital Finance Study Centre and Ant Financial Services Group launched a joint research group, which developed three indicators to gauge the breadth of digital finance coverage based on the huge data collected. They are, respectively, the number of Alipay accounts per 10,000 individuals, the percentage of Alipay card-tied users, and the average number of bank cards linked to each Alipay account.

The value of a company's future is inextricably related to its value. The three primary components that determine enterprise value are future value-added capability, enterprise risk, and longevity. Tobin-Q, which is defined as the ratio of a stock's market value to its replacement cost, is used in this study to calculate enterprise value.

The firm-level control variables mentioned in this research are based on current literature and include Table1 Asset, Debt, Age, represented by the length of time the firm has been listed, top1, the largest shareholder's stake of the stock is reflected by the percentage of shares he or she owns(%), State-owned enterprise (SOE), defined as a dummy variable with a value of 1 if the company is a state-owned enterprise and 0 if it is not, Foreign, measured by a dummy variable that equals 1 if the company is foreign-owned and 0 if it is not, Board Size, No. of Independent Director, Salary, expressed by executive compensation, and ROA (%), expressed by the ratio of net profit to total assets of the enterprise in the year.

Table 1 Variables' definition

Variable	Variable Type	Definition
Coverage Breadth	Core independent variable	From Peking University Digital Inclusive Finance Index 2018
Tobin Q	Dependent variable	Tobin-Q is used to measure enterprise value, defined as the ratio of the market value of a stock to the replacement cost of an asset.
Asset	Control variable	Total assets at the year-end
Debt		Total liabilities at the year-end
Age		Length of time the firm has been listed
top1		The shareholding ratio of the first largest

	shareholder (%)
SOE=1	State-owned enterprise=1, otherwise 0
Foreign=1	Foreign-funded enterprises=1, otherwise 0
Board Size	Size of the board of directors
No. of Independent Director	Number of independent directors
Salary	Executive compensation
ROA, %	Return on Assets

2.3 Descriptive statistics

The following table reports the descriptive statistics characteristics. The standard deviation of Coverage Breadth is 61.8875, showing that there is a significant variability in the breadth of digital financial coverage among the sampled locations, which is connected to the level of economic growth. And the maximum value of Assets and Liabilities is 22776239 and the minimum value is 3627.572. It indicates that many SMEs have the problem of higher liabilities. The maximum and minimum values of SMEs are 0.8932 and 9.0216, respectively, indicating that there is a significant difference in their values. The average value shows that the proportion of SOE is 16.59%, foreign enterprises are 5.6%, and ROA is 4.6863%.

Table 2 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Coverage Breadth	4925	190.9165	61.8875	-10.49	290.3175
Tobin Q	4925	2.119	1.2479	.8932	9.0216
Asset, unit: 10000 Yuan	4925	519932.49	1063943	18657.975	22776239
Debt, unit: 10000 Yuan	4925	257555.13	730952.16	3627.572	19140186
Age	4925	5.1785	3.2695	0	14
top1	4925	34.2196	14.5269	4.15	86.49
SOE=1	4925	.1659	.372	0	1
Foreign=1	4925	.056	.23	0	1
Board Size	4925	8.4039	1.46	5	15
No. of Independent Director	4925	3.1005	.4642	2	5
Salary, unit: 10000 Yuan	4925	348.072	310.7357	15.7712	2411.08
ROA, %	4925	4.6863	6.25	-32.8121	23.4179

3 EMPIRICAL RESULTS

3.1Benchmark Regression

The results of the estimation of the influence of the breadth of digital financial coverage on business value are presented in Table 3. After putting the coverage breadth in the first column of the estimated results, it can be concluded that the estimated coefficient of the coverage breadth is 0.0021, which is significant at a confidence level of 1%. The estimated coefficient of the breadth of coverage of digital finance does not change after the inclusion of the

coverage breadth and control variables in the second column. Indicating that the control variables such as the length of time the firm has been listed and the size of the board of directors cannot affect the empirical results. In the third column, not only the coverage breadth but also the time variable and the industry effect variable are put in, and the estimated coefficient increases compared to the first column. After putting all the variables in the fourth column of the model, the estimated result can be obtained as 0.0032. The estimated results from these four columns of data can be concluded that the effect of digital financial coverage breadth on firm value is significantly positive. It can be concluded from the data in column (4) that every 1 unit increase in the breadth of digital financial coverage will lead to an increase in Tobin-Q value of 0.0032, which is significant at the 1% level. The control variables in the table are observed as follows; Age has a positive value and Age-sq has a negative value which shows that the relationship between listing year and Tobin-q is inverted U. The coefficients of Asset and Debt and Board size are negative, indicating a negative relationship with enterprise value. Top1 and SOE have a positive relationship with enterprise value, foreign firms and independent directors have no coefficient and no significant relationship, and salary and ROA have a positive and significant relationship with enterprise value, which are correlated and significant.

Table 3 Benchmark regression

VARIABLES	(1) OLS Tobin-Q	(2) OLS Tobin-Q	(3) OLS Tobin-Q	(4) OLS Tobin-Q
Coverage Breadth	0.0021***	0.0021***	0.0028***	0.0032***
	(0.0003)	(0.0003)	(0.0007)	(0.0006)
Age		0.4004***		0.3020***
		(0.0147)		(0.0132)
Age-sq		-0.0239***		-0.0157***
		(0.0012)		(0.0011)
Ln asset		-0.4486***		-0.5129***
		(0.0519)		(0.0473)
Ln debt		-0.1773***		-0.1158***
		(0.0344)		(0.0320)
top1		0.0015		0.0034***
		(0.0012)		(0.0011)
SOE=1		0.0765*		0.0793*
		(0.0436)		(0.0405)
Foreign=1		0.0735		0.0763
		(0.0781)		(0.0685)
Board Size		-0.0648***		-0.0590***
		(0.0154)		(0.0138)
No. of Independent Director		0.0541		0.0637
		(0.0449)		(0.0403)
Ln salary		0.1664***		0.2044***
		(0.0291)		(0.0283)

ROA, %		0.0324***		0.0266***
		(0.0038)		(0.0035)
Constant	1.7143***	11.6853***	2.1922***	11.2624***
	(0.0479)	(0.6112)	(0.2289)	(0.5918)
Observations	4,925	4,925	4,925	4,925
R-squared	0.0111	0.2791	0.2770	0.4642
Data	Unbalanced	Unbalanced	Unbalanced	Unbalanced
Industry Dummy	No	No	Yes	Yes
Year Dummy	No	No	Yes	Yes

3.2 Heterogeneity Analysis

The grouping test of large and small firms will be done to more precisely reflect the impact of digital financial coverage breadth on different enterprises. And the dummy variable is set to be defined as 1 when the total assets of the year are in the 50th percentile and above, and 0 otherwise. That is, when the dummy is 1, it means above-scale (large) enterprises, and when it is 0, it means small enterprises. Besides, the cross-term of digital financial coverage breadth and firm size dummy variable is added in the estimation. Table 4 displays the test results. Coverage Breadth has a greater impact on the value of above-scale firms. The interaction term is positive and significant at the 5% level, as shown in the fourth column. It can be concluded that large enterprises are still the biggest beneficiaries in terms of financial accessibility and financing constraints. As a result, we must continue to focus on the complementing role of digital finance for small businesses. X. and G. (2021) mentioned that the country should accelerate the digital transformation of traditional finance. And financial institutions should strive to enhance the coverage of digital finance and build a diversified digital financial product system to meet the diversified financial needs of SMEs [10]. To expedite the development of digital finance, the country should actively support the creation of new infrastructure. Digital financial infrastructure should also be improved to enhance the efficiency of technological innovation in serving SMEs. Government departments also need to pay more attention to the development status of SMEs in rural and remote areas, and give appropriate is policy preferences and care.

Table 4 Heterogeneity Analysis

	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
VARIABLES	Tobin-Q	Tobin-Q	Tobin-Q	Tobin-Q
Coverage Breadth	0.0036***	0.0026***	0.0023***	0.0035***
	(0.0003)	(0.0003)	(0.0008)	(0.0007)
Dummy	-0.4378*	-0.0845	-0.8707**	0.1058
	(0.2536)	(0.3417)	(0.3423)	(0.3576)
Dummy × Coverage Breadth	0.0024**	0.0019	0.0014***	0.0009**
	(0.0010)	(0.0013)	(0.0003)	(0.0002)
Constant	1.5096***	10.6208***	2.1748***	11.8194***
	(0.0505)	(0.6206)	(0.2346)	(0.6208)

Observations	4,925	4,925	4,925	4,925
R-squared	0.0573	0.2916	0.2790	0.4667
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

In this section of the paper, the robustness test of the Panel Fixed-effect (FE) approach was conducted to re-estimate the model and the results are reported in Table 5. The data of Coverage Breadth from the first column to the fourth column show that the results are positive and all are significantly correlated, so the conclusions of this paper are robust.

Table 5 Panel fixed-effect regression

	(1)	(2)	(3)	(4)
	Panel FE	Panel FE	Panel FE	Panel FE
VARIABLES	Tobin-Q	Tobin-Q	Tobin-Q	Tobin-Q
Coverage Breadth	0.0031***	0.0045***	0.0033***	0.0021***
	(0.0003)	(0.0007)	(0.0007)	(0.0003)
Constant	1.5726***	12.3211***	1.3093***	12.1197***
	(0.0604)	(1.2644)	(0.2155)	(1.2217)
Observations	3,112	3,112	3,112	3,112
Number of id	389	389	389	389
Data	Balanced	Balanced	Balanced	Balanced
Controls	No	Yes	No	Yes
Year Dummy	No	No	Yes	Yes

5 CONCLUSIONS

The influence of digital financial coverage breadth on the value of SMEs is the topic of this article. This article examines and tests the processes and routes of the influence of digital financial coverage breadth on the value of SMEs using a sample of Chinese A-share listed businesses in Shanghai and Shenzhen. According to the findings, the breadth of digital financial coverage is important in enhancing the value of SMEs. The findings of this paper are tested for robustness, and the findings still hold from the test results, which also indicate that the findings are not affected by the selection of models.

Finally, the impact of digital financial coverage breadth on firm value for different firm sizes is further examined. The influence of digital financial coverage breadth on enterprise value is found to be more substantial in the large business sample, indicating that large enterprises are still the biggest beneficiaries from the aspects of financial availability and financing constraints, while SMEs are limited by the favourable impact of digital financial coverage breadth.

For the policy implications of this paper; the breadth of digital finance is important for SMEs that need to enhance their enterprise value, so it is important to continue to promote the development of digital finance and increase its breadth of coverage for SMEs, especially those in remote areas. Secondly, while promoting the breadth of digital finance coverage, the government should not only focus on the enhancement of the enterprise value of large enterprises but also focus on the enterprise value of SMEs with the short establishment, so that they can better finance and grow. When promoting the coverage of digital finance, especially when giving preferential policies to SMEs, it is also necessary to strengthen the screening mechanism to ensure the optimal allocation of limited credit resources.

REFERENCES

[1] Xiaowei, D. (2021). From Internet Finance to Digital Finance; Development Trends, Features and Concepts. J. Nanjing University Journal.

[2] Changluan, F. & Yulong. W. (2020). An Analysis of the Meaning, Characteristics and Development Trend of Digital Finance. J. Industrial Innovation Research. 51-54.

[3] Mengmeng, Z. (2021). Research on the impact of digital inclusive finance on innovation of small and medium-sized enterprises. D. Dalian University of Technology. 1-76.

[4] Yiping, H. & Zhuo, H. (2018). Digital financial development in China, present and future. J. Econometrics (Quarterly). 1489-1502.

[5] Cailing, L. (2021). Problems and strategies in the management of funds of small and medium-sized enterprises. J. Enterprise Reform and Management. 159-160.

[6] Yuwei, X. (2021). Research on internal control and enterprise value of small and medium-sized enterprises. J. China Collective Economy. 58-59.

[7] Bang, L. & Jianhua, Z. (2019). Can digital financial inclusion development stimulate innovation? -- Evidence from Chinese cities and SMEs. J. Contemporary Economic Science. 41, 74-86.

[8] Jiayu, W. Qin, Z. & Yi, X. (2020). Digital finance, financing constraints and corporate innovation. J. Economic Review. 71-83.

[9] Hongli, J. & Pengcheng, J. (2022). Can digital finance improve total factor productivity of firms? – An empirical evidence from Chinese listed companies. J. Journal of Shanghai University of Finance and Economics. 1-11.

[10] Tingting, X. & Lili, G. (2021). A study on the impact and mechanism of digital finance on technological innovation of SMEs - based on the analysis of traditional financial structure mismatch. J. Financial Development Research. 60-68.