WEP Warwick Evans Publishing

International Journal of Social Sciences and Public Administration

ISSN: 3005-9836 (Print), ISSN: 3005-9585 (Online) | Volume 5, Number 2, Year 2024
DOI: https://doi.org/10.62051/ijsspa.v5n2.27
Journal homepage: https://wepub.org/index.php/IJSSPA/index

Does Digital Financial Inclusion Promote Innovation among Small and Medium-sized Enterprises?

Xuheng Zhang*

Waikato Management School, University of Waikato, Hamilton, New Zealand
*Corresponding Author: Xuheng Zhang

ABSTRACT

In recent years, due to the rapid development of information technology and the Internet, digital inclusive finance has emerged based on Internet technology. Compared with traditional finance, digital inclusive finance has higher availability, wider coverage, and stronger sustainability, which is conducive to small and medium-sized enterprises to break financing constraints, broaden financing channels, and develop enterprise innovation. Therefore, this study selects relevant data on Chinese small and medium-sized enterprises from 2012 to 2020 to empirically test the impact of digital inclusive finance on the innovation of small and medium-sized enterprises. The empirical results show that: (1) The development of digital inclusive finance can significantly promote enterprise innovation; (2) Financing constraints play a partial mediating role in the process of digital inclusive finance promoting enterprise innovation.

KEYWORDS

Digital Financial Inclusion; Innovation; Small and Medium-Sized Enterprise.

1. INTRODUCTION

The rapid development of China's economy has promoted the entrepreneurial wave and greatly encouraged the enthusiasm of small and medium-sized enterprises (SMEs) to start businesses. According to the "Twelfth Report of the Fourth National Economic Census Series", among all corporate legal entities of all sizes, small and medium-sized enterprises account for 99.8%, contributing more than 70% of technological innovation [1]. Therefore, it can be clearly seen that SMEs have become an important force in my country's economic development and technological innovation, playing a pivotal role both in the economic market and in the field of enterprise innovation.

However, SMEs need financial support for technological innovation, but because small and medium-sized enterprises generally have the characteristics of high investment, short cycle and high risk in the innovation process, they have long faced serious financing constraints [2]. In terms of internal financing, the development of small and medium-sized enterprises is not mature, and the retained earnings of enterprises are not much. Apart from the daily operating expenses, the funds to support R&D and innovation are not sufficient. In terms of external financing, banks, venture capital and other large lenders are unwilling to lend funds to small and medium-sized enterprises due to problems such as excessive risks. What's worse is that since the COVID-19 pandemic in 2019, the global economy has been in a downturn, and many companies have declared bankruptcy due to problems such as broken capital chains or insufficient capital flows. In this unfavorable environment, it is more difficult for SMEs to obtain financing, and the innovation resistance of SMEs is greater.

However, in recent years, due to the rapid development of information technology and the Internet, the digital financial industry has developed rapidly. Compared with the traditional financial industry, digital finance relies on Internet technology and has advantages such as higher availability, wider coverage, and stronger sustainability, which is conducive to SMEs to obtain financial resources more efficiently [3], thereby promoting the innovation of SMEs. This paper will evaluate the impact of digital inclusive finance on SME innovation through empirical research, and explore the transmission mechanism of this impact, so as to provide relevant policy recommendations on how digital inclusive finance can promote SME innovation.

2. HYPOTHESIS DEVELOPMENT

Digital inclusive finance, generally refers to all actions that promote inclusive finance through the use of digital financial services, includes various financial products and services (such as savings, credit, transfers, payments, securities, bank statement services, etc.), which are traded through digital or electronic technology, such as electronic money, payment cards and regular bank accounts[4]. Enterprise innovation requires a steady stream of capital investment, so the development of the financial industry can theoretically provide more financial support for enterprise innovation, thereby promoting enterprise innovation[5].

However, due to the small scale, low risk resistance and low credit level of SMEs, financial institutions are often reluctant to lend or invest in SMEs in order to reduce their own risks. Government-controlled enterprises are often more likely to borrow because they can obtain implicit guarantees of government support, which further compresses the financing environment of SMEs[6]. Digital inclusive finance is a new type of financial service that combines modern digital technology with traditional inclusive financial services. Its essence is still financial services. The essence of inclusive finance is to enhance the hematopoietic function of SMEs. The further combination of digital technology and traditional inclusive finance enables small and medium-sized enterprises in the long tail effect to better enjoy the benefits brought by inclusive finance, which is conducive to the financial industry to better serve the development of the real economy[7]. Today, with the rapid development of digital inclusive finance, companies with high development potential will rely on the convenience brought by inclusive finance to complete their own industrial upgrading and innovation in technology, management and other aspects. Therefore, the development of digital inclusive finance will directly drive the innovation and development of small and medium-sized enterprises[8].

At the same time, financing constraints have a suppressive effect on enterprise innovation. At present, my country's small and medium-sized enterprises are facing insufficient internal financing and difficulty in external financing. From the previous concept, we can know that small and medium-sized enterprises need to develop through enterprise innovation, which requires a lot of capital and time costs, and there are many uncertain factors. Financial institutions are often cautious about lending to small and medium-sized enterprises, which creates financing constraints. Financing constraints further suppress enterprise innovation. Digital inclusive finance relies on the Internet and uses technologies such as big data, artificial intelligence, and blockchain to greatly reduce financing constraints, which has the advantage of alleviating information asymmetry and improving financing efficiency. Digital inclusive finance uses cloud computing, big data and other technologies to conduct an all-round and objective analysis of different small and medium-sized enterprises in different industries, select small and medium-sized enterprises that meet the investment intentions of financial institutions, evaluate the true value of enterprises, and then provide matching financial services to help carry out targeted marketing. While effectively controlling risks, it also effectively solves the information asymmetry in the financing process of small and medium-sized enterprises, making it easier for investors to understand the internal information of the enterprise[9]. Therefore, based on the above analysis, this study proposes the following hypotheses:

H1: Digital inclusive finance can promote innovation among SMEs;

H2: Digital inclusive finance promotes innovation among SMEs by alleviating financing constraints.

3. RESEARCH DESIGN

According to the definition of SMEs, this study selected data from the Beijing Stock Exchange, the Science and Technology Innovation Board and the ChiNext Board in mainland China from 2012 to 2020, and excluded ST enterprises and financial enterprises as samples, and conducted regression analysis in the empirical analysis. The reasons for selecting the ChiNext Board and the Science and Technology Innovation Board are as follows: First, the ChiNext Board is a financing channel specially established for SMEs that cannot be listed on the main board. It has the characteristics of loose listing requirements and strict management, which is conducive to the development of potential SMEs and meets the definition of SMEs. Second, the Science and Technology Innovation Board is a board specially established for technological and innovative SMEs. It is suitable for financing technological innovation enterprises that have not yet entered the mature stage of development. Among them, the enterprises meet the characteristics of SMEs. Third, financial enterprises may have outliers, and their company characteristics will also have a significant impact on the results, which need to be eliminated. The explained variable of this study is enterprise R&D investment, the explanatory variable is the digital inclusive finance index, and the mediating variable is the financing constraint WW index. The remaining control variables include: audit opinion, equity concentration, enterprise growth, enterprise profitability and fixed asset ratio. The details of all variables are shown in the Table 1 Variable Summary Table.

Table 1. Variable Summary Table

Variable	Name	Sign	Detail
Dependent Variable	Enterprise R&D investment	RD	Ln(Enterprise R&D amount/1,000,000)
Independent Variable	Digital Financial Inclusion Index	DIFI	Digital Financial Inclusion Index/100
Mediating Variable	Financing constraints	WW	WW Index
Control variables	Audit opinion	Audit	Annual audit report of the enterprise
	Ownership Concentration	Lash	Shareholding ratio of the largest shareholder
	Enterprise growth	Growth	Operating income growth rate
	Corporate profitability	Roa	Net profit of the enterprise
	Fixed assets ratio	Fas	Fixed assets/total assets

This paper analyzes whether digital inclusive finance has a significant impact on corporate R&D investment, and uses financing constraints as the mediating variable to establish the following empirical model:

$$RD_{i,t}=\alpha_0+\alpha_1 DIFI_{i,t-1}+\sum\varphi CV_{i,t-1}+\varepsilon_1 \quad (1)$$

$$WW_{i,t}=\beta_0+\beta_1 DIFI_{i,t-1}+\sum\varphi CV_{i,t-1}+\varepsilon_2 \quad (2)$$

$$RD_{i,t}=\gamma_0+\gamma_1 DIFI_{i,t-1}+\gamma_2 WW_{i,t}+\sum\varphi CV_{i,t-1}+\varepsilon_3 \quad (3)$$

Model (1) verifies whether digital inclusive finance has a significant impact on corporate innovation. The coefficient α_1 refers to the total effect of the digital inclusive finance index on corporate R&D investment. If α_1 is significant, the test of model (2) is performed, otherwise the test is terminated; models (2) and (3) are used to test whether the mediating effect is effective. β_1 refers to the indirect effect of the digital inclusive finance index on the WW index, γ_2 refers to the indirect effect of the WW index on corporate R&D investment, and γ_1 refers to the direct effect of the digital inclusive finance index on corporate R&D. The total effect is equal to the product of the direct effect and the two indirect effects.

Therefore, if the three coefficients of β_1, γ_2, and γ_1 are all significant, it means that financing constraints play a partial mediating effect. If β_1 and γ_2 are significant, but γ_1 is not significant, then financing constraints play a complete mediating effect.

4. RESULTS AND DISCUSSION

4.1. Descriptive Statistics

Table 2 lists the descriptive statistics of the sample data. From the perspective of the explained variables, the average value of the R&D investment amount of SMEs after logarithmic processing is 3.796, but the difference between the extreme values is large, and the standard deviation is also relatively large, reflecting that there are large differences in the R&D investment amounts of the sample enterprises. From the perspective of the explanatory variables, the average value of the total digital inclusive finance index after dividing by 100 is stable at around 2.767, the standard deviation is small, and there are certain differences between the extreme values. Although there are differences between the mechanisms of the remaining variables, the overall fluctuation is not large. Therefore, from the above descriptive statistical results, the range of values of the variables selected in this article is within a reasonable range, and there are basically no obvious outliers in the variables. The selected samples meet the requirements of the research.

Table 2. Descriptive Statistics Table

Variable	N	Mean	p50	SD	Min	Max
RD	3,784	3.796	3.734	1.036	-2.125	8.180
DIFI	3,784	2.767	2.681	1.319	0.759	22.640
WW	3,784	-0.990	-0.987	0.051	-1.631	-0.798
Fas	3,784	0.164	0.141	0.120	0.001	0.764
Lash	3,784	0.307	0.289	0.131	0.030	0.930
Roa	3,784	-0.521	0.107	35.381	-2.175	1.822
Audit	3,784	0.062	0.000	0.433	0.000	4.000
Growth	3,784	0.243	0.166	0.555	-0.982	16.908

4.2. Correlation Analysis

Before conducting the model regression empirical study, the main variables were analyzed for correlation to prevent multicollinearity between variables. The results in Table 3 show that the correlation coefficients between the 1 explained variable, 1 explanatory variable, 1 mediating variable and 5 control variables in this study are basically less than 0.6. Therefore, there is no strong correlation between the variables. The correlation between the variables meets the requirements.

Table 3. Correlation Analysis Table

Variable	RD	DIFI	WW	Fas	Lash	Roa	Audit	Growth
RD	1							
DIFI	0.252***	1						
WW	-0.561***	-0.145***	1					
Fas	0.081***	-0.039**	-0.504***	1				
Lash	-0.128***	-0.0220	0.056***	-0.061***	1			
Roa	-0.159***	-0.092***	0.052***	-0.012	0.110***	1		
Audit	-0.041**	-0.0190	-0.044***	0.035**	-0.00700	-0.037**	1	
Growth	-0.002	0.066***	0.095***	-0.058***	-0.029*	-0.106***	-0.004	1

Note:* p<0.1, ** p<0.05, *** p<0.01

4.3. Baseline Regression Result

This paper uses the model to test the relationship between digital inclusive finance and the intensity of corporate R&D investment, and the regression results are shown in Table 4. From the regression results, it can be concluded that at a confidence level of 99%, the total index of digital inclusive finance and corporate R&D investment are significantly positively correlated, indicating that the improvement of the level of digital inclusive finance can significantly promote the improvement of corporate innovation R&D investment intensity/therefore, hypothesis H_1 is established.

Table 4. Baseline Regression Result Table

Variable	RD
DIFI	0.190***
	(15.57)
Growth	0.149***
	(5.16)
Fas	-0.915***
	(-6.84)
Lash	-1.076***
	(-8.64)
Roa	-0.001***
	(-2.94)
Audit	-0.072*
	(-1.93)
Constant	3.717***
	(62.76)
Observations	3,765
R-squared	0.106

Note:* p<0.1, ** p<0.05, *** p<0.01.

4.4. Robustness Test

This study conducts robustness tests by replacing core variables and eliminating special values. Table 5 shows the results of the robustness test. Column (1) is the regression result obtained by eliminating all enterprises registered in municipalities (including Beijing, Shanghai, and Chongqing) in this sample. Column (2) is tested by replacing the explained variable. The method is to take the logarithm of the original RD and obtain RD1 for regression. The results in Table 5 show that after eliminating special values and replacing core variables, the results are still significant, proving the robustness of the previous conclusions.

Table 5. Robustness Test Table

Variable	(1) RD	(2) RD
DIFI	0.161***	0.052***
	(12.58)	(15.18)
Growth	0.157***	0.041***
	(4.94)	(4.97)
Fas	-0.516***	-0.271***
	(-3.41)	(-7.15)
Lash	-0.985***	-0.311***
	(-7.05)	(-8.81)
Roa	0.049	-0.000**
	(0.85)	(-2.30)
Audit	-0.064	-0.030***
	(-1.53)	(-2.88)
Constant	3.655***	1.284***
	(56.00)	(76.53)
Observations	2,931	3,758
R-squared	0.083	0.104

Note:* p<0.1, ** p<0.05, *** p<0.01

4.5. Mediating Effect Regression Result

Table 6 analyzes the transmission mechanism of digital inclusive finance - financing constraints - enterprise innovation based on regression. Among them, column (1) the total effect of the digital inclusive finance index coefficient is positive at the 1% significance level, indicating that digital inclusive finance has a promoting effect on enterprise innovation; column (2) the coefficient of the digital inclusive finance index on financing constraints is negative at the 1% significance level, indicating that digital inclusive finance has a role in easing financing constraints; column (3) adds financing constraints and the digital inclusive finance index to the regression model at the same time, and the coefficients are significant at the 1% level, and the WW index coefficient is negative. The direct effect coefficient of the digital inclusive finance index is 0.103, which is less than the total effect coefficient of 0.19, indicating that financing constraints play a partial mediating role in the

process of digital inclusive finance promoting enterprise innovation. Digital inclusive finance promotes enterprise innovation by easing financing constraints. In summary, hypothesis H2 is established.

Table 6. Mediating Effect Regression Result Table

Variable	(1) RD	(2) WW	(3) RD
DIFI	0.190***	-0.006***	0.103***
	(0.012)	(0.001)	(0.010)
WW			-13.421***
			(0.300)
Growth	0.149***	-0.046***	-0.470***
	(0.029)	(0.001)	(0.027)
Fas	-0.915***	0.010	-0.786***
	(0.134)	(0.006)	(0.108)
Lash	-1.076***	0.016***	-0.861***
	(0.124)	(0.005)	(0.101)
Roa	-0.001***	-0.000**	-0.002***
	(0.000)	(0.000)	(0.000)
Audit	-0.072*	0.010***	0.058*
	(0.037)	(0.002)	(0.030)
Constant	3.717***	-0.968***	-9.275***
	(0.059)	(0.003)	(0.295)
Observations	3765	3765	3765
R-squared	0.106	0.290	0.416

Note:* p<0.1, ** p<0.05, *** p<0.01.

5. CONCLUSION

Financing constraints and enterprise innovation have always been a hot topic in academic research. According to previous studies, financing difficulties for SMEs are an important factor restricting enterprise innovation. With the development of finance and Internet technology, digital inclusive finance provides a new path for SMEs to solve the problem of financing constraints. This paper uses SMEs from 2012 to 2020 as a research sample to empirically explore the impact of the development of digital inclusive finance on SMEs' innovation and R&D investment. The main conclusions of this paper are as follows: (1) The development of digital inclusive finance has a significant promoting effect on SME innovation. The total index of digital inclusive finance can significantly promote the R&D investment of SMEs, indicating that the development of digital inclusive finance makes enterprise financing more convenient and the financing cost lower, which better alleviates the financing constraints of SMEs and promotes the innovation of SMEs; (2) Financing constraints play a partial mediating role in the process of digital inclusive finance promoting enterprise innovation.

Digital inclusive finance can alleviate the financing constraints of SMEs by broadening financing channels, alleviating information asymmetry, reducing financing costs, providing differentiated financial products and services, and relying on big data and cloud computing, making it easier for SMEs to obtain financing and having more abundant funds for enterprise innovation.

This paper studies the impact of the development of digital inclusive finance on the innovation of SMEs from the perspective of the intermediary mechanism of financing constraints. In order to promote the steady development of China's economy and continuously improve the innovation ability of SMEs, the following suggestions are put forward: (1) Vigorously promote the development of digital inclusive finance and ease the financing constraints of SMEs. Through empirical research, digital inclusive finance can promote the innovation of SMEs by alleviating the financing constraints of SMEs. Therefore, the government should actively guide the development of digital inclusive finance and advocate that digital inclusive finance provide diversified and differentiated financial products by relying on big data and the Internet. At the same time, it also provides good market and technical support for the development of digital inclusive finance; (2) Pay attention to the heterogeneity of enterprise innovation and implement precise policies. Through empirical research, digital inclusive finance has a heterogeneous effect on the innovation development of SMEs. For non-state-owned enterprises, high-tech enterprises and enterprises in the central and western regions, the role of digital inclusive finance in promoting them is more obvious, so the government should provide more convenient policies for such enterprises to facilitate their financing and support their innovation. Financial institutions should also put aside discrimination and appropriately lower the financing threshold for such enterprises to promote their innovation.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

[1] Pan Lingling. Research on the impact of digital inclusive finance on innovation of small and medium-sized enterprises. Shandong University of Finance and Economics, 2021. DOI: 10.27274/d.cnki.gsdjc.2021.000165.

[2] Liu Li, Yang Hongrui. Digital finance, financing constraints and technological innovation of small and medium-sized enterprises - an empirical study based on the data of the New Third Board. East China Economic Management, 2022, 36(05): 15-23. DOI: 10.19629/j.cnki.34-1014/f.211223003.

[3] Chang Jianxin, Fan Lichun, Gao Li. Can digital inclusive finance promote high-quality economic development? Financial Development Research, 2021(12):69-76.DOI:10.19647/j.cnki.37-1462/f.2021.12.009.

[4] Niu Yubin. An Empirical Study on the Effect of China's Digital Inclusive Finance Development on Poverty Alleviation. Shandong University, 2018.

[5] Yu Jing. Research on the Construction of my country's Digital Inclusive Finance Credit System[J]. Economic Research Guide, 2022(14):126-128.

[6] Guo Feng, Wang Jingyi, Wang Fang, Kong Tao, Zhang Xun, Cheng Zhiyun. Measuring China's Digital Inclusive Finance Development: Index Compilation and Spatial Characteristics. Economics (Quarterly), 2020, 19(04):1401-1418.DOI:10.13821/j.cnki.ceq.2020.03.12.

[7] Chen Hua. An empirical study on how digital inclusive finance can alleviate the financing constraints of small and medium-sized enterprises. Zhejiang University, 2021. DOI:10.27461/d.cnki.gzjdx.2021.001304.

[8] Zhong Kai, Cheng Xiaoke, Xiao Xiang, Zheng Lidong. Does macroeconomic policy affect corporate innovation investment? An analysis based on the perspective of financing constraints and financing sources. Nankai Management Review, 2017, 20(06):4-14+63.

[9] Song Ke, Liu Jialin, Li Zhoujia. County financial availability and digital inclusive finance: From the perspective of new financial institutions. Finance and Trade Economics, 2022, 43(04):36-52. DOI:10.19795/j.cnki.cn11-1166/f.20220408.007.