The Impact of Digital Finance on Deleveraging of A-Share Listed Companies in China: A Crucial Research Topic

Jiao Wang[1], Nirote Sinnarong[2], Kittawit Autchariyapanitkul[3], and Ke Nunthasen[4]

Digital Economics and Management Innovations, Maejo University Thailand[1]

Faculty of Economics, Maejo University Thailand[2, 3, 4]

E-mail: nirote@mju.ac.th[2]

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Abstract

This research aimed to analyze the impact of digital finance development on the deleveraging of A-share listed companies. Based on the panel data of 1,111 A-share listed companies from 2011 to 2022, this research established a panel fixed effect model for analysis. The empirical results showed that the development of digital finance in China can significantly reduce the leverage ratio of enterprises; that is, the development of China's digital finance is conducive to the deleveraging of enterprises. The robustness test and endogenous problem treatment examined the above results, indicating that the above conclusions were robust. The heterogeneity analysis showed that developing digital finance in China could significantly reduce the leverage ratio of non-state-owned enterprises. However, the impact on state-owned enterprises' leverage ratio was insignificant. The development of digital finance in China can significantly reduce the leverage ratio of small enterprises, with no significant impact on the leverage ratio of medium and large enterprises. The development of digital finance in China can significantly reduce the long-term leverage ratio of enterprises, but the impact on the short-term leverage ratio was not significant. The analysis of the mediating effect showed that the development of digital finance in China can deleverage enterprises by reducing financing costs and alleviating financing constraints. The moderating effect analysis showed that the impact of digital financial development in China on enterprise deleveraging was moderated by financial supervision. The stronger the financial supervision, the weaker the impact of China's digital financial development on corporate deleveraging. This research also further verified that there is no non-linear relationship between China's digital finance development and corporate deleveraging.

Based on the above analysis, this research put forward policy suggestions from the government, enterprises, investors, and regulators, as well as the digital financial development strategy of enterprise deleveraging from the government and enterprise aspects. The research results can not only enrich the research on digital finance and corporate deleveraging but also provide certain policy suggestions to the government, regulatory agencies, enterprises, and investors in practice and can provide the strategy of digital finance to help deleveraging, so the research was of great significance.

Keywords: Digital Finance; Deleveraging; Financial Supervision

Introduction

After the outbreak of the global financial crisis in 2008, countries adopted a series of "bailout" measures; China had long implemented a series of loose monetary and fiscal policies and launched the famous "four trillion" investment plan to promote China's economic growth, after which China's economy began to recover gradually, but at the same time also produced problems such as China's rising leverage ratio and overcapacity. According to the Center for National Balance Sheets of China, China's non-financial corporate leverage ratio from 95.2% in 2008 gradually rose to 160.9% in 2022, a high leverage ratio threat to corporations and the high-quality development of China's economy. As early as 2015, the Chinese government had put forward the policy task of corporate deleveraging. In 2021, the Fourteenth Five-Year Plan and 2035 Vision Outline of China pointed out that promoting the deep integration of digital and real economies is necessary. As an essential part of the digital economy, digital finance supports the financial system in the digital era.

Digital finance is a new type of financial format that combines modern information technology with traditional finance (Huang & Huang, 2018), combining financial and technological innovation. Wan et al. (2020) believed that the development of digital finance significantly eased the financing constraints of enterprises and then had a significant positive impact on enterprise innovation. Tang et al. (2020) believed that the development of digital finance could effectively alleviate the problem of "difficult and expensive financing" for enterprises and drive enterprises to deleverage and improve financial stability, which is conducive to enterprise technological innovation and improves enterprise innovation output. Digital finance breaks the limitations of time and space. It has the advantages of low transaction costs, high efficiency, and diversified participation, increases the financial availability of enterprises and residents, and contributes to the inclusive growth of China's economy (Zhang et

al., 2019). It can ease the financing difficulties faced by Chinese enterprises, which in turn promotes corporate deleveraging.

Research Objectives

1. To analyze the impact of China's digital finance development on A–share listed companies deleveraging and conduct a heterogeneity analysis.

2. Financial supervision moderates deleveraging to analyze the impact of China's digital finance development on A–share listed companies.

Literature Review

1. Definition of term

Digital finance generally refers to using digital technology by traditional financial institutions and Internet companies to realize financing, payment, investment, and other new financial business models, significantly improving financial institutions' service efficiency and quality (Huang & Huang, 2018).

Corporate deleveraging refers to reducing the leverage ratio, measured by the asset–liability ratio.

2. Information asymmetry theory

Akerlof, the Nobel Prize winner in economics, first proposed the concept of information asymmetry. It means that in a market with incomplete information, one party (such as the buyer) and the other (such as the seller) have an asymmetric distribution of information related to the transaction, thus affecting the transaction and the efficiency of the market operation. Digital finance uses big data, cloud computing, artificial intelligence, and other digital technologies to significantly reduce the degree of information asymmetry and transaction costs between financial institutions and enterprises. Before capital lending, the development of digital finance improves the degree of information sharing between financial institutions and enterprises, reduces the pre–loan review cost of financial institutions before enterprise lending, improves the efficiency of both borrowers and lenders, and optimizes the allocation of resources. After the lending of funds, the development of digital finance enables financial institutions to learn more about enterprises with the help of digital technology, monitor the flow of lending funds, and reduce the loss of bad debts to reduce the financing cost of enterprises. Reducing financing costs will reduce enterprises' operating costs and

then increase enterprises' surplus capital so that enterprises can expand reproduction and repay enterprise debt, which is conducive to reducing enterprise leverage ratio.

3. Research on the development of digital finance in China

Liang and Zhang (2019) found that the development of digital finance can promote the innovation of enterprises by alleviating financing constraints and increasing the investment efficiency of enterprises (Wan et al., 2022). Wan et al. (2020) believed that this innovative effect is heterogeneous due to the different nature of enterprises. Tang et al. (2020) showed that financial regulation had a more significant role in promoting digital financial development and corporate innovation. Zhang et al. (2021) pointed out that developing digital finance can suppress the digital divide. However, attention should be paid to the risk supervision of digital finance in the development process to prevent significant risks it may cause.

Through the research of previous scholars, it can be found that the development of digital finance empowers traditional financial services, breaks the limitations of time and space, reduces the information asymmetry problem and operating costs of financial services, and sinks financial services to the small and medium–sized enterprises, low–income groups, and poor groups that were excluded by the traditional financial institutions, and reflects the inclusive characteristics of digital finance. However, in the development process of digital finance, attention should also be paid to preventing financial risks and establishing appropriate regulatory systems and mechanisms.

Conceptual Framework

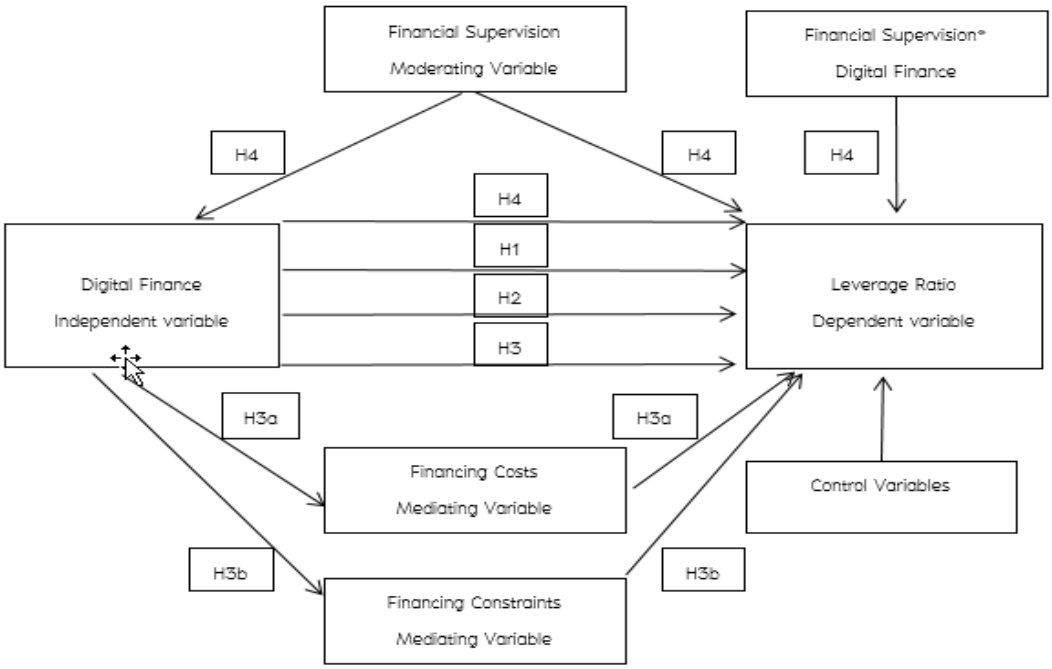

Figure 1 Conceptual Framework

Research Methodology

Sample Selection and Data Sources

Population and Sampling

The population was A-share listed companies. By December 31, 2022, there were 5,067 A-share listed companies (Securities Association of China, 2023). To pair with the start and end years of the Digital Financial Inclusion Index, the sample period was 2011 to 2022, and the sample was selected according to the following criteria:(1) Select A-share listed companies that had existed from 2011 to 2022. (2) Exclude A-share listed companies in the financial industry. (3) Exclude delisted A-share companies such as ST and PT. (4) Exclude A-share listed companies with missing and abnormal data (liabilities are more significant than assets). This research selected the balance panel data of 1,111 A-share listed companies from 2011 to 2022, for a total of 13,332 observed values. Continuous variables were treated with a 1% -99% tail reduction to avoid the influence of outliers.

Documentary Study

With the rapid development of digital finance, digital technology permeated all aspects of the enterprise so that the business risk of enterprises was reduced, business performance was rising, and the problem of information asymmetry between markets was alleviated to some extent (Tang et al., 2020). With more financing channels, enterprises can obtain liquidity, increase investment and effective operation, and have abundant internal funds, which can help repay debt (Zhao & Cao, 2022). At this stage, the leverage ratio of China's non–financial corporations was generally high. In the context of such high leverage, the rapid development of digital finance was conducive to enterprise deleveraging. Based on this, hypothesis 1 was proposed.

H1: The development of digital finance in China is conducive to deleveraging A–share listed companies, and there is heterogeneity.

At the Central Economic Work Conference in December 2020, it was clear that financial innovation must be carried out under prudent supervision. In March 2021, The Fourteenth Five–Year Plan and 2035 Vision Outline of China clarified the regulatory requirements: improve the modern financial supervision system, make up the shortcomings of the regulatory system, promote financial innovation in an orderly manner under the premise of prudent supervision, improve the regulatory framework with full risk coverage, and improve the transparency and rule of law of financial supervision. Based on this, hypothesis 2 was proposed.

H2: Financial supervision plays a moderating role in the impact of China's digital finance development on the deleveraging of A–share listed companies.

Measurement of Variable

The leverage ratio was taken as the explained variable and measured by the ratio of total liabilities to total assets. The development of digital finance was taken as an explanatory variable and used the natural logarithm of the digital inclusive financial index compiled by Peking University to measure (Xie et al., 2018; Guo et al., 2020). Financial supervision was used as a moderating variable and used regional financial supervision expenditures to measure (Wang et al., 2019). To

exclude other factors that may affect the relationship between explained variable and explanatory variable, referring to previous literature, the proportion of fixed assets, return on assets, operating cash flow, growth rate of operating income, equity concentration, and enterprise size were selected as the control variables of this research (Ma et al., 2021; Wang & Fan, 2022; Zhao & Cao, 2022).

Data Collection

The data used in this research were secondary. The data of Chinese A–share listed companies are derived from the CSMAR database (China et al. Database, CSMAR). The development of digital finance in China was measured by the Digital Financial Inclusion Index (2011–2022) compiled by the Institute of Digital Finance, Peking University. The financial supervision data was from the National Bureau of Statistics of China.

Model Design

This research established the following benchmark regression model:

1. i represented enterprise t represented the year, I represented the pro you, u_{year} represented the fixed effect of the year, used to control the influence of some factors that change with the year and cannot be observed, λ_{Ind} represented the fixed effect of the industry and used to control the influence of some factors that change with the industry and cannot be observed, represented the random disturbance term.

To analyze the impact of China's digital finance development on the deleveraging of A–share listed companies moderated by financial supervision, the following moderating effect model is constructed:

$$Lev_{i,t}\eta_0 + \eta \quad DfDfi_{I,t} * \mathrm{n}\, sup_{i,t} + \quad Fin\, sup_{i,t} \quad \eta_4 Ro\eta_5 F\eta_6 Gro_{i,t} + \eta_7 Size_{i,t} + \eta_8 Cfo_{i,t} + \eta_9 Shr_{i,t} + \mu_{year} + \lambda_{Ind} + \varepsilon_{i,t} \tag{2}$$

We are adding the interaction item between financial supervision and digital finance in the benchmark regression model to test the moderating effect. If the interaction item's coefficient is significant, verify hypothesis 2.

Results Analysis

Table 1 Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Lev	13,332	0.451	0.199	0.0320	0.898
Llev	13,332	0.0835	0.106	0	0.509
Slev	13,332	0.367	0.168	0.0319	0.806
Dfi	13,332	5.442	0.605	2.916	6.133
Dfi Usage	13,332	5.463	0.569	2.546	6.236
Dfi Coverage	13,332	5.351	0.682	1.118	6.122
Dfi Digiti~n	13,332	5.582	0.742	2.026	6.147
Roa	13,332	0.0399	0.0502	-0.217	0.222
Fix	13,332	0.226	0.171	0.00170	0.754
Gro	13,332	0.366	0.980	-0.744	9.184
Size	13,332	22.74	1.346	20.09	26.94
Cfo	13,332	0.0519	0.0662	-0.193	0.257
Share	13,332	0.560	0.152	0.226	0.916
Cost	13,332	0.0173	0.0363	-0.0819	0.224
Fincon	13,332	1.139	2.199	-6.260	6.855
Finsup	13,332	0.258	0.308	0.000700	1.611

Source: Author,2023

From Table 1, we found that the variables' mean, standard deviation, minimum, and maximum values were quite different in the sample enterprises.

Table 2 Variance Inflation Factor

Variable	VIF	1/VIF
Fincon	2.38	8.428601
Cfo	1.89	8.529387
Roa	1.63	8.613558
Size	1.48	8.712298
Cost	1.36	0.732835
Dfi	1.35	0.738180
Fix	1.30	8.771868
S hr	1.22	6.821988
Finsup	1.89	8.919892
Gro	1.08	0.928710
Mean VIF	1.47	

Source: Author,2023

For Table 2, As can be seen from the above table, the Variance Inflation Factor of each variable is less than 3, indicating that there was no serious collinearity problem among the variables in this research.

Table 3 Financial Supervision moderating effects analysis

	(1)	(2)	(3)
	Lev	Lev	Lev
Dfi	−0.029**	−0.027**	−0.028**
	(0.013)	(0.013)	(0.013)
Roa	−0.736***	−0.737***	−0.734***
	(0.038)	(0.038)	(0.038)
Fix	0.077***	0.077***	0.078***
	(0.024)	(0.023)	(0.023)
Gro	0.008***	0.008***	0.008***
	(0.001)	(0.001)	(0.001)
Size	0.094***	0.094***	0.093***
	(0.005)	(0.005)	(0.005)
Cfo	0.044**	0.043**	0.043**
	(0.018)	(0.018)	(0.018)
Share	−0.195***	−0.195***	−0.194***
	(0.023)	(0.023)	(0.023)
Finsup		0.007*	−0.249***
		(0.004)	(0.092)
Interact			0.045***
			(0.016)
_cons	−1.409***	−1.417***	−1.401***
	(0.140)	(0.139)	(0.140)
Company	Control	Control	Control
Year	Control	Control	Control
Industry	Control	Control	Control
N	13332	13332	13332
R^2	0.271	0.271	0.272
adj. R^2	0.269	0.269	0.270

Standard errors in parentheses, $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 3 Adding the interaction item between financial supervision and digital finance in the benchmark regression model to test the moderating effect, regression models 4–8 were established. The results are shown in Table 3. The regression coefficient between the digital financial inclusion index and the corporate leverage ratio was –0.028 and significant at 5%. The regression coefficient of the interaction term and corporate leverage ratio was 0.045 and significant at the 1% level. This indicated that financial supervision negatively moderates the impact of digital finance development on reducing the leverage ratio. The stronger the financial supervision, the less impact the development of digital finance has on reducing the corporate leverage ratio (deleveraging). This may be because the stronger the financial supervision, the stricter the investigation of digital finance, and the more restrictions on the use of digital finance, which would limit the use of digital finance by enterprises and then weaken the impact of deleveraging of digital finance.

Conclusion

This research selected 1111 A–share listed companies in China from 2011 to 2022 for fixed–effect model analysis. The empirical results showed that the development of China's digital finance can significantly reduce the leverage ratio of enterprises, and it is conducive to the deleveraging of enterprises. The above results were examined by the robustness test and the endogeneity treatment, indicating that the above conclusions are robust.

The heterogeneity analysis showed that the development of digital finance in China could significantly reduce the long–term leverage ratio of enterprises. However, the impact on the short–term leverage ratio was not significant. The development of digital finance in China can significantly reduce the leverage ratio of non–state–owned enterprises. However, the impact on state–owned enterprises' leverage ratio was insignificant. The development of digital finance in China can significantly reduce the leverage ratio of small enterprises. In contrast, the impact on medium–sized and big–sized enterprises' leverage ratios is insignificant.

The analysis of the mediating effect showed that the development of digital finance in China realized enterprise deleveraging by reducing the financing constraints and financing costs.

The analysis of the moderating effect showed that financial supervision played a negative moderating role in reducing the leverage ratio. That is, the stronger the financial supervision, the weaker the impact of China's digital financial development on corporate deleveraging.

Discussion

The results showed that the impact of China's digital finance development on A–share listed companies deleveraging, we found that the 1% increase in the digital financial inclusion index will lead to a 0.029% decline in the leverage ratio. The results were consistent with the research of Liang & Lin (2020), Ma et al. (2021), and Wang & Fan (2022). The regression results were still robust in solving the possible endogenous problems, taking the digital financial index lag one period as the instrumental variable and carrying out the two–stage instrumental variable method. The Internet penetration rate was a measurement indicator of digital finance (Xie et al., 2018; Tang et al., 2020), and excluding the 2015 China stock market crash for regression, results were still stable. The heterogeneity analysis found that the development of digital finance had a significant impact on the deleveraging of small enterprises but not significantly on medium and large enterprises; this may be because small enterprises were facing the most prominent problem of expensive financing difficulties. The development of digital finance has significantly given these small enterprises access to financial services, thus reducing the leverage ratio of small enterprises. It was also found that financial supervision negatively moderated the impact of digital finance development on deleveraging. The stronger the financial supervision, the less impact the development of digital finance has on deleveraging. This may be because the more robust the financial supervision, the stricter the investigation of digital finance, and the more restrictions on the use of digital finance, which would limit the use of digital finance by enterprises and hinder the impact of digital finance on deleveraging.

New Knowledge

First, the empirical model was established to study the impact of digital finance on corporate deleveraging quantitatively; that is, every 1% increase in digital finance helps the corporate leverage ratio to decrease by 0.029% and has the most significant impact on small–size enterprises. Second, the results showed that financial supervision negatively moderates the impact of digital finance development on reducing the leverage ratio. Third, suggest suggestions to the government, corporations, investors, and regulators.

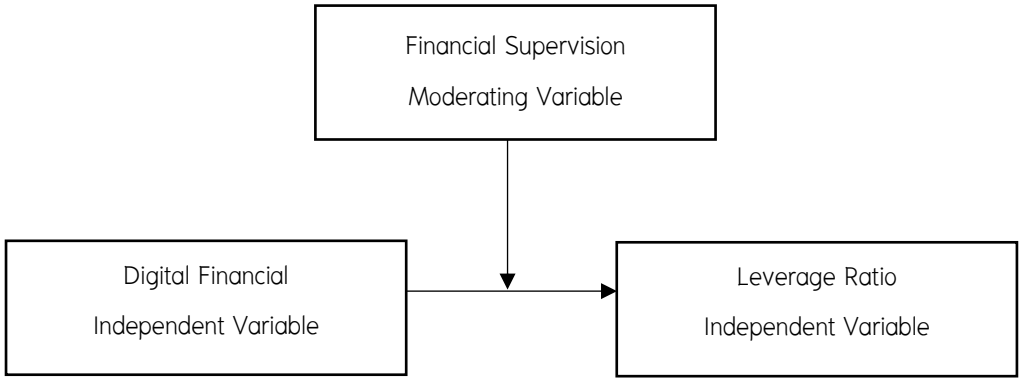

Figure 2 New Knowledge

Suggestions

First, the Chinese government authorities should increase the development of digital finance, promote the implementation of the "digital China" strategy, improve the quantity and quality of the development of China's digital finance, and promote the universality of financial services. Second, enterprises should make effective use of digital finance according to their conditions to deleverage, rationalize the use of digital technologies, and accelerate the digital process of enterprises. Make full use of digital finance to solve its capital needs, especially for small enterprises. Third, when selecting listed companies, investors should pay attention to reviewing the financial situation of the company, especially the leverage ratio of the company, to prevent financial and debt default risk. Focus on the company's ability to use digital technology and the application of digital finance. Fourth, the financial regulators should reasonably supervise the development of digital finance. The financial regulatory agencies should formulate digital financial regulatory policies, set regulatory red lines, use digital technology to dynamically monitor the development of digital finance, and prevent digital financial risks.

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