

Big Data, Financial Digitalization and Enterprises' Shift from Real to Virtual

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Abstract. Technological advancements, for instance, big data, mathematical modeling, the Internet of Things, blockchain, and cloud algorithms, have made inclusive finance more feasible. In order to cope with future uncertainties and reduce operational risks, enterprises might increase the proportion of financial assets. Finance, real estate, and other industries have become more and more important to enterprises in recent years. The aim of this paper is to examine how the progress in digital finance has enabled businesses to become more "financial" and to formulate the following policies. The model used in this paper researched how financial digitization affects the degree of financialization of firms. Digital technology has significantly contributed to the financialization of enterprises based on experimental results. A shift from real to virtual economy may result from more real enterprises participating in financial investment or financial business. Based on the model above, dummy variables and their interaction terms are introduced, which shows digitalization level has no heterogeneous effect on the degree of financialization in large and small enterprises. The study discovered that developing digital finance has a favourable impact on how financial assets are allocated by businesses (regardless of size). Due to the financialization of these businesses, financial markets have surely grown more competitive, putting pressure on all participants, and presenting opportunities and threats.

Keywords: Digital finance, Enterprise financialization, Motivation of financialization, Shift from Real to Virtual.

1. Introduction

Financial services delivered via phones, computers, or bank accounts linked to a trusted digital payment system are referred to as "digital finance." [1]. In the early stage, digital finance is a traditional financial service model. Since 1967, the first ATM machine of Barclays Bank in England was born, financial services of enterprise tended to be transformed into digital processes. It uses Internet technology to collect or transmit information and provide services for the public, but low efficiency. A viable and effective model is required to overcome the challenge facing traditional finance. Currently, thanks to the quick development of big data and cloud computing in the financial sector, the modern financial model has undergone beneficial changes [2]. For example, there is a positive relationship between the creativity of traditional financial industry and third-party payment in China. Moreover, such relationships tend to be stable over the long term [3]. With the development of new technology, such as cloud computing, mathematical modeling, The blockchain and cloud algorithm, the inclusive finance has been increased [4].

During the historical process, the financial model of enterprises has changed accordingly. The financialization of enterprises is a gradual adjustment of all the relevant dimensions of enterprises [5]. It is a type of resource allocation strategy that places an emphasis on capital operations, demonstrating that businesses are more likely to engage in investment-related activities than more conventional production and operation tasks. Usually, it utilizes the ratio of financial investment income to productive investment income to measure the financialization of enterprises. Financial assets have strong liquidity and low adjustment cost. Enterprises will increase the holding proportion of financial assets to cope with future uncertainties and reduce operational risks [6]. It is true that in recent years, more and more enterprises from the original main business, have poured into finance, real estate, and

other industries. This paper is going to analysis that it is the progressive made in digital finance push the enterprise becoming more “financial” and give following policy.

With the growth of financial digitalization, more and more financial services and products have been born, which undoubtedly improve the credit availability of micro actors (such as individuals and SMEs) and also promotes GDP growth by this way. This can increase overall spending, and consequently the GDP Level. Digital finance can also lead to improved financial intermediation and economic stability for consumers and the economy in which they and their family reside[1]. Also, corporate financialization has a benefit in that it integrates several indications around an understanding of corporate transformation in favor of a more shareholder-focused, market power-driven governance approach [7]. Financial institutions must aggressively investigate new markets and build comprehensive strategy and plans for their own growth. They should make vulnerable groups like farmers, the self-employed, small businesses, and micro enterprises their primary clients, provide them the right development finance solutions, and increase the accessibility of development financing in rural regions. In order to increase customer choice and boost financial and informational support for development financing of rural entrepreneurship, financial institutions must also provide a variety of development financing services and products [8].

Financial robotics is a crucial step of AI in the context of the new technological era. It may free up financial staff from numerous mundane and repetitive tasks, allowing them to devote more time and effort to tasks with a high added value, such financial technology application and rational decision-making. Through the security and intelligent financial robot software, a security risk management, smart environment are established, and technologies such as smart voice, robot service to consumers, and machine learning are expanded and compatible, so as to improve the efficiency of cross-business collaboration, cross-system processing, and operation automation, and effectively control financial internal control risk, data management efficiency and financial identification and decision-making ability, improve customer experience, and provide good management and economic benefits for power companies. RPA will be more crucial in the future for the financial management of electricity firms as artificial intelligence technology advances. In addition, managers should increase risk management and control, pay close attention to the numerous dangers that RPA brings to the enterprise's everyday operations, and welcome the changes it brings with an open mind. They should also encourage digitization and intelligent transformation. [9].

Digitization and financialization of enterprises will also bring digital products, which are products that can be transmitted over a digital network like the Internet [10]. Increasingly, products are becoming "smart" generators of the data needed by other products, such as programming interfaces (API) [11], as digital technologies enable them to go beyond their primary function. These new digital products are important innovations driving the gradual transformation of the entire industry [12].

The positive impact of corporate Digitization and financialization has been analyzed above, but some scholars still believe that digital transformation is not necessary for every company, process, or business model [13]. This paper investigates how the financialization of businesses has changed as a result of the advent of financial digitalization. The excessive financialization of companies is a bad phenomenon, which represents the transformation of enterprises from real to virtual. That is, real enterprises may engage in financial business, which will harm the development of the real economy in the long run.

The following parts are organized as follows: Part 2 is Research Design, which includes data sources, model specification and summary statistics; Part 3 is Empirical Results, which includes benchmark regression, heterogeneity analysis, and robustness test. Part 4 is conclusion.

2. Model Specification and Identification Strategy

2.1 Data sources

The initial research samples used in this paper's analysis are from CSMAR and include A-share listed businesses in Shanghai and Shenzhen stock markets from 2011 to 2018. The "Digital Financial

Inclusion Index," created by the Digital Finance Research Center of Peking University from 2011 to 2018, is where the digital financial data comes from. Based on the initial research samples, firstly, eliminating following samples: Excluding the sample of firms in the financial sector; Excluding the sample of companies that are ST and *ST; It removed some missing variables. Secondly, considering the influence of extreme values, use the winsorize method shrink the main continuous variables by 1%. Finally, process the data as a balance panel to Improve accuracy. This paper finally chooses 13200 samples.

2.2 Model specification and variable explanation

This paper employs the following model to identify how the independent variable (inclusion index) affect dependent variable (financialization of enterprises).

$$y_i = \alpha_0 + \alpha_1 \times D_i + x_i' \beta + \varepsilon_i \quad (1)$$

This model uses the ratio of a company's financial assets to its overall assets, which is denoted as y_i , to determine the financialization degree of an organization.

Digital finance index, defined by Peking University Digital Financial Inclusion Index 2018.

This model indicates D_i as an Aggregate Index. This article selects the digital financial index system is mainly composed of digital financial coverage, the depth of usage. This paper uses aggregate index to identify the regional development of financial digitalization.

This model chooses x_i' as control variables, including time span of the company listed (age), Total ending assets (Ln asset), Total ending liability (Ln debt), Size of board of directors (Board Size), executive pay (Ln salary), return on assets (ROA). Table 1 is for variable definitions.

Table 1 Variable Definition

variable	type	definition
Aggregate Index	Core variable	defined by Peking University Digital Financial Inclusion Index 2018
Degree of Financialization	dependent variable	The ratio of a company's financial assets to its overall assets at the end of the period is used to determine how financialized a business is.
Asset, unit: 10000 Yuan		total asset at year-end
Debt, unit: 10000 Yuan		Total ending liabilities
Age		time span of the company listed
top1		share proportion of the largest shareholder (%)
SOE	Controls	state-owned business=1, otherwise 0
Foreign		state-owned business=0, otherwise 1
Board Size		Size of the directors' board
No. of Independent Director		Number of independent directors
Salary, unit: 10000 Yuan		Salary
ROA, %		ROA

2.3 Descriptive statistics

Table 2 shows the descriptive statistics. The mean of digital finance (Aggregate Index) is 183.8048, standard deviation 65.0504 minimum 23.88, maximum 302.9827. The substantial disparity between the highest and minimum value and the high standard deviation revealed that there is a significant gap between each sample. The mean of the financialization of enterprise (Degree of Financialization)

is 0.0358, standard deviation 0.0828, minimum 0, maximum 0.5748. This indicates that these samples have large difference in allocating financial assets.

Table 2 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Degree of Financialization	13200	.0358	.0718	0	.5748
Aggregate Index	13200	183.8048	65.0504	23.88	302.9827
Age	13200	11.0943	6.7273	0	25
Age-sq	13200	168.3377	163.4769	0	625
Ln asset	13200	22.316	1.3309	19.0444	26.8421
Ln debt	13200	21.3253	1.739	17.4067	26.5411
top1	13200	34.9149	15.1974	3	89.99
SOE	13200	.4389	.4963	0	1
Foreign	13200	.0388	.1931	0	1
Board Size	13200	8.7467	1.7714	5	15
No. of Independent Director	13200	3.2248	.5956	2	5
Salary	13200	14.8578	.7914	11.9685	16.9982
ROA	13200	.042	.0551	-.3281	.2342

3. Empirical Results

3.1 Benchmark regression

This paper use Four models to calculate the regression results.

The first two columns 1 do not control the year dummy and industry effect, while the last two columns include these. Moreover, columns (1) and (3) show Sigle variable regression, and columns (2) and (4) add control variables.

The estimation findings in column provide the foundation for this paper (4). It is discovered that when the digitalization index grows by 1 unit, the degree of financialization of businesses rises by 0.04%, and the coefficient is substantial at the 1% level. It demonstrates how the financialization of businesses has been greatly aided by the use of digital technologies in the financial sector. This may lead to more participation of real enterprises in financial investment or financial business, which may lead to the economy "shifting from real to virtual" in the long run.

Table 3 Baseline regression

VARIABLES	(1) Financialization	(2) Financialization	(3) Financialization	(4) Financialization
Aggregate Index	0.0002*** (0.0000)	0.0001*** (0.0000)	0.0004*** (0.0000)	0.0004*** (0.0000)
Age		0.0027*** (0.0004)		0.0038*** (0.0004)
Age-sq		0.0000 (0.0000)		-0.0000 (0.0000)
Ln asset		0.0064*** (0.0016)		0.0099*** (0.0016)
Ln debt		-0.0085*** (0.0012)		-0.0116*** (0.0013)
top1		0.0001 (0.0000)		-0.0000 (0.0000)
SOE=1		-0.0055*** (0.0017)		-0.0062*** (0.0016)
Foreign=1		0.0131*** (0.0043)		0.0115*** (0.0041)
Board Size		-0.0028*** (0.0005)		-0.0020*** (0.0005)

No. of Independent Director		0.0034** (0.0015)		0.0029** (0.0014)
Ln salary		0.0015 (0.0010)		-0.0013 (0.0010)
ROA		-0.0230* (0.0132)		-0.0254* (0.0131)
Constant	-0.0006 (0.0017)	0.0158 (0.0143)	0.0047 (0.0031)	0.0299** (0.0140)
Observations	13,200	13,200	13,200	13,200
R-squared	0.0322	0.1072	0.0872	0.1509
Year Dummy	No	No	Yes	Yes
Industry Effect	No	No	Yes	Yes

3.2 Heterogeneity Analysis

As mentioned above, digital finance can improve enterprise financialization. In order to further test the mechanism of digital finance and enterprise financialization and observe the different performance of digital finance on enterprise financialization in enterprises of different sizes, this paper divides the whole sample into large-scale enterprises (asset at year-end above percentile 50) and small enterprises (asset at year-end below percentile 50). For the precautionary motivation of enterprise financialization, if digital finance promotes the financialization of large and small enterprises to different degrees because of different enterprise asset size, and is not related to the different industries and different annual characteristics of the enterprise, then the positive correlation between digital finance and enterprise financialization should be more significant. Now expend the previous model to the follow one to analysis the impact is more apparent to the large enterprise or to the small one.

Dummy is defined as 1 if the total assets of the year are above the 50 quantile and 0 otherwise.

$$y_i = \alpha_0 + \alpha_1 \times D_i + \alpha_2 \times D_i \times Dummy + \alpha_3 \times Dummy + x_i' \beta + \varepsilon_i \quad (2)$$

In this part, dummy variables and their interaction terms are introduced to investigate whether there is heterogenous impact on enterprises with different size.

Dummy $\times$ Aggregate Index is significantly positive, showing that digital technology has a stronger impact on the level of financialization of major firms at the 10% level, according to the estimation results of the first two columns. However, after adding year and industry effects in columns (3) and (4), the coefficients become insignificant, indicating that these effects can be absorbed by time trends and industry effects. That is, there is virtually no heterogeneous effect.

Table 4 Heterogeneity Analysis

VARIABLES	(1) OLS Financialization	(2) OLS Financialization	(3) OLS Financialization	(4) OLS Financialization
Aggregate Index	0.0002*** (0.0000)	0.0001*** (0.0000)	0.0004*** (0.0000)	0.0004*** (0.0000)
Dummy	-0.1105*** (0.0243)	-0.1455*** (0.0245)	-0.0258 (0.0249)	-0.0299 (0.0251)
Dummy $\times$ Aggregate Index	0.0004*** (0.0001)	0.0005*** (0.0001)	0.0000 (0.0001)	0.0001 (0.0001)
Age		0.0026*** (0.0004)		0.0037*** (0.0004)
Age-sq		0.0000* (0.0000)		-0.0000 (0.0000)

Ln asset		0.0071*** (0.0016)		0.0102*** (0.0016)
Ln debt		-0.0086*** (0.0012)		-0.0115*** (0.0013)
top1		0.0001 (0.0000)		-0.0000 (0.0000)
SOE=1		-0.0057*** (0.0017)		-0.0062*** (0.0016)
Foreign=1		0.0129*** (0.0043)		0.0115*** (0.0041)
Board Size		-0.0028*** (0.0005)		-0.0020*** (0.0005)
No. of Independent Director		0.0033** (0.0015)		0.0028** (0.0014)
Ln salary		0.0014 (0.0010)		-0.0013 (0.0010)
ROA		-0.0225* (0.0132)		-0.0225* (0.0130)
Constant	-0.0018 (0.0017)	0.0020 (0.0145)	0.0050 (0.0031)	0.0222 (0.0142)
Observations	13,200	13,200	13,200	13,200
R-squared	0.0343	0.1109	0.0884	0.1516
Year Dummy	No	No	Yes	Yes
Industry Effect	No	No	Yes	Yes

3.3 Robustness test

This paper uses the Panel FE method to carry out the robustness test and finds that the coefficient size and significance have not changed, showing that the conclusion is robust.

Table 5 Panel data regression

VARIABLES	(1) Panel data regression Financialization	(2) Panel data regression Financialization
Aggregate Index	0.0004*** (0.0001)	0.0004*** (0.0001)
Age		-0.0045 (0.0111)
Age-sq		-0.0000 (0.0000)
Ln asset		-0.0095** (0.0037)
Ln debt		0.0001 (0.0026)
top1		0.0000 (0.0001)
SOE=1		-0.0032 (0.0073)
Foreign=1		-0.0130 (0.0095)
Board Size		-0.0004 (0.0007)
No. of Independent Director		0.0003

		(0.0018)
Ln salary		0.0014
		(0.0015)
ROA		-0.0265*
		(0.0137)
Constant	-0.0074	0.2188**
	(0.0068)	(0.0996)
Observations	13,200	13,200
R-squared	0.0947	0.1046
Number of id	1,650	1,650
Year Dummy	Yes	Yes

4. Conclusion

Based on the precautionary motivation for enterprise financial allocation of financial assets, this paper investigates how digital finance development affect enterprises' financialization. It uses the development of digital finance as its research background and companies listed on A-shares in Shanghai and Shenzhen between 2011 and 2018 as its sample. It has been discovered that the growth of digital finance encourages businesses to allocate financial resources. Moreover, the positive effect seems to have little difference between large and small firms. The financialization of these enterprises undoubtedly enhances the competitiveness of the financial market, simultaneously creates pressure and opportunities for all participants. However, while enjoying the benefits of digital finance, they should also recognize the risks behind digital finance, reasonably use digital finance to carry out financial activities and achieve their own business objectives. Regulators need to maintain a healthy, orderly environment and regulate monopolies and unfair competitive practices. Government agencies can leverage new technology platforms like the Internet and cloud computing to improve financial supervision and enhance the frequency of oversight in order to boost supervision and stop economic bubbles.

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