

A Study of the Impact of Digital Financial Inclusion on New Quality Productivity

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Abstract: The rise of the digital era and the consequent digital financial inclusion have become a new focus of economic research, especially its role on new quality productivity has received increasing attention. The purpose of this study is to analyze the impact of digital inclusive finance on new quality productivity and its mechanism in China. Based on the Peking University Digital Inclusive Finance Index, this study quantitatively assesses the extent of digital inclusive finance and uses the entropy method to quantify the new quality productivity in a multidimensional way to ensure the precision of the concept of new quality productivity in the empirical analysis. The empirical analysis using the double fixed-effects model reveals that the composite index of digital financial inclusion significantly and positively affects the new quality productivity. Meanwhile, the study also shows that R&D investment contributes positively to technological progress and innovation.

Keywords: Digital financial inclusion; New quality productivity; Entropy method; Double fixed effects modeling

1. Introduction

In the rapid development of the global economy, digital financial inclusion has been increasingly emphasized by academics and the industry as a key tool for enhancing the efficiency and coverage of financial services. By breaking down the time and space boundaries of traditional finance and leveraging innovative technologies such as mobile payments, cloud computing and big data, digital inclusive finance provides convenient and caring services to a variety of users, especially low-income people and small and microenterprises. This not only promotes convenient financial services, but also has the potential to have a profound impact on the enhancement of new quality productivity^[1].

In recent years, digital financial inclusion has become an efficient and widespread form of financial services due to its convenience^[2], inclusiveness and universality. Liang Bang and Zhang Jianhua (2019) used data from prefecture-level cities to study the incentive effect of digital financial inclusion on technological innovation in China^[3]. They found that digital financial inclusion significantly promoted technological innovation at both the city and firm levels, and this effect remained significant after controlling for endogenous issues. Especially in the central and western cities^[4], areas with weak financial services and small private enterprises, the incentive effect is particularly strong.

2. Research design

2.1 Research hypothesis

This study aims to explore the impact of digital financial inclusion on new quality productivity. Based on the existing literature, the following research hypotheses are proposed:

H1: Digital inclusive finance can significantly improve the level of new quality productivity;

H2: After controlling for other influencing factors, the positive effect of digital financial inclusion is still significant.

2.2 Research model

This study uses a dual fixed effect model to examine the relationship between digital financial inclusion and new quality productivity, and to control for individual and time effects. The model Settings are as follows:

$$P_{it} = \alpha + \beta D_{it} + \gamma X_{it} + \mu_i + \tau_t + \epsilon_{it}$$

Where, P_{it} represents the quality productivity index of the i region at time t ; D_{it} is the Digital Financial Inclusion Index; X_{it} is a vector of control variables including urbanization level, marketization index, human capital level, infrastructure level, R&D intensity, etc. μ_i is a regional fixed effect; τ_t is a time-fixed effect; ϵ_{it} is the error term.

2.3 Variable definition and data source

The new quality productivity index system contains a total of 27 sub-indicators, and the sample range is the panel data of 30 provinces in China (excluding Hong Kong, Macao, Taiwan and Tibet) from 2012 to 2022. Data sources are: China Industrial Statistics Yearbook, China Energy Statistics Yearbook, China Environmental Statistics Yearbook and provincial statistical yearbook. Due to a small amount of missing original data, in order to reduce sample loss, the missing data is processed by analogy or interpolation

(1) Independent variable: Construction method of digital financial inclusion index

The Digital Financial Inclusion Index measures the penetration and quality of digital financial inclusion in a region by constructing an index that includes several sub-indicators. This paper uses the Peking University Digital Financial Inclusion Index as the core explanatory variable. The index, compiled based on Alipay user transaction data, has been widely used to measure the development level of digital inclusive finance.

(2) Dependent variable: new quality productivity index synthesized by entropy method

New quality productivity, the dependent variable, refers to the new quality productivity index constructed by Yu Jue (2024) using the entropy method. Seven indicators measure labor force: per capita years of education, labor force education level structure, the proportion of college students in the total population, per capita GDP, average employee wage, proportion of tertiary industry employees, and entrepreneurial activity. The means of production are defined by eight indicators: traditional and digital infrastructure, total and renewable energy consumption, patents per capita, investment in R&D, the digital economy, and enterprise digitalization.

3. Empirical analysis

3.1 Descriptive analysis

In this study, there are a total of 330 observed values. Through descriptive statistical analysis, we can obtain the basic statistical characteristics of each variable. For example, the average observed value of the code (representing various regions or entities) is 15.5, the standard deviation is 8.668586, the minimum is 1, and the maximum is 30. Again, the years span from 2012 to 2022, indicating that the study covers 10 years of time series data.

Table 1 Descriptive analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
code	330	15.5	8.669	1	30
year	330	2017	3.167	2012	2022
new quality productivity	330	.143	.071	.042	.509
Digital universal financial	330	261.634	92.365	61.47	460.691
Urbanization index	330	.607	.117	.363	.896
marketization index	330	8.25	1.915	3.359	12.864
level of human capital	330	.021	.006	.009	.044
infrastructure level	330	39.982	25.09	5.161	147.439
R&d intensity	330	.018	.012	.004	.068

3.2 Preliminary data processing and analysis

Prior to the estimation of the double fixed effects model, the initial processing of the data includes checking for missing values, processing of outliers, and ensuring data consistency. Given the data balance requirements of fixed effects models, processing is also required to eliminate potential sample bias.

3.3 Interpretation of the results of the double fixed effect model

The coefficient of the digital inclusive finance composite index is 0.0008273 (SE=0.0001811, T=4.57, P<0.01), indicating a significant positive effect on the new quality productivity composite index. The coefficient of urbanization level is -0.3714978 (SE=0.1046063, T=-3.55, P<0.01), indicating a significant negative effect. The coefficient of marketization index is 0.0087261 (SE=0.0028501, T=3.06, P<0.01), indicating a significant positive impact. The coefficient of human capital level is -5.409822 (SE=1.121408, T=-4.82, P<0.01), indicating a significant negative impact. The coefficient of infrastructure level is -0.0014599 (SE=0.0004611, T=-3.17, P<0.01), indicating a significant negative effect. The coefficient of R&D intensity is 3.266813 (SE=0.8431709, T=3.87, P<0.01), emphasizing a significant positive impact. Therefore, the results demonstrate that the digital inclusive finance composite index and marketization index positively affect new quality productivity, while increased R&D intensity significantly contributes to productivity. These findings are crucial for formulating policies to enhance productivity.

Table 2 Regression results

	(1)	(2)
	New quality productivity composite index	New quality productivity composite index
Digital Financial Inclusion Composite Index	0.00176*** (0.000188)	0.000827*** (0.000181)
Urbanization level UR		-0.371*** (0.105)
Marketization index market		0.00873** (0.00285)
Human capital level HC		-5.410*** (1.121)
infrastructure level		-0.00146** (0.000461)
R&d intensity		3.267*** (0.843)
_cons	-0.0754*** (0.0193)	0.258*** (0.0531)
N	330	330
R ²	0.709	0.798
adj. R ²	0.669	0.766

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4. Conclusion and suggestion

This study empirically analyzes the effect of digital inclusive finance on new quality productivity. The results show that the digital financial inclusion composite index has a significant positive effect on improving productivity. By increasing the connectivity and convenience of financial services, it facilitates access to capital for individuals and businesses, especially in the areas of innovation and entrepreneurship. Market reform is promoting the efficiency of resource allocation, boosting the vitality of enterprises, and promoting technological innovation and knowledge diffusion. However, the level of urbanization, human capital and infrastructure development have negative effects, which may be caused by uneven distribution of resources, environmental burdens, education and training that do not match market needs, and inadequate infrastructure. At the same time, the study emphasizes the important role of R&D investment in technological progress and innovation.

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