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Research on the Impact of Financial Technology on High-quality Economic Development

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Abstract

Financial technology is a technology driven financial innovation, which refers to the emerging financial products, financial services or financial models generated by the transformation and innovation of traditional financial services or businesses by using emerging cutting-edge technologies such as big data, cloud computing and artificial intelligence. In recent years, financial technology has provided a new driving force for China's high-quality economic development. Based on this, this paper first summarizes the mechanism of fintech serving the real economy, then makes an empirical study on the impact of fintech promoting the development of the real economy, and finally puts forward the path of fintech promoting the development of the real economy.

Keywords

Financial Technology; Real Economy; High Quality Development.

1. Introduction

The successful convening of the 19th National Congress of the Communist Party of China has not only provided a good driving force for financial reform, development and stability, but also provided an opportunity for the development of the financial industry. Finance was originally born for the real economy. Due to irreplaceable services, finance has become an important part of modern economy. With the development of history, we will see that the process of financial development is a process of continuously improving and upgrading the services of the real economy. At the same time, the impact of the financial industry on the real economy is multifaceted and comprehensive. The basic function of finance is to provide investment and financial services. However, this does not include all financial functions, which can supplement the financing of basic business skills, such as convenient transaction methods, effective risk management skills, cost-effective accounting and management mechanisms. New technologies such as the Internet and mobile Internet have opened the door to modern economic development. The emergence of the new business model has changed the traditional business model of the real economy, and the traditional financial industry can no longer effectively serve the real economy. The traditional financial industry faces problems such as information security, time and space constraints, and it faces many insurmountable obstacles to serve the real economy. In recent years, with the continuous development of financial technology, the emergence of new technologies has promoted the development of the real economy. Fintech integrates the latest mobile Internet, big data, cloud computing, blockchain and other Internet technologies with the financial sector, which not only effectively balances the data, but also solves the problems of security, time and space constraints [1]. Financial technology has provided a new driving force for China's high-quality economic development.

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2. Theoretical Basis and Literature Review

2.1. Financial Development

The theory of financial development is the premise of the study of regional financial theory, which has been studied earlier abroad. Patrick (1966) put forward the causal relationship between financial development and economic growth, and expounded the role and status of Finance in it, which is considered to be the earliest prototype of financial development theory. Goldsmith (1969) gave a complete definition of financial structure and financial development for the first time. He defined financial structure as the overall of a country's financial instruments and financial institutions, and financial development is the change of financial structure. He also proposed a series of indicators to measure the financial structure and financial development level, in which the financial correlation ratio (FIR) was widely used in the research of financial development. The change of fir can reflect the change of scale proportion between financial structure and economic structure, and understanding a country's financial structure is equivalent to understanding its financial development level and future financial development trend. O. McKinnon (1973) called the phenomenon that excessive government intervention in financial activities would inhibit the development of the financial system financial repression. Financial deepening means that the government should liberalize interest rate control, cancel credit rationing, realize financial liberalization, and promote economic development through savings, investment, income distribution and other effects. McKinnon proposed the financial deepening index (M2 / GDP) to describe the financial development. The ratio of total deposits and loans of financial institutions to GDP is used to measure financial development in this paper.

2.2. Economic Development

Since Adam Smith and others put forward the theory of classical economics in the 18th century, economics has developed for more than 100 years. Classical economics equates economic development with economic growth. Economic growth refers to the growth of the total amount of products and services produced by a country. It is usually measured by GDP, per capita GDP, GDP growth rate and other indicators. Boeke (1953) put forward the dualism theory, that is, economic development includes the traditional Ministry of agriculture 17 and the modern urban sector. Solow (1956) put forward the neoclassical growth theory. He believed that capital and labor can replace each other. The ratio of capital to output can be adjusted by adjusting the marginal productivity of production factor input. High growth rate will not only be obtained by high input, but also technological progress is an important influencing factor. But he still regards technological progress as an exogenous variable. Rostow C (1960) put forward the stage theory of economic development. He believed that economic development will change with the stage of social development, from the traditional social stage to the economic take-off stage of vigorously developing investment and savings, and then to the stage of high consumption and pursuing higher quality of life. Romer (1986) put forward the new growth theory and improved it based on the neoclassical model. He believed that technological improvement should not be regarded as an exogenous variable, but an endogenous product of economic development. Knowledge accumulation and technological progress are the decisive factors of economic growth. At the United Nations Conference on environment and development in 1992, participants reached a consensus on sustainable development, requiring that economic and social development should not cause damage and threat to the lives of future generations on the basis of meeting the normal lives of contemporary people, and achieve sustainable and balanced development at the economic, social and ecological levels. Since then, scholars have studied economic development from the traditional economic growth and economic structure to the social livelihood and ecological environment. Indicators to measure

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economic development include not only economic growth indicators, but also structural indicators, social and people's livelihood indicators and ecological environment indicators. Structural indicators mainly include industrial development structure, the proportion of output value of the three major industries, growth power structure, investment in emerging industries, regional development structure, urban-rural structure, resident income distribution structure, etc. Social and livelihood indicators mainly include residents' education level, social security payment rate, per capita housing area, income ratio of urban and rural residents, the proportion of urban population, classification and quantity of hospitals, per capita highway mileage and per capita number of motor vehicles. Ecological environment indicators mainly include forest coverage rate, urban greening rate, water network density, land degradation degree, PM 10 index, AQI index, etc.

2.3. Spatial Metrology

Tobler (1970) proposed that there is a certain connection between anything and other things around, and the connection between similar things is closer. This certain law is widely used in scientific research and provides support for relevant research. Spatial econometrics is based on the first law of geography, which mainly comes from the characteristics of spatial dependence or spatial autocorrelation of spatial data. At the annual meeting of the Netherlands statistical association in 1974, Paelinck proposed to establish an econometric branch to study regional econometric models, and formally proposed the concept of spatial econometrics together with Klaassen in 1979, and introduced the problems that need to be considered in spatial econometrics. Spatial econometrics mainly includes the following theories: spatial dependence, the asymmetry of spatial relations, the importance of the influence of other space units on a space unit, distinguish the interaction before and after the event, the established model needs to highlight spatial factors. According to the above introduction, when using spatial econometric method to study the influencing factors of regional financial differences and the correlation with economic development, we need to pay attention to the above points to ensure the scientific and reasonable analysis. Anselin (1988) expanded spatial econometrics and optimized its system to be more comprehensive and refined, which provides a basis for the use of spatial econometrics.

3. Empirical Research on the Impact of Financial Technology on High-quality Economic Development

3.1. Index and Data Selection

3.1.1. Index Selection

(1) The profitability rating index of commercial banks: return on assets (ROA). Similar to most traditional bank profitability studies, this paper selects the rate of return on investment as the index to measure the profitability of traditional banks. This is because this indicator measures the ability of traditional banks to convert assets into net income, which can more truly reflect the profitability of traditional banks. Therefore, this paper uses the index as the dependent variable to check the relationship between other index variables and indexes [2].

(2) Relevant financial technology development indicators: online banking transaction scale (IBOP), third-party payment (TPP). As for the independent variable index, it is difficult to measure the overall scale of fintech business, because there is no single standard for the definition of fintech services. Therefore, the overall scale of fintech business cannot be used to measure the development level of fintech. Due to the availability of data, online banking transactions and third parties, the document may have a significant impact on the profitability of traditional banks, that is, it is explained as an independent variable to measure the development status of Internet financing in China.

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(3) Relevant indicators related to the profitability of commercial banks: asset size (size), bank net interest (NIM), bank balance and loan interest rate (LDR), asset liability ratio (DAR), and gross domestic product (GDP).

3.1.2. Data Selection

The sample selected in this paper includes 16 listed traditional banks. Five state-owned commercial banks, including industrial bank, Agricultural Bank of China, Bank of China, China Construction Bank and telecom bank. 8 united commercial banks, including China CITIC Bank, Shanghai Pudong Development Bank, Minsheng Bank, Huaxia Bank, Pingan Bank, China Merchants Bank, industrial bank and China Light Industry Bank. Three municipal commercial banks, including Bank of Beijing, Bank of Nanjing and Bank of Ningbo. The study period is 28 quarters from the first quarter of 2010 to the fourth quarter of 2021. The data comes from the annual report of the world bank and the "China Financial Statistics Yearbook".

3.2. Descriptive Statistical Analysis and Stability Test

3.2.1. Descriptive Statistics

This paper makes a descriptive statistical analysis on the basic data of 16 listed banks from 2010 to 2021. The results are shown in Tables 1 and 2.

Table 1. Descriptive statistics of variable raw data

Variable	Average value	Maximum value	Minimum value	Standard deviation
ROA	1.041	1.840	0.120	0.274
SIZE	4.654	23.169	0.050	5.389
NIM	2.584	2.990	1.493	0.331
DAR	89.564	121.395	89.364	2.564
LDR	68.307	83.780	47.430	6.987
IBOP	793.753	1990.200	72.600	612.787
TPP	14.132	58.000	0.020	16.883
GDP	47.127	74.410	18.730	17.609

Table 2. Descriptive statistics of natural logarithm of variables

Variable	Average value	Maximum value	Minimum value	Standard deviation
LNROA	0.005	0.663	-2.040	0.335
LNSIZE	0.800	3.184	-3.160	1.396
LNNIM	0.892	1.188	0.464	0.144
LNDAR	4.545	4.734	4.465	0.022
LNLDR	4.218	4.428	3.859	1.116
LNIBOP	6.304	7.596	4.285	0.954
LNTPP	1.129	4.060	-3.923	2.520
LNGDP	3.773	4.310	2.930	0.418

3.2.2. Stationary Test

In order to avoid pseudo regression, it is necessary to test the stability of the data. This paper uses Eviews software to carry out LLC test, IPS test, ADF Fisher test and PP Fisher test [3]. See Table 3 for specific results.

It can be seen from table 3 that variables such as ROA, SIZE, IBOP, TPP and GDP are unstable at the 5% significance level, while variables such as NIM, DAR and LDR are stable at the 5% significance level. Next, conduct the second round of stability test. We take the natural logarithm of the four non-stationary variables (ROA, SIZE, IBOP, TPP, GDP) and test the stability of the natural logarithm of the variables. The results show that these variables are stable.

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Table 3. Results of variable stationarity test

Variable	LLC test		IPS test		ADF-Fisher test		PP-Fisher test	
	Statistic	P value	Statistic	P value	Statistic	P value	Statistic	P value
ROA	-8.52581	0.0000	-0.4325	0.3125	41.5698	0.0056	31.8941	0.2698
SIZE	-1.6548	1.4879	3.4965	0.1569	33.8221	0.8912	32.1548	0.4651
NIM	-7.5689	0.0000	-4.1324	0.0011	55.2456	0.4974	69.2459	0.0000
DAR	-16.5698	0.0000	-9.2641	0.0000	112.3654	0.0001	89.1546	0.0000
LDR	-16.5641	0.0000	-3.1648	0.0000	66.3458	0.0000	76.3264	0.0000
IBOP	1.2648	0.7894	8.1492	0.9569	1.8726	0.0008	0.7864	1.0000
TPP	25.5412	0.8942	17.2348	0.8736	7.0015	0.9847	2.2105	1.0000
GDP	-4.2791	0.0000	-1.5871	0.0981	26.3654	0.1654	79.2645	0.0000

3.3. Model Establishment

Establish the following measurement model:

$$LNROA_{it} = \alpha_1 + \alpha_2 \Delta LNSIZE_{it} + \alpha_3 NIM_{it} + \alpha_4 DAR_{it} + \alpha_5 LDR_{it} + \alpha_6 \Delta LNIBOP_{it} + \alpha_7 \Delta LNTPP_{it} + \alpha_8 \Delta LNGDP_{it} + \varepsilon_{it}$$

The common evaluation methods are F test and Hausman test. Among them, F test is used to test whether there is a separate effect, and Hausmann test is used to judge whether the econometric model is a fixed effect model or a random effect model. The results of the first F-test using Eviews software are as follows:

Table 4. Results of F test

Effects Test	Statistic	D.F.	Prob.
Cross-section F	4.215868	(15,147)	0.0000
Cross-section Chi-square	60.827308	15	0.0000

It can be seen from the results in the above table that the original hypothesis is rejected at the significance level of 5%, because the p value of the corresponding F-test statistic is less than 0.000 and less than 0.05, indicating that the individual effect model is better than the mixed effect model. The Haussman test results are shown in Table 5.

Table 5. Results of Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. D.F.	Prob
Cross-section random	0.000000	7	1.0000

It can be seen from the results in the above table that the assumption that the model is in the form of random effect is accepted at the significance level of 5%, because the corresponding p value of Hausmann test statistic is greater than 0.05.

3.4. Regression Estimation

Based on the relevant variable data of 16 samples in 2010 and 2021, the regression estimation of the above model is carried out. The estimation results are shown in Table 6.

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Table 6. First regression estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob
△LNSIZE	0.020098	0.237694	0.084553	0.9327
NIM	0.244988	0.065341	3.749412	0.0002
DAR	-0.080091	0.009063	-8.837340	0.0000
LDR	-0.002021	0.003186	-0.633453	0.5273
△LNIBOP	-0.152722	0.088871	-1.718462	0.0876
△LNTPP	-0.054270	0.030256	-1.793664	0.0747
△LNGDP	-1.080730	0.505450	-2.138155	0.0340
C	7.308738	0.901379	8.108395	0.0000
R-squared	0.448795	Mean dependent var		0.012790
Adjusted R-squared	0.424978	S.D. dependent var		0.276632
S.E. of regression	0.209801	Sum squared resid		7.130661
F-statistic	18.84308	Durbin-Watson statistic		1.076201
Prob (F-statistic)	0.000000			

According to the DW value, the estimated DW value of the model is 1.076201, indicating that the model may have autocorrelation. Adding the delay term of variable LNROA to the correction model, the final estimation result is as follows.

Table 7. Regression estimation results of adding dependent variable LNROA delay term

Variable	Coefficient	Std. Error	t-Statistic	Prob
△LNSIZE	-0.157565	0.084529	-1.864043	0.0646
NIM	0.108285	0.025507	4.245314	0.0000
DAR	-0.019968	0.006769	-2.949762	0.0038
LDR	-0.001535	0.001003	-1.530994	0.1283
△LNIBOP	0.061356	0.068782	0.892032	0.3741
△LNTPP	-0.034354	0.013003	-2.641963	0.0093
△LNGDP	1.366523	0.200076	6.830013	0.0000
LNROA(-1)	0.742607	0.055220	13.44814	0.0000
LNROA(-2)	-0.057429	0.051501	-1.115098	0.2669
LNROA(-3)	0.017575	0.028236	0.622442	0.5348
C	1.630520	0.641898	2.540153	0.0123
R-squared	0.841597	Mean dependent var		0.094358
Adjusted R-squared	0.829026	S.D. dependent var		0.200750
S.E. of regression	0.083008	Sum squared resid		0.868186
F-statistic	66.94418	Durbin-Watson statistic		1.825702
Prob (F-statistic)	0.000000			

At this time, the R2 estimate of the model increases to 0.841597, and the DW value is close to 1.825702 and 2, indicating that the autocorrelation has been eliminated. The estimated equation of the model is as follows:

$$LNROA_{it} = 1.630520 - 0.157565\Delta LNSIZE_{it} + 0.108285NIM_{it} - 0.019968DAR_{it} - 0.001535LDR_{it} + 0.061356\Delta LNIBOP_{it} - 0.034354\Delta LNTPP_{it} + 1.366523\Delta LNGDP_{it} + 0.742607LNROA_{it-1} - 0.057429LNROA_{it-2} + 0.017575LNROA_{it-3}$$

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According to the regression results, except the delay period of LNROA, the variables NIM, DAR, ΔLNTPP, ΔLNGDP. The estimated coefficient of LNGDP was significantly 5% ($P < 0.05$), and the estimated coefficient of other variables was not significant at 5%. This shows that net interest margin, asset liability ratio, third-party payment and economic growth have a significant impact on the total return of listed assets of commercial banks. In addition, the return on total assets is positively correlated with the return on net interest and economic growth rate, and the return on total assets is negatively correlated with the asset liability ratio and the amount paid by the third party.

The estimated factor changing the transaction volume of third-party payment is negative, equivalent to 5%, indicating that the transaction volume with third parties has a significant negative impact on the profitability of commercial banks. In other words, the development of third-party payment platform has a certain impact on the profitability of commercial banks. Since the coefficient is very small, only -0.034354, the impact is not significant. Thus, so far, the impact of third-party payment platforms on the profitability of commercial banks is limited. In recent years, although financial technology has developed rapidly, commercial banks have developed for decades, and there is still a large gap between their asset scale and customer base. Third party payment platforms continue to need the support of the banking system to complete payment and payment, and it is impossible to bypass commercial banks directly. Therefore, it is necessary to share this advantage with commercial banks. The third-party payment model has changed from the original payment channel to the consumption channel for managing customer resources. This makes commercial banks worry about the expansion of the market when making wedding dresses for others. At the same time, commercial banks, in cooperation with payment institutions, have taken a series of measures to address the impact of third-party payment, including facial recognition, fingerprints and other innovative payment tools and applications.

4. The Path of Financial Technology to Promote the Development of Real Economy

4.1. Rely on the Positive Energy of the Development of Financial Science and Technology to Realize the Anti Fraud under the New Situation

One method is to use big data network, device fingerprint and machine learning to implement effective fraud prevention. Using big data risk control as technology transformation can prevent fraud. Use intelligent risk management based on device fingerprints and big data on social media, focus on tracking malicious behaviors (such as frequent transactions) and effectively prevent integrated fraud, and use systematic anti fraud model to improve machine knowledge. Another way is to use biotechnology to effectively prevent and combat fraud. With the growing controversy between mobile payment and password security, biotechnology has gradually become an indispensable choice for online financial security. Transitional biotechnology is not only used to verify payments, but also can be integrated with security, monitoring and management systems to effectively prevent and manage fraud [4].

4.2. Control the Spread of Financial Risks with Financial Technology Innovation

First, identify and monitor corporate credit risks through early warning of big data risks, especially for small and medium-sized companies. Big data risk alert is mainly based on a single user in observation. It explores various forms of information, such as securities, groups, shareholders, executives, industry and commerce, taxes, industries, high-level and low-level relationships, lending and securities, and then compiles data for each dimension for data mining and analysis. Second, commercial banks use mobile information technology to obtain a

large number of timely and reliable control company customer data through photos, videos and more electronic information reports. Third, bring blockchain technology into the company's credit research to better manage credit risk. Through the enterprise blockchain credit survey, financial institutions are migrating credit agreements to the blockchain system and automating them through smart contracts attached to credit terms. This not only increases the credibility of credit investigation, but also increases the start-up cost, and it is easier for commercial banks to control risks.

4.3. Strengthen Financial Supervision by Using the New System of Financial Technology Innovation and Compliance Management

The guidelines for the management of financial institutions jointly issued by the people's Bank of China and four other departments on April 27, 2021 clearly stipulates that the asset management business meets the basic goal of serving the real economy and meeting the actual needs of investment and financing. It must be effectively managed. We must avoid the rotation of funds in the financial system to reality, so as to prevent products from becoming too complex and increase the risk transfer across industries, markets and regions. First, use the expert system of intelligent supervision system for compliance management. The system uses natural computing and mobile technology language to combine laws and regulations, government regulations in the news industry, the requirements of industry system and cases within and outside the scope of cases, including obtaining the general knowledge of organic database by pulling mining and association. The monitoring function of the push platform can help financial experts (such as bank access) understand rules and consciously manage compliance. Financial regulators can also use the system to monitor compliance with the law, especially when focusing on the real economy. Second, use deep machine learning technology to develop data analysis in a wise direction. Based on the concept of supervision, fintech can diversify banks according to a variety of regulatory requirements, and supervise financial regulators to improve regulatory efficiency. Third, choose to use blockchain technology to help financial institutions improve their existing credit reporting system, automatically identify and store customer data and wrong transaction records, update data at any time and automate relevant data due to application embedding. Managing all kinds of duplication will save energy. By analyzing and tracking irregular transactions in blockchain books, criminal crimes such as fraud and money laundering can be found in time [5].

4.4. Strengthen the Research and Development of Financial Technology and Enhance China's Core Competitiveness in the Field of Financial Technology

In order to make China a global leader in financial technology and gain more popularity, China's financial technology companies and financial institutions should increase investment in R & D, continue to innovate and develop their core technologies and improve their competitiveness in this field, for example, efficient small and micro enterprise services, consolidated finance, providing low-cost financial management to the public and providing capital. In terms of supply chain, we need our own financial technology. This will provide one belt, one road, and more effective financial and technological support for the mobilization, digitalization and intellectualization of the domestic financial industry, the actual economic development and the construction of a shared economy along the "one belt and one road".

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