

Research on the impact of financial technology on the efficiency of joint-stock commercial banks

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Abstract: This paper takes 11 joint-stock commercial banks as samples, and makes an empirical analysis of the data from 2011 to 2018. The empirical study finds that there is a negative correlation between fintech and the cost-income ratio of joint-stock commercial banks. In addition, GDP growth rate, bank size and inflation rate index are negatively correlated with cost-to-income ratio. Finally, based on the empirical results, this paper proposes countermeasures to improve the efficiency of China's joint-stock commercial banks with the help of financial technology.

1. Introduction

Joint-stock commercial banks, one of the important components of China's financial system, play an indispensable role in national development and national economy. The financing effect of joint-stock commercial banks on funds indirectly affects the degree of resource allocation and optimization in national economic development, which will also affect the development of financial markets and the efficiency of joint-stock commercial banks. In the processing of data technology, financial technology quickly generates reports for data processing, making bank operations faster ; in the information processing of financial data and customers, the data processing characteristics of the big data platform are used to classify and screen in time, so that it has a strong convertible type, thus enhancing the professionalism of financial services.^[1] Led by the innovation and technological change of fintech, the traditional joint-stock commercial banks have made a lot of ' profits ' from it. More and more commercial banks have begun to expand their business scope. Through the financial advantages of commercial banks and the extensive information platform advantages of fintech, they are constantly sharing resources.

2. Relative basic theory

2.1 Scale economy theory

Adam Smith's economics of scale believes that within a certain period of time, a certain number of goods will be reduced, that is, the unit cost will be reduced. Commercial banks can show

themselves on a larger scale in financial technology, and innovative promotion methods bring better operational benefits and improve scale efficiency.^[2] At the same time, joint-stock commercial banks can continue to exert greater operational effects under the technology of big data platform, cloud computing and block chain. Financial technology has a good promotion effect for commercial banks.

2.2 Asymmetric information theory

After the addition of financial technology to the field of commercial banks, a huge amount of transaction information flow is completed through the big data Internet platform, and the traditional economic transaction mode is less and less.^[3] Financial technology means such as big data, cloud computing, block chain and artificial intelligence require transaction information to be more open, fair and transparent, which greatly reduces the information asymmetry of commercial banks and minimizes their risks. Commercial banks also use the big data platform to classify customer information and give customers better targeted financial services.

2.3 Transaction cost theory

Financial technologies such as big data platform, cloud computing, artificial intelligence and block chain provide higher operation level for traditional joint-stock commercial banks, thus reducing the output of customer data, improving business efficiency and improving customer satisfaction. Commercial banks use financial technology to collect and analyze customers' data in the shortest time, give customers the most suitable financial products and services, and minimize the time cost of customers in choosing financial products.

3. Measurement of the efficiency of joint-stock commercial banks

3.1 The measurement of financial technology development

On the basis of references, this paper selects the China Data Inclusive Finance Index at the prefecture-level city level compiled by the Financial Research Center of Peking University to describe the financial technology indicators, and decomposes the financial technology indicators into two indicators : the depth of use of financial technology (Z_usage_depth) and the payment situation ($Z_payment$), and examines the mechanism path of the role of financial technology in the efficiency of China's joint-stock commercial banks.

Table 1: Changes in China's financial science and technology index data from 2011 to 2018

year	fintech index($Z_Fintech$)	Used-depth(Z_usage_depth)	payment($Z_payment$)
2011	0	0	0
2012	0.244	0.231	0.068
2013	0.459	0.426	0.224
2014	0.521	0.373	0.445
2015	0.675	0.506	0.653
2016	0.762	0.727	0.871
2017	0.924	1	0.949
2018	1	0.963	1

This paper standardizes the data of financial technology indicators : financial technology index ($Z_Fintech$), usage depth (Z_usage_depth) and payment ($Z_payment$), so that the data

change processing is between 0 and 1 (Max-Min method). Finally, the data change of China's financial technology indicators in 2011-2018 (table 1) is obtained. According to the chart, it can be shown that between 2011 and 2018, the financial technology index, usage depth and payment situation all show an increasing state year by year.^[4] That is, the development level of China 's financial technology is increasing year by year.

As shown in Figure 1, China's financial technology development level can be divided into two stages: the first stage is from 2011 to 2013, during which the development growth rate is relatively fast; the second stage is from 2014 to 2018. The growth rate of this stage is slower than that of the first stage, and the overall relationship is only a positive correlation function.

3.2 Measurement of the efficiency of China's joint-stock commercial banks

In the selection of measurement methods for the efficiency of China 's joint-stock commercial banks, this paper adopts the analysis of the ratio between the construction indicators of cost-income ratio (CIR). In the selection of measurement indicators, this paper selects data from 11 joint-stock commercial banks in China as the research object to study the dynamic changes of their operating efficiency from 2011 to 2018. In the data source of the measurement indicators, the data used are all from the global financial statements of the Bank Focus database, including a total of 11 Chinese joint-stock commercial banks from 2011 to 2018.

In this paper, when measuring the efficiency of China 's joint-stock commercial banks, this paper sorts out the standardized treatment of the efficiency of each bank to measure the time change degree of the efficiency of joint-stock commercial banks by comparison. Through the standardized treatment and the results after the collation, the cost-income ratio (CIR) of different joint-stock commercial banks in China from 2011 to 2018 is obtained.

4. Empirical analysis of the impact of financial technology on the efficiency of China 's joint-stock commercial banks

4.1 Research Samples and Data Sources

This paper takes China 's joint-stock commercial banks from 2011 to 2018 as the research sample, and empirically tests the impact of financial technology on the efficiency of joint-stock commercial banks. ^[5] The data sources of this paper are : global detailed financial statements from Bank Focus database at the bank level ; the financial technology data is derived from the China Data Inclusive Finance Index at the prefecture-level city level compiled by the Digital Finance Research Center of Peking University ; macroeconomic data come from China Statistical Yearbook 2019 and China Economic Net database.

4.2 Measurement Model Settings

This paper studies the impact of financial technology on the efficiency of joint-stock commercial banks. Through the panel data analysis of STATA system software, the measurement model set in this paper is as follows :

$$CIR_{ij} = \alpha + \beta_1 Z\text{-FinTech}_{ij} + \beta_2 CPI_{ij} + \beta_3 GDP_{ij} + \beta_4 SIZE_{ij} + \beta_5 DLR_{ij} + \beta_6 CAP_{ij} + ij$$

where $i = 1, 2, 3, \dots, 10, 11$; $j = 2011, \dots, 2018$; i means the first joint-stock commercial bank ; the core explanatory variable is Z-FinTech (financial technology index), the explained variable is CIR (cost-income ratio), and the control variables are CPI (inflation index), GDP (GDP growth rate), SIZE (bank size), DLR (loan-to-deposit ratio) and CAP (capital adequacy ratio).

4.3 Empirical analysis of the impact of financial technology on the efficiency of joint-stock commercial banks

The empirical results show that fintech significantly reduces the cost-to-income ratio of banks, and the reduction of cost-to-income ratio indicates the improvement of bank operating efficiency. Fintech is a combination of finance and technology, using high and new technologies such as big data platform and blockchain to spread the financial service information of banks more widely.^[6] Artificial intelligence will specify financial services that are more in line with customer needs according to customer needs, so that customers rely on banks. The operating efficiency of banks has also increased. The empirical results show that financial technology can improve the operating efficiency of joint-stock commercial banks, showing the role of financial technology in promoting their operating efficiency.

5. Suggestions on improving the efficiency of China 's joint-stock commercial banks with the help of financial technology

First, further expand the scope of market services. In traditional joint-stock commercial banks, the market service scope of banks will be limited by many factors and will not be expanded. However, under the influence of financial technology, it has brought high-end technologies such as big data platforms and block chains. Joint-stock commercial banks should maximize the benefits of big data platforms to expand their market service scope, optimize their own operational efficiency, expand the scope of market services, and introduce more customers.^[7] In order to better improve the business capabilities of enterprises, and while expanding the scope of market services, it is necessary to develop new financial products and services in a targeted manner, form a targeted financial plan, and give different financial customers different financial needs.^[8] Second, to attract professional talents, in the context of financial technology, traditional joint-stock commercial banks lack of professional talents in financial technology in the short term. They need to focus on attracting high-end technical talents that banks lack, and need to have training programs for talents within the bank. In order to retain talents and give full play to the technology that high-end technical talents can have, we should constantly explore the potential of talents, and can continuously cultivate a new generation in terms of talents under the implementation of training programs, so as to enhance their work quality, sense of belonging and loyalty to enterprises.^[9] Third, use financial technology to strengthen risk control. As the core of the current financial institutions, risk control is an essential part. In terms of risk control, financial technology enriches the dimension on the basis of traditional risk control. It establishes a model for customer data, analyzes and judges users with abnormal transactions, and can be used to screen out qualified users. It can also monitor customer data in real time through artificial intelligence technology, and at the same time prevent fraud groups from infringing on banks to steal customer information data, ensure user capital security, and improve bank operating efficiency.

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