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The Impact of Internet Finance on China's Banking Industry–Evidence from Internet Funds Sales and Third-Party Payment

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Abstract

With the popularity of the Internet, more and more industries begin to combine their business with the Internet, and the financial industry is one of them. The new financial model generated by the combination of the two is Internet finance. The emergence of Internet finance has brought revolutionary changes to traditional financial service models and provide some new types of financial services, such as third-party payment and Internet fund sales. For third-party payment, third-party institutions with credit guarantee provide customers with payment and other services. Internet fund sales can aim to achieve direct connection between investment customers and third-party fund institutions, without the involvement of banks. Therefore, as traditional financial service providers, banks will face great challenges and need to re-evaluate their competitiveness. Therefore, this research will discuss the challenges brought by Internet finance to China's banking industry, which will be specifically reflected in the profitability of China's banking industry.

Introduction

Internet finance refers to the integration of financial services and Internet technology to provide convenient and innovate financial services for customers. Based on Liu (2018), Internet payment, online lending, Internet fund sales, insurance and financial trust are the main business models of Internet finance. Therefore, for banks, most of their profit models will be impacted by Internet finance. For commercial banks, they provide basic banking services to individuals and businesses, including checking, savings accounts, and investment services. Meanwhile, banks make their profits mainly from service fees and commissions, such as late fees, minimum balance fees, overdraft fees, monthly maintenance fees, etc. (Kagan, 2021). This is of concern because banks will no longer be the sole provider of these financial services, hence they will suffer as more efficient and fee-free financial services become available. According to Wu and Bo (2020), the financial service products, deposit and loan, financial management and other businesses provided by commercial banks have been affected and impacted by Internet finance. For example, in the original payment transfer mode provided by banks, banks can make profits by charging fees. Now, with the development of Internet technology, third-party payment platforms can also provide customers with payment and transfer without charging fees. Therefore, more and more customers will choose third-party payment for payment transfer. Correspondingly, the China's banks' pool of potential customers will shrink.

For Internet fund sales and third-party payment, their essence is still the demand for funds and payment transfer services, and what has changed is the transaction mode. For Internet fund trading, consumers can choose the fund they want to buy on the third-party fund trading platform, which means that consumers do not

need to go to physical financial institutions to operate, which means that the sale of Internet fund is more convenient. Yu 'e Bao is a typical example. Yang et al (2019) indicate that Yu 'e Bao allows people with a small amount of idle funds, such as students, to participate in the financial market through its ultra-low financial threshold and avoidance of tedious registration procedures. Based on the fact, we can roughly estimate that more and more students will be involved in financial management, but the first thing they will be exposed to will be wealth management software like Yu 'e Bao, rather than wealth management provided by banks. This is significant because banks may lose a number of customers in the future because they have contacted third-party wealth management platforms in advance and experienced the fast service, just like Yu 'e Bao. Similarly, Alipay and WeChat Pay have taken a huge share of the market. According to Yuan (2021), WeChat Pay and Alipay are the two most typical payment systems in China that is on its way to becoming a cashless society, with a combined market share of 94%. Even though major Chinese banks are now rolling out their online banking apps, Alipay and WeChat Pay are older and more popular, and Chinese banks' online payment apps are unable to lure back their existing customers. Based on these two situations, this research will mainly analysis the impact of Internet funds sales and third-party payment to Chinese bank industry, especially on banks' profitability.

The rest of this research is structured as follows. The literature review will elaborate on previous relevant studies and the relationship between third-party payment and Internet fund sales and Chinese banks. The research design part will explain the dependent variables, main independent variables and control variables of this research, and hypotheses will also be explained. In addition, the main method and model of this study will be explained in detail, that is, the linear regression method.

The research results will test the relationship between Internet fund sales and third-party payment and bank profitability respectively, and verify whether the hypothesis is valid. Lastly, a conclusion will be made in this study.

Literature Review

Based on the development trend of Internet finance, this study will mainly focus on Internet funds and third-party payment of Internet finance, then discuss and analyze the impact on China's banking industry.

The development of Internet finance

Internet finance reflects the combination of traditional financial services and the Internet, creating a new financial service model, mainly reflected in payment, lending, investment and other aspects. To be more specific, Shen and Huang (2016) illustrate that Internet finance is a new business model that relies on the Internet and information and communication technologies, such as third-party payment, online lending, direct fund sales, online insurance and so on. It is significant because it can be regarded as an innovation of traditional financial services. Obviously, it will reform the original financial services model. The role of the Internet in financial services is not auxiliary. Instead, the Internet will bring about fundamental changes in financial transactions and organization (Xie et al., 2016). This is noteworthy because Internet finance does not play a supporting role, which means that the traditional financial service model will be challenged. Before the advent of Internet finance, financial services needed to be completed offline, such as over the counter. Nowadays, under the influence of Internet finance, transactions can be conducted anytime and anywhere through the Internet. Therefore, in essence, Internet finance improves the financial mechanism of resource allocation efficiency, creates a new financial service model, and meets consumers' demand for high efficiency in the Internet era (Yang et al., 2017). For consumers, they will choose the option what is beneficial and convenient for them. Meanwhile, the new model of Internet finance

also brings many benefits to consumers. Its advantage lies in that it can effectively reduce transaction cost, promote market competition and solve the problem of information asymmetry in financial activities (Fu et al., 2020).

However, not all is good about Internet finance. According to xiaoqiu (2015), Internet finance also brings some risks, from reliance on technology and lack of trust to lack of rules and regulations leading to business failure. Again, this cannot be ignored. To confirm the negative effect, Guo and Shen (2016) point out that the influence of Internet finance on the risk taking of China's commercial banks presents a u-shaped trend. In the initial stage of development, it can help banks reduce management costs and risk taking, but later, Internet finance will increase the cost of capital, thus aggravating the risk taking of banks. This is significant because too much emphasis on the benefits of Internet finance while ignoring its negative effects may lead to excessive pursuit of the development of Internet finance, which will lead to the instability of the financial market. With the development of Internet finance and the continuous expansion of customer base, Internet finance has an explosive development trend. Internet finance can meet the financing needs of small and medium-sized enterprises and individuals, which not only promotes the development of Internet finance, but also intensifies the competition in the financial market (Qiao et al., 2018). Therefore, the financial market is increasingly competitive, which represents not only the competition of Internet financial companies, but also the competition with traditional financial institutions, such as banks.

The influence of third-party payment and Internet funds on banks

With the rapid development of China's finance, the whole society has an increasing demand for financial services. For a bank, its main functions are lending,

deposit-taking and payment processing institutions. In China, banks, as the most important financial institutions, mainly provide loans, deposit and sell financial and fund products. Based on Qiao et al. (2018), Internet financial services are gradually affecting various areas of commercial banks, including payment and settlement business, deposit business, and even loan business, which has intensified the market competition between Internet financial enterprises and commercial banks. This is noteworthy because these types of businesses are the main profit areas of commercial banks. With the rapid development of Internet finance, it is worth exploring whether the profitability of commercial banks will be affected. What is more, large banks are relatively slow to respond to the development of Internet finance, while small and medium-sized commercial banks are quick to respond to Internet finance by introducing advanced technologies and innovating their original financial services efficiently (Qiao et al., 2018). Thus, in this aspect, this research will analyze the influence of Internet finance based on some large banks in China.

As one of the Internet finances, third-party payment, which can be understood as an online payment mode that facilitates transactions through Internet docking by third-party independent institutions other than banks. Chen et al. (2020) show that with China's underdeveloped capital market, banks will be the main institution for people to choose financial products, such as deposits and loans. Currently, with the development of Internet finance, the situation has improved. This is significant because the challenge brought by the third-party payment platform is the payment business of banks. According to Yang and Liang (2018), they illustrate that compared with the payment and transfer services provided by traditional banks, the fees of third-party payment are lower, or even free, so that consumers can experience the benefits. This is noteworthy because consumers tend to opt for less costly options, hence banks

will be challenged in the area of payments and transfers. What is more, Yang and Liang (2018) find that although banks are also taking measures to cope with the trend of third-party payment, statistics show that more than half of online banking users choose to pay on third-party platforms. For example, Alipay, one of the most advanced third-party payment platforms in China. Chen (2017) has already pointed out that in 2015, Alipay's mobile payment terminal users accounted for more than half, accounting for 68.4%, and Internet payment accounted for 47.5%, surpassing similar products. In addition, Liao (2018) claims that the third-party payment platform accumulates a large and stable user group and transaction information, through connecting enterprises, consumers and banks by acting as an intermediary. For banks, their advantage is that they have a large number of loyal customers. However, these customers are likely to be attracted by third-party payment platforms such as Alipay, so the advantages of banks in the payment field are gradually declining. Under these benefits of third-party payment, Xiao (2021) refers to some threats that Chinese commercial banks are facing. Third-party payment platforms, such as Alipay and WeChat, allow users to pay by phone without cash and do not charge fees. These third-party payment methods have caused a huge impact on the payment and settlement business of traditional commercial banks. Therefore, it is worth discussing the influence of the third-party payment of Internet finance on China's five state-owned banks, which represent the most abundant capital and strength of China's financial sector.

With the increasing influence of third-party payment, Internet finance has also launched financial products and services of Internet funds. Compared with the traditional fund financing mode, the Internet fund realizes the virtualization of the trading place and the direct communication between investment customers and third-

party financial institutions, without the intervention of banks. For example, Ma et al (2021) indicate that by the end of the first quarter of 2021, the size of Yu 'ebao was about 972.415 billion yuan. Yu’E Bao is typical type of Internet funds because it gathers the idle funds of individual investors, the fund management company invests these idle funds to obtain profits In addition to Yu 'e Bao, a number of Chinese Internet companies have also started selling online funds. Gong et al. (2019) illustrate that "Baocaitong", "Lingqianbao" and "Baidu Baipatent" and other "Bao bao" funds are new products launched by large Internet companies in cooperation with domestic fund enterprises. Therefore, this phenomenon is noteworthy because as fund companies cooperate with Internet companies, the advantages of banks are gradually disappearing. Thus, this research will explore the influence degree of Internet fund according to the influence method of third-party payment on some large Chinese banks.

Research Design

This study will explore the impact of third-party payment and Internet fund transaction scale of Internet finance on 12 banks in China from 2011 to 2020. All data comes from wind database and choice financial terminal. Firstly, the model will be selected, and appropriate variables will be selected for empirical analysis. Finally, the empirical results will be explained. The empirical analysis of this paper will use Stata software as auxiliary tools.

Variables:

For the profitability evaluation of banks, return on Asset (ROA) and return on Equity (ROE) can be used for analysis. Compared with ROE, ROA represents net income divided by average assets, which tells us how banks are effectively using the earnings advantages of their asset base. Meanwhile, considering the debt of banks, ROA will be used in this study.

The main explanatory variables will be the subject of this study, and they will be the scale of third-party payment (TTP) and the transaction scale of Internet funds sales (IFS) from 2011 to 2020. In order to determine the relationship between Internet fund sales and third-party payment and bank ROA respectively, the main independent variable of this study is the quantity of the Internet funds sales and Third-party payment from 2011-2020. All data comes from wind Choice financial terminals.

Table: Descriptive Statistics of third-party payment and Internet funds sales from 2011-2022.

Year	The scale of third-party payment (hundred million)	Transaction scale of Internet funds (hundred million)

2011	22036	82576.15
2012	36589.1	87671.62
2013	53729.8	94836.31
2014	74368.9	134465.47
2015	104066.3	230661.43
2016	141439.6	273658.38
2017	184808.4	328198.30
2018	1905000	393173.73
2019	2265000	428577.42
2020	2710000	541717.29

In addition to Internet fund sales and third-party payment, other factors of the bank will also affect the bank's ROA. Therefore, several control variables are also set in this study. In addition, twelve Chinese banks were selected for this study, namely industrial and Commercial Bank of China, Bank of China, Bank of Communications, Agricultural Bank of China, China Construction Bank, Bank of Beijing, Everbright Bank, Industrial Bank, China Citic Bank, China Merchants Bank, Shanghai Pudong Development Bank and Guangdong Development Bank Co., LTD. All data about banks will come from wind database.

Total assets: ROA represents a company's profits as a percentage of total assets, hence the total assets of the bank can be selected as the control variable because it affects the ROA of the bank.

Non-performing loan ratio (NPLR): According to Segal (2021), the NPL ratio is defined as loans on which borrowers have failed to meet their payments. Therefore,

The non-performing loan ratio will affect the bank's interest income. Once the non-performing loan ratio is abnormal, the bank's profit will decrease.

Non-interest income ratio (NIIR): Based on Chen (2020), non-interest income refers to the income banks receive from various fees, such as deposit and transaction fees, annual fees, monthly account service fees, and check and deposit certificate fees, which are in addition to interest rate differentials.

Capital-adequacy ratio: The capital adequacy ratio reflects the ratio of a bank's total available capital to its risk-weighted assets (Hayes, 2020). This is a measure of whether a bank can cover losses with its own capital. Generally speaking, capital adequacy ratio represents the degree of asset protection for savers.

Models:

In order to determine the relationship between Internet fund sales and third-party payment and bank profits, this study will use linear regression to judge. The tool used is Stata.

To identify the relationship between Internet fund sales and third-party payment and bank ROA respectively, this study will put forward two hypotheses.

Hypothesis 1: Internet fund sales are negatively correlated with bank ROA.

Hypothesis 2: Third-party payment is negatively correlated with bank ROA.

Therefore, based on the 2 hypotheses and variables, the regression model that will be used in this study will be shown below.

$$ROA_{nm} = \alpha_1 IFS_{nm} + \alpha_0 + \alpha_2 ASSETS_{nm} + \alpha_3 NPLR_{nm} + \alpha_4 NIIR_{nm} + \alpha_5 CAR_{nm} + \varepsilon_{nm}$$

$$ROA_{nm} = \alpha_1 TTP_{nm} + \alpha_0 + \alpha_2 ASSETS_{nm} + \alpha_3 NPLR_{nm} + \alpha_4 NIIR_{nm} + \alpha_5 CAR_{nm} + \varepsilon_{nm}$$

(n means the number of banks, the total number of banks is 12. M means the year selected will be from 2011-2012. α_1-α_5 means the coefficients of the variables. α_0 is the constant term. ε_{nm} stands for error)

Based on these formulas, this study will use Stata software to construct the relationship between the dependent variable ROA, the main independent variable Internet fund sales (IFS), third-party payment (TTP), and the control variable non-performing loan ratio (NPLR), total assets, non-interest income ratio (NIIR), and capital adequacy ratio (CAR).

Results

First of all, in this research, STATA software is used for descriptive statistical analysis of each variable. The variable data range is from 2011 to 2020. The mean, standard deviation, maximum and minimum values are analyzed, and the sample size are 120.

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	120	0.010472	0.002459	0.0048	0.0177
IFS	120	260099.0	155092.8	82576.14	547171.3
TTP	120	749703.8	1031831.1	22036	2710000
NPLR	120	0.013128	0.003993	0.0038	0.0239
ASSETS	120	96600.82	81619.02	9189.8	333450.5
CAR	120	0.114609	0.030371	0.0108	0.1752
NIIR	120	0.266098	0.090358	0.0944	0.6186

From the table of descriptive statistics, because the means of internet funds sales (IFS) and Third-Party payment (TTP) are 260099 and 719703.8 respectively, these means indicate that the volume of third-party payment is larger than that of Internet fund sales. Meanwhile, from the observation of standard deviation and maximum and minimum value, the volatility of third-party payment is also greater than that of Internet fund sales.

Then, the correlation between variables will be analyzed, which can tell us the degree of correlation between two variables.

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) roa	1.000						
(2) IFS	-0.613	1.000					

(3) TTP	-0.458	0.880	1.000				
(4) NPLR	-0.505	0.626	0.357	1.000			
(5) ASSETS	0.176	0.305	0.261	0.307	1.000		
(6) CAR	0.171	0.249	0.214	0.236	0.814	1.000	
(7) NIIR	-0.481	0.444	0.290	0.477	0.011	0.053	1.000

From the pairwise correlations, the correlation coefficient between Internet fund sales (IFS) and ROA is -0.613, and the correlation coefficient between Third-Party Payment (TTP) and ROA is -0.458. These figures can indicate that both major variables were negatively correlated with ROA. In addition, the correlation coefficient between Internet fund sales (IFS) and Third-Party payment is 0.880, but this research aims to identify the effects of the two main variables on ROA respectively, hence the high correlation coefficient between Internet fund sales and Third-Party Payment does not affect the research.

To determine whether collinearity exists between independent variables, collinearity analysis will also be tested in this study, through VIF tests.

Variable	VIF	1/VIF
IFS	9.060	0.110
TTP	6.170	0.162
ASSETS	3.240	0.308
CAR	2.990	0.334
NPLR	2.460	0.406
NIIR	1.440	0.694
Mean VIF	4.230	

From the VIF tests, the mean VIF is 4.230, which is smaller than 10. Thus,

this figure can illustrate that collinearity between variables is not strong.

After determining that collinearity between independent variables is not strong, linear regression analysis can be started. First, the relationship between Internet fund sales and ROA will be judged.

Linear regression

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
IFS	-8.43e-09	1.28e-09	-6.58	0	-1.10e-08	-5.89e-09	***
NPLR	-0.140169	.0509321	-2.75	.007	-0.241066	-0.039274	***
ASSETS	1.01e-08	3.27e-09	3.08	.003	3.59e-09	1.66e-08	***
CAR	0.007514	0.008458	0.89	.376	-0.009242	0.024269	
NIIR	-0.003942	0.001964	-2.01	.047	-0.007831	-0.000052	**
Constant	0.013719	0.000917	14.97	0	0.011903	0.015534	***

Mean dependent var	0.010	SD dependent var	0.002
R-squared	0.585	Number of obs	120
F-test	32.109	Prob > F	0.000
Akaike crit. (AIC)	-1195.779	Bayesian crit. (BIC)	-1179.054

**** p<.01, ** p<.05, * p<.1*

From the table of linear regression about internet fund sales, through the t-value and p-value, we can judge if the results are significant or not. For t-value, if the absolute value of t-value is greater than 2, the result is significant. For p-value, the smaller the p-value is, the more significant the result is. If the p-value is less than 0.05, the conclusion is significant; if the p-value is less than 0.01, the conclusion is very significant. In this table, the absolute value of t-value is 6.58, which is quite larger than 2, and the p-value is smaller than 0.01. Therefore, the coefficient results of Internet fund sales and ROA are very significant, and they are negatively correlated because the coefficient is negative.

For control variables, the total assets and capital adequacy ratio are positively correlated with ROA. This all makes sense because the larger the total assets of the bank, the larger the size of the bank, the more likely it is to be profitable. For capital

adequacy ratio, capital adequacy ratio represents the extent to which a bank withstands losses with its own assets, so the higher the bank's capital adequacy ratio is, the less likely customers will suffer losses. Therefore, the total assets and capital adequacy ratio of the bank may be proportional to the bank's ROA.

Non-interest income ratio and non-performing loan ratio are negatively correlated with ROA. For the non-interest income ratio, the negative correlation with ROA is probably because with the increase of non-interest income, the bank's interest income will relatively decrease, such as loan income, which has a greater impact on ROA. For the non-performing loan ratio, the more non-performing loans, the more loans the bank may not be able to recover, which will obviously reduce the income of the bank.

To sum up, for the internet fund sales, the final equation is going to be:

ROA_{nm} = -8.43e-09 IFS_{nm} +0.013719+1.01e-08$ASSETS_{nm}$-0.140169 $NPLR_{nm}$-0.003942 $NIIR_{nm}$+0.007514CAR_{nm}+ ε_{nm}

This equation means that the regression coefficient of Internet fund sales is -8.43E-09. That is to say, for every unit increase of Internet fund sales, ROA will correspondingly decrease by -8.43E-09. This equation supports hypothesis one.

In the same way, this research also establishes a linear regression for third-party payment.

Linear regression

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
TTP	-8.63e-10	1.68e-10	-5.13	0	-1.20e-09	-5.29e-10	***
NPLR	-0.249240	0.048661	-5.12	0	-0.345637	-0.152844	***
ASSETS	9.71e-09	3.47e-09	2.80	0.006	2.84e-09	1.66e-08	***
CAR	0.007406	0.008957	0.83	0.41	-0.010339	0.025149	
NIIR	-0.005215	0.002049	-2.54	0.012	-0.009275	-0.001155	**

Constant	0.013991	0.000968	14.46	0	0.012075	0.015908	***

Mean dependent var	0.010	SD dependent var	0.002
R-squared	0.534	Number of obs	120
F-test	26.163	Prob > F	0.000
Akaike crit. (AIC)	-1184.025	Bayesian crit. (BIC)	-1170.088

**** p<.01, ** p<.05, * p<.1*

From the table of linear regression about third-party payment, the absolute t-value of third-party payment is 5.13, which is larger than 2, and the p-value is less than 0.01. Thus, the result for third-party payment is significant. In addition, the coefficient of third-party payment is -8.63e-10, which indicates the third-party payment is negatively correlated with ROA.

Compared with the analysis of Internet fund sales, the coefficients of the control variables are the same, so the interpretation of the relationship between the control variables and ROA is similar. Similarly, non-interest income ratio and non-performing loan ratio are negatively correlated with ROA, while total assets and capital adequacy ratio of banks are positively correlated with ROA.

To sum up, for the internet fund sales, the final equation is going to be:

$$ROA_{nm} = -8.63e\text{-}10TTP_{nm} + 0.013991 + 9.71e\text{-}09ASSETS_{nm} - 0.249240\ NPLR_{nm} - 0.005215\ NIIR_{nm} + 0.007406CAR_{nm} + \varepsilon_{nm}$$

Similarly, since the coefficient of the third-party payment is -8.63E-10, it means that for each additional unit of the third-party payment, ROA will decrease by 8.63E-10 units correspondingly. This supports hypothesis 2.

Conclusion

To sum up, the theme of the text research is to explore the impact of Internet fund sales and third-party payment on banks, which are extended products of Internet finance. In view of the two hypotheses of negative correlation between Internet funds and bank ROA and negative correlation between third-party payment and bank ROA, this research selected 12 large banks in China, and determined variables that also affect bank ROA as control variables, collected data from 2011 to 2020, and used Stata software to conduct regression analysis. Then, in this research, the coefficients between Internet fund sales and bank ROA, as well as third-party payment and bank ROA were determined through regression analysis. Finally, it was found that both coefficients were negative, that is, both of them were negatively correlated with bank ROA.

Limitations and Contributions

- **Limitations**

As there are a large number of banks in China, 12 banks may not be able to reflect the trend of all banks. In addition, the control variables in this paper only select the four variables of capital adequacy ratio, bank assets, non-performing loan ratio and non-interest income ratio, which may ignore the influence of other variables on ROA.

The time span selected in this paper is also limited. The main data of this research are annual data from 2011 to 2020, but quarterly or even monthly data are not selected. The data source is data database. However, wind database does not show the specific monthly data of the bank, so the time span of this study is set as every year. The method selected in this paper is linear regression, a relatively simple model, so the test results are not so complex and accurate.

- **Contribution**

As both third-party payment and Internet fund sales have a negative impact on bank ROA, this study can prompt banks to attach importance to these two new financial models and learn from Internet finance companies to provide new financial service models.

After confirming that Internet fund sales and third-party payment are negatively correlated to bank profits, the following research can explore specific reform aspects of banks, such as the formulation of strategies and the impact of strategies. At the same time, the influence of Internet fund sales and third-party payment on other factors of banks, such as stability, can also be discussed.

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