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The Influence of Internet Finance on the Profitability of Commercial Banks in China

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ABSTRACT

The emergence of internet finance is dominating the commercial bank's market and replacing some of its roles. Hence, this study intends to investigate the impact of internet finance services; 1) third-party internet payment) and 2) peer-to-peer (P2P) online lending, towards commercial banks in China. Therefore, this study aims to analyse the impact of (1) third-party payment and (2) P2P online lending on the profitability of commercial banks, and (3) to investigate the different impact of internet finance on profitability of commercial banks by types. This study uses EViews to regress the annual data of 16 commercial banks in China from 2008 to 2018. The dependent variable is Return On Assets (ROA) of commercial banks. The independent variables are third-party internet payment and P2P online lending. In order to preserve the fairness in findings, total bank assets, non-performing loan ratio and gross domestic product growth were set as the control variables. The findings highlight that third party internet payment has a significant negative effect, while P2P online lending exhibits a positive effect on the banks' profit. Moreover, the effect varies with

different types of banks. Joint-stock commercial banks are more affected by third-party payment, and obtain relatively smaller profit from P2P online lending in comparison with state-owned banks. This study solidifies that internet finance does affect commercial bank's profit and commercial banks should mutually cooperate with Internet finance platforms to capitalise on its development.

Keywords: *third-party payment, P2P online lending, profitability of commercial banks, random effect model*

INTRODUCTION

Finance plays an important role in the modern economy. It serves the present economy better through the strong information processing capabilities of the modern telecommunications infrastructure (Xu, 2017). As information technology develops, so does internet finance. Internet finance is a new type of financial business intermediary, which employs internet tools to execute financing, payment and settlement, and information exchange (Shen & Huang, 2016). In the early stage of the development of internet finance, traditional financial institutions used the internet to reduce business transaction costs and improve efficiency.

With the continuous development of mobile communication technology, internet finance has expanded its reach. Among the three internet giants which are responsible in the finance technology (FinTech) revolution in China are Baidu, Alibaba and Tencent. Many internet-based companies which are not traditional financial intermediaries, independently provide financial services, such as financial settlement, financing and payment services. This created a strong impression on the traditional financial industries. Internet finance uses the internet platforms to carry out financial services which leads to financial disintermediation. The business structure of internet finance industry in China is shown in Table 1 (Liu, 2018).

The E-commerce market flourished in China in 1999. This led to the shift from personal computers to mobile devices in 2009, which possesses greater processing power to enable financial innovations in China. With the establishment of Yu'E Bao (a Chinese money market fund) in 2013, internet

finance entered the stage of prosperity. Numerous internet financing products and platforms followed suit, such as, Ant Financial, Lufax, JD Finance and Qufenqi. This has exerted impacts on the traditional financial industry, positively and negatively. From the positive perspective, internet finance has continuously extended the industrial chain of traditional financial industry, expanded the development space, and improved service efficiency. However, from the traditional finance point of view, internet finance is penetrating into its territory, eating up its market and replacing some of its roles.

Table 1: Business Structure of Internet Finance in China

Types of Business	Traditional Financial Institutions	Internet-based Enterprises
Payment	Online banking payment	Third-party online payment
	Mobile-banking payment	
Financing	Online-loan	Peer-to-peer online lending
		Crowd-funding
		E-commerce micro loans
Financial management	Direct bank	Internet money fund
	Internet insurance	Investment and financial management platform
	Internet trust	Non-standard financial management

E-commerce giants, such as, Alibaba, Tencent, Baidu, Sina showed their competitive capabilities by creating new frontiers in the internet field of finance. Internet financial products and services provided by them include third-party online payment, peer-to-peer online lending, crowd-funding and internet money market funds. All these are similar with the products that are offered in the commercial banks minus the inefficiency, such as, bureaucracy and excessive paperwork. According to statistics from iResearch, the number of third-party mobile payment transactions in China reached 190.5 trillion transactions in 2018, an increase of 36.9% year-on-year. At the same time, the number of third-party internet payment transactions reached 29.1 trillion transactions, an increase of 3.8% year-on-year. The transaction amount of

P2P lending reached 1.7 trillion yuan in 2018. Due to high efficiency and convenience, these e-commerce companies were more preferred by the customers. The rapid development of internet finance is inevitable and its impact on traditional financial markets, especially the commercial banks, should not be taken lightly.

As a center of financial system, commercial banks are of great significance to the stability of the financial system in China, and its profitability is key to its survival. Commercial banks in China have also began to use the internet platform in providing their products and services. For example, in the year 2000, Industrial and Commercial Bank of China launched its personal online banking business, providing services, such as, personal transfers, inquiries, and remittances (An, 2020). The bank's internet business has been enriched, presently, covering account management, transfers and remittance, online payments, online shopping, online wealth management, and online loans. Commercial banks have equipped themselves with basic proficiencies in developing internet finance, cultivated technical talents, in addition to their huge capital and customer database.

To date, few studies have been conducted on the impact of internet finance on banks due to its relatively short history. Most of the research focused on banks' adoption of internet technology, however, little attention was given on the effect of internet finance on profitability (Chen, 2018). Thus, the main contribution of this study is to analyse the influence mechanism of internet finance on banks' profitability.

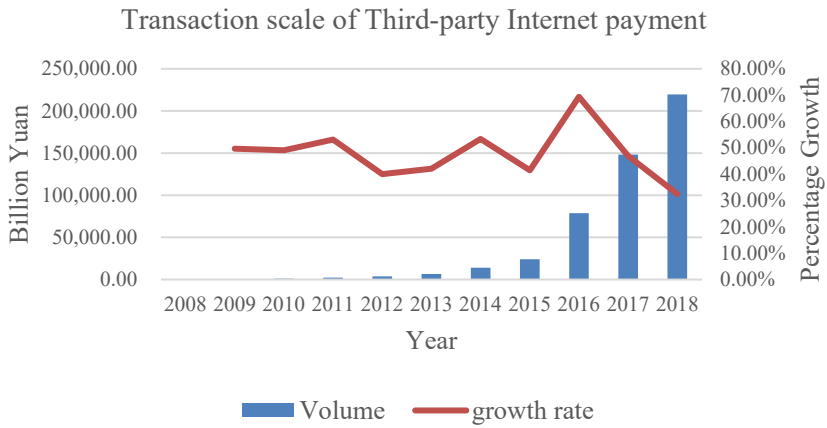
Overview of the Development of Internet Finance in China

The development China's internet finance can be divided into three stages: the first stage is before 2005, during which, traditional financial institutions employed internet their business operation. This era witnessed the birth of online banking industry. Around the same period, in 2003 and 2004, Taobao and Alipay came into picture, and initiated e-commerce as a new business operation model in China. The second stage was between 2005 until 2012, during which, internet finance gradually penetrated the financial intermediary business domain; with the birth of numerous third-party payment platforms. In addition, new forms of internet finance, such as, online loan platforms, and crowd-funding emerged, one after another.

The third stage was after 2012, during which, third-party payment was standardised and P2P platforms developed rapidly. With the launch of Yu'E Bao, the internet finance was developing at an intense pace.

The Mode of Internet Finance and Development Status

Internet finance can be mainly summarised into three categories: 1) third-party online payment, 2) internet financing, and 3) internet investment and wealth management (Liu, 2018). Third-party payment is a payment transaction platform established by internet-based companies which helps customers complete currency payment and settlement in a short time. It also plays the role of credit and technical guarantor. As an intermediary agency, third-party internet payment eliminates the inconvenience, reduces the payment cost, and improves payment efficiency through resource integration.



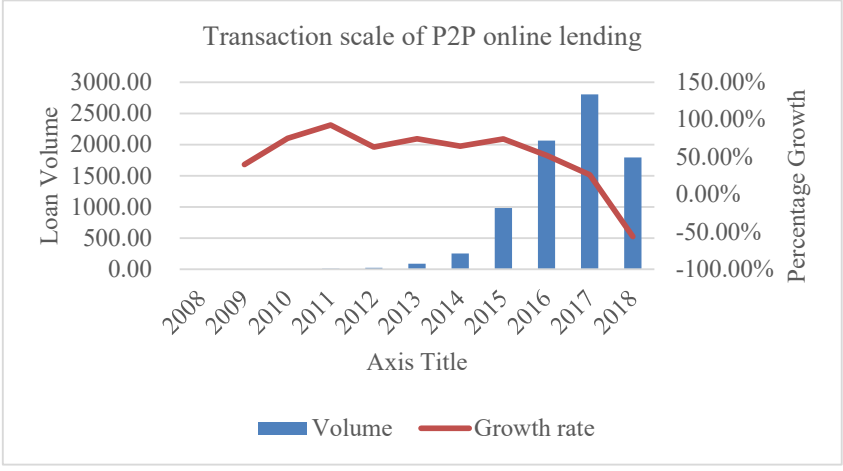
Note: Statistics of enterprises do not include banks.
Source: Official website of iResearch

Figure 1: Transaction Scale of Third-party Internet Payment (Unit: Billion CNY)

China's third-party online payment market developed rapidly and has become an important part of China's financial system. By the end of 2018, China's central bank (People's Bank of China) issued a total of 271 internet payment licenses. There are, presently, 238 valid payment licenses in China. The payment business mainly comprises of third-party internet payment

and third-party mobile payment. According to 2020 China's Third-party Payment Industry Report issued by iResearch, Alipay and Tenpay have the monopoly on the third-party payment market in China. In 2019, the two giants accounted for 93.8% of the mobile third-party payment market in China. According to Analysis of the Digitalization Process of the Internet Payment Industry issued by Analysys, Alipay ranks first in the internet payment market with 23.55%, followed by Tencent Finance with a market share of 23.27% by the end of 2018. As shown in Figure 1, the transaction scale of third-party payment in China has been developing rapidly in recent years, reaching 219,600 billion yuan by the end of 2018.

Internet financing is the second component of internet finance. It can be divided into three areas: a) peer-to-peer lending, b) crowd-funding and c) E-commerce micro credit . Crowd-funding mainly targets small enterprises and individuals. It obtains funds from the public to ensure the completion of the project. E-commerce micro loans is based on platform data processing. With the help of cloud computing technologies such as big data and cloud computing, it assesses the credit history of customers and issues loans.



Source: Official annual report of online lending sector

Figure 2: Transaction Scale of P2P Online Lending (Unit: Billion CNY)

P2P lending provides funds for both the supply and demand parties to complete their transactions with the help of online platform, and charge fees for it. P2P online loan is currently the largest category in the internet

financing market. Online lending has become widespread, and the whole industry has entered a stage of rapid development since 2013, as shown in Figure 2. More than three thousand P2P lending platforms have sprung up in China, peaking in 2015. However, due to the lack of supervision, imperfect review mechanism, opaque trading information on the platform, illegal appropriation of customer funds, regulators have carried out a special reform in April 2016 to regulate and supervise P2P online lending.

Internet investment and wealth management business is the third internet finance component. This refers to the internet platforms which provide users with intelligent investment recommendation and wealth management services using internet technology and big data. Users can purchase financial products in the financial market through the internet platform, such as, funds, trusts, and insurance. According to the Statistical Report on Internet Development in China (the 43rd) issued by CNNIC, by the end of 2018, the number of internet wealth management users was 151.36 million users, an increase of 22.55 million from 124.81 million at the end of 2017. This represents an increase of 22.55 million users with a growth rate of 17.5%. The transaction amount of the internet wealth management market was 950 billion yuan in 2013, while in 2018, the transaction scale of reached 17,800 billion yuan.

Types of Commercial Banks in China

To add depth to the research, the influence of internet finance on different types of banks are also analysed. The commercial banks in China can be divided into a) state-owned, b) joint-stock, c) urban and d) rural commercial banks. These banks are differentiated based on their background, shareholders and asset size. This study focuses on state-owned and joint-equity commercial banks due to their substantial asset sizes and line of business. A state-owned commercial bank is a wholly state-owned commercial bank. Its characteristics are reflected in all its capital is obtained from the state. State-owned commercial banks make the main body of China's banking system. They are in an absolute monopolistic position in terms of the number of personnel and institutional outlets, as well as, in asset size and market share. They play a pivotal role in China's economic and financial development (Pan, 2017).

The five state-owned commercial banks controlled by the state are vital for the national economic construction. They have the inherent advantages of government support with minimal constraints in budget. Even with a loss, they can still rely on the government to make up for their shortcomings. Government support has further improved the status of large banks in the financial system. However, due to excessive reliance on government support, the state-owned commercial banks lack market incentives and new impetus (Pan, 2017). Their internal operating mechanisms are severely bureaucratized, and have crude corporate governance mechanisms. Their asset size accounts for 40% of the financial sector assets in China, and occupy most market shares. At present, they have all been public listed.

A joint-stock commercial bank is a type of commercial bank with non-state-owned capital participating. The organisational form of a joint-stock bank is similar to that of a joint-stock company. It is issued in accordance with the stock system and is created by using share capital. A joint stock bank is an independent legal entity and enjoys the rights and obligations stipulated in the banking law. Its capital does not depend on the personal property of the shareholders and exists independently. Joint-stock commercial banks have become a dynamic force in China's commercial banking system and an indispensable part of the development of the banking industry and even the national economy.

The joint-stock commercial banks are relatively smaller in size, with fewer preferential policies and lower market positions. They are responsible for their own profits and losses in their operations. In the fierce market competition, they will be more affected compared to large state-owned banks. Joint-stock commercial banks, which are market-oriented, have more efficient corporate-governance mechanism. They pay more attention on efficiency and innovation, and possess higher flexibility in operation and management in order to be able to respond to market requirements.

Problem Statement

As an emerging financial model, internet finance influences traditional financial institutions and services of commercial banks in China with its unique business models and value creation methods (Liu, 2018). Internet-based companies have brought on a huge impact on commercial banks.

Third-party payment services, internet financial management services and Internet financing services are increasingly growing and are consuming the market share of the commercial banks. Not wanting to be left behind, traditional financial institutions are also adopting the internet to improve their operating efficiency and financial services. Nonetheless, the influences of internet finance are different for large commercial banks and joint-stock commercial banks, due to their different property structure, position in the market, and business models.

The rapid development of internet-based companies has had an impact on the traditional banking industry. It would be interesting to find, whether internet-based companies affect the profitability of traditional banks and whether the impact is different on different types of banks.

Objectives of the Study

This study explores the influence of internet finance and its impact to the business of traditional commercial banking in China. It investigates whether internet finance has an impact on the profitability of commercial banks. The objectives of this study are:

1) To study the impact of third-party payment on profitability of commercial banks in China.
2) To find the impacts of peer-to-peer online lending on the profitability of commercial banks in China.
3) To further explore the different impact of internet finance on profitability of commercial banks by types.

Significance of the Study

In the current information era, internet finance which has been quickly recognised by the market for its convenient, fast, and low transaction costs, has had a profound impact on people's lives and the traditional financial industry. It is driving the innovative development of financial industry, and promoting economic growth. Most of the existing researches look at the development of internet finance as both challenges and opportunities for commercial banks. However, how much internet finance influence the profitability of commercial banks, remains to be further explored. Due to

its short history, most of the discussions in the literature are limited to the analysis of the mechanism of internet finance with not many empirical evidence. This study empirically analyses the impact of internet finance on commercial banks which will supplement to previous related research and contributes towards future studies.

LITERATURE REVIEW

Commercial Banks' Profitability

Profitability is an important indicator in measuring the performance of banks (Bordeleau & Graham, 2010). The profitability of commercial banks is mainly supported by three major businesses: asset business, liability business and off-balance sheet business (Zhang, 2011). The asset and liability business bring interest margin income to banks, while the off-balance sheet business generates huge non-interest income. For commercial banks, the main source of income is the spread of bank deposits and loans, which is the main component of bank income (Norden *et al.*, 2014; Zhang, 2011).

There are extensive researches which investigate the factors that influence commercial banks' profitability at home and abroad. Most of them use Return on Assets (ROA) and Return on Equity (ROE) to measure bank's profitability (Bordeleau & Graham, 2010). Golin (2001) reported that ROA is the best indicator in evaluating the profitability of banks. The factors that influence the profitability of commercial banks can be divided into two categories: 1) macroeconomic environment and 2) bank-specific determinants (Ong & Teh, 2013). The macroeconomic factors include interest rate levels, economic growth, and inflation rate, while the bank-specific factors include bank size, liquidity, capital adequacy, and leverage among others.

Boyd (2001) found that the economic growth rate and interest rate level showed a significant positive correlation with commercial banks' profitability, while the profitability of commercial banks will decline after offsetting the effect of inflation.

The Impact of Internet Finance on Bank Profits

Internet finance has transitioned itself from being a nonentity, to its current indispensable state. Many scholars agree that the development of internet finance introduced a huge shock on China's traditional financial industry. Internet finance has its unique advantages in some aspects compared with traditional finance. Li (2015) believed that internet finance has the characteristics of inclusiveness, low cost, high efficiency and convenient services, and it also alleviates information asymmetry. The business model of traditional banks includes to use of information asymmetry between the supply and demand of funds. internet finance can greatly reduce information asymmetry which will compress bank asset business, divert liability business, and replace intermediary business of traditional commercial banks, and therefore has a profound impact on commercial banks (Zheng, 2018). Internet finance diverts the deposits of commercial banks through its channel, information technology, capital, and customer superiority, which changed the monopolistic structure and profitability of commercial banks.

Yang (2017) used the data of 16 listed banks and studied the relationship between typical models of internet finance and the profitability of commercial banks and found that the higher the degree of internet finance development is, the lower is the profitability of commercial banks. The rapid development of third-party payment has a certain impact on the business of commercial banks, and ultimately affect the profitability of commercial banks (Xie, Zou & Liu, 2012). The development of internet finance will reduce the income of commercial banks, and the financial intermediary status of commercial banks is facing certain threats (Zhou, 2013). Based on data of commercial banks in China from 2006-2014, Wang, Shen and Huang (2016) designed a dynamic panel model that included internet finance indexes model and found the internet finance creates a more significant negative effects on deposit and lending business of commercial bank.

However, there are many studies which state that the internet finance provides opportunities to commercial banks, and does not affect their profitability. Xiao (2016) believes that although the internet finance has made great development, commercial banks have experienced decades of accumulation, and their business and profit model will not flounder in the short term. Instead, it would be impossible for internet finance to

completely replace traditional finance. It can only be a beneficial supplement to traditional finance (Zeng & Hu, 2014). Lee (2009) believes that internet finance and commercial banks have a win-win relationship. The innovative development of internet finance provides financial business with a good opportunity. Geng (2014) empirically analyses the future development trends and development factors of commercial banks through P2P lending and third-party payment, and the result shows that internet finance could enhance the profitability of commercial banks.

The Effect of Internet Finance on Different Types of Banks

State-owned commercial banks and joint-stock commercial banks are different in terms of resource constraints, property rights structure, market position and business model. Based on the data of 110 commercial banks in China from 2013 to 2017, Ye and Huang (2019) adopts the generalised moment estimation method to study the impact of the development of internet finance on the profits of commercial banks. The results show that the profitability and profit structure of joint-stock banks and city commercial banks are affected the most by internet finance. The state-owned commercial banks (which possess large assets and secure customer viscosity), and rural commercial banks (with the characteristics of geo-economic restrictions, slow information circulation, poor hardware facilities) are the least affected. In another research, Zhao (2017) find that internet finance could improve the overall profitability of commercial banks while its impact on the profitability of state-owned commercial banks is not significant.

Strategies for Traditional Financial Institutions (Commercial Banks)

Traditional financial institutions have their own unique advantages in adopting internet finance (Liang & Shen, 2013). Commercial banks should pay attention to the core competitiveness of the internet, understand the reasons for the popularity of internet finance, and combine the inherent advantages of banks to create a win-win situation. Commercial banks possessed the upper hand compared to internet finance companies, such as, huge customer base and reputation. They should develop their own internet finance and build a new financial ecosystem to leverage on their strengths and promote the transformation of their business models.

THEORETICAL FOUNDATION

Modern Financial Intermediation Theory

The Financial Intermediation Theory mainly articulate that bank collects deposits and then lend them out. The theory looks at reducing investors' economic costs and loss due to information asymmetry. Commercial banks can reduce transaction costs and solve the information asymmetry problem in the financing activities via internet finance. Moreover, they can optimise resource allocation and improve their operating efficiency in the market. However, the bureaucratic ineffectiveness, such as, customer information screening, credit risk management, and non-performing loan processing have contributed towards excessive transaction costs for commercial banks and reduced their profits.

The emergence of internet finance poses a challenge to the traditional financial intermediaries (Bai, 2014). Internet finance relies on information and network technologies. These contribute towards making information resources more transparent, reducing information asymmetry, and making accurate match between both surplus and deficit parties. Internet finance provides online trading platforms, and can meet customer financial needs in a short time, which significantly reduces the transaction costs and improves transaction efficiency (Sun, 2019). Therefore, the emergence of internet finance speeds up the process of financial disintermediation, and the role of traditional financial intermediaries has been further obfuscated.

THE INFLUENCE MECHANISM OF EXTERNAL INTERNET FINANCE

The main research objective of this study is to find the impact of internet finance on the profits of commercial banks. The profit sources of commercial banks from three aspects: asset business, liability business and intermediary business.

Third-party Payment

With the development of internet finance, especially payment functions, third-party payment and settlement businesses have also had

a profound impact on bank liabilities. The third-party payment which is established on e-commerce platforms, such as Alipay and Tenpay. The distinguishing feature of third-party payment is that there is a time difference between the buyer's payment and the seller's collection. For example, when transaction that takes two to seven days to complete takes place, Alipay, as an intermediary between buyers and sellers, absorbs the funds paid by buyers which is yet to be passed to the seller. In order to obtain profits, Alipay will deposit the funds as fixed deposits with higher interest rates. In the end, the demand deposit which used to be of low interest rate has morphed into a form of an agreement deposit with a higher interest rate. This, among others, pushes up the cost of debt of commercial banks.

Intermediary Business

The income of intermediary business for commercial banks is realised by handling the payment and settlement business for the customer, completing the customer's entrusted agency business and providing various financial services. The intermediary business of traditional commercial banks mainly include bank card business, agency business, custody business, payment and settlement business and consulting business.

Third-party payment represented by Alipay provides the same or similar services as commercial banks at a lower price, and it is faster and more convenient. Moreover, the third-party payment not only provides payment and settlement services, but can also combine credit evaluation and guarantees, which makes online transaction payments safer and more reliable, and gets more and more popular with users. It has led to a decrease in the bank's settlement business income to a certain extent. By providing customers with financial products with high yield and convenient investment, internet wealth management business competes with intermediary business, such as, agency sales and wealth management services, thus reducing the fee income and commission income of commercial banks. Contradictorily, the internet financial companies rely on banks to carry out their business to a certain extent. For example, the funds of P2P online lending must be deposited in banks, and third-party payment companies must conduct funds clearing through the banking system. Therefore, the cooperation between the two can bring certain intermediary business income for commercial banks.

CONCEPTUAL FRAMEWORK

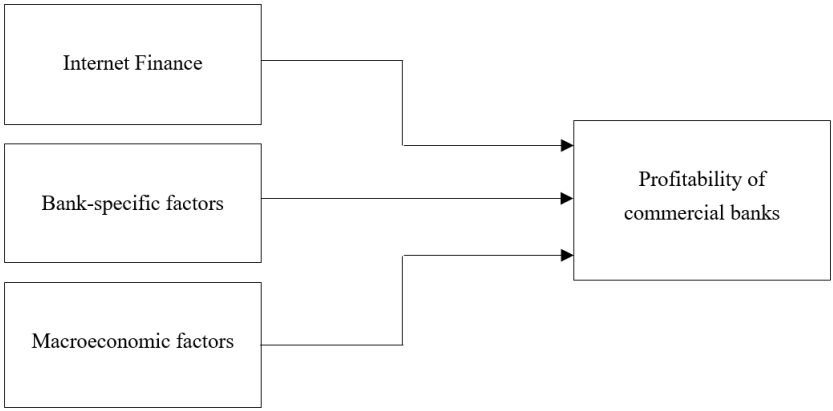


Figure 3: Conceptual Framework

The conceptual framework illustrated the impact of internet finance, bank-specific factors, and macroeconomic determinants profitability of commercial banks as show in Figure 3. On the basis of previous studies, the explanatory variables with expected signs are derived to guide the hypotheses constructed in this study to explain the influence on the profitability of commercial banks in China.

HYPOTHESES

The Third-Party Payment (TPP) platform has the advantages of convenience, efficiency, and high yield, which makes it divert the deposit business of commercial banks. In addition, it also competes with the payment and settlement business of commercial banks and intermediate businesses, thereby reducing the bank's net interest income and non-interest income at the same time and reducing the bank's profitability. As such, the first hypothesis is as below.

H_1: The transaction volume of the Third-Party Payment (TPP) has a negative impact on the profitability of commercial banks.

P2P online lending uses big data and cloud platform technology to

provide funding sources for individuals, and small and medium enterprises that have difficulty in obtaining financing from commercial banks. On the one hand, it has had an impact on the lending business of banks. On the other hand, because the P2P online loan platform integrates the upstream and downstream of funds, some bank deposits are also transferred to the platform, reducing the bank's net interest income, thereby reducing the bank's profitability. Below is the second hypothesis of the study.

H_2: The transaction of P2P online lending has negative impact on the profitability of commercial banks.

The sample commercial banks selected in this article can be divided into the following two categories; large state-owned commercial banks and joint-stock commercial banks. Different types of banks have large differences in many aspects, such as differences in market size and business models. Because of the many differences in these aspects, the impacts are also different. Therefore, internet finance should have a differentiated impact on different types of banks. The third hypothesis is as below:

H_3: The influence of internet finance varies from different types of banks and joint-stock commercial banks is more affected.

METHODOLOGY

Data Selection and Sources

Table 2: Sample Banks

Type of banks	Name of Banks	Date Formed
State-owned bank	Bank of China (BC)	05/02/1912
	Agriculture Bank of China (ABC)	1951
	Industrial and Commercial Bank of China (ICBC)	01/01/1984
	China Construction Bank (CCB)	01/10/1954
	Bank of Communications (BCM)	01/04/1987

Joint-equity commercial bank	China CITIC Bank (CITTC)	28/02/1987
	Ping An Bank (PAB)	28/12/1987
	Industrial Bank (CIB)	08/1988
	China Minsheng Bank (CMBC)	12/01/1996
	China Merchants Bank (CMB)	08/04/1987
	Shanghai Pudong Development Bank (SPDB)	09/01/1993
	Hua Xia Bank (HXB)	10/1992
	China Everbright Bank (CEB)	08/1992
	China Bohai Bank (CBHB)	12/2005
	China Guangfa Bank (CGB)	09/1988
	China Zheshang Bank (CZB)	1993

The data in this study include annual data of state-owned commercial banks and joint-equity commercial banks. The period of the study is from 2008 to 2018. The development of internet finance is measured by the transaction volume of third-party payment and P2P online lending. The data is extracted from official website of iResearch and Analysys International. Given the standardisation of the bank's information disclosure system and the possibility of obtaining complete data of commercial banks, this study selects five state-owned commercial banks and 11 joint-equity commercial banks as a research sample. The data for banks are derived from annual reports of banks and macroeconomic data comes from EPS data. The information of banks is presented in Table 2.

Variables Selection

Dependent Variable

Profitability of commercial banks is used as the dependent variable. Profitability is the ability of a bank to generate revenue with its own and foreign capital. Prior studies related to banks' profitability used ROA and ROE to measure profitability (Sun, 2019). ROE is a measure of how effectively a bank uses shareholders' equity to produce income. ROA is a ratio that reflects the ability of commercial banks to use all assets to make

profits. The higher the value, the stronger the profitability of commercial banks. The income of commercial banks is mainly based on attracting deposits and issuing loans (Liu and Lin, 2016). Sun (2019) believe that ROA can better reflect the profitability of the bank. Thus, ROA is selected as dependent variable to measure the profitability of commercial banks.

Independent Variable

China's internet finance mainly comprises of third-party payment and P2P lending as the two main platforms (Fan and Lin, 2019). They are relatively large in scale with long history and have conformed to a certain standard compared to other channels in internet finance. Third-party internet payment and P2P online lending have been selected to measure the development of internet finance, in line with Fan and Lin (2019).

Control variables

To better estimate the impact of development of internet finance on the profitability of commercial banks, three control variables from micro-and-macro aspects are chosen in this study, i.e. GDP growth, bank size, and bank risk. Table 3 depicts the variables used in this study.

Table 3: Variables Description Table

Type	Variable name	Proxy	Description
Dependent variable	Profitability	ROA	Return on total assets (Total profit + interest income) / Total assets
Independent variable	Development of Internet finance	lnTPP	Logarithm of transaction volume of third-party internet payment
		lnP2P	Logarithm of volume of peer-to-peer online lending
Control variable	Economic growth	lnGDP	Logarithm of gross domestic product
	Bank size	lnTA	Logarithm of Total assets of banks
	Bank risk	NPLR	Non-performing loan / total loans × 100%

Model Specification

The panel data regression method is used for analysis. The following are the regression models for this research:

Model 1: $ROA_{it}=\alpha_0+\alpha_1 lnTPP_t+\alpha_2 lnTA_{it}+\alpha_3 NPLR_{it}+\alpha_4 lnGDP_t+\varepsilon_{it}$
Model 2: $ROA_{it}=\alpha_0+\alpha_1 lnP2P_t+\alpha_2 lnTA_{it}+\alpha_3 NPLR_{it}+\alpha_4 lnGDP_t+\varepsilon_{it}$

where,

ROA is the profitability (ROA of the Ith bank in the period t)
lnTPP is the log of transaction volume of third-party internet payment
lnP2P is the log of transaction volume of P2P online lending
lnGDP is log of gross domestic product
lnTA is log of total assets of i banks
NPLR is non-performing loans ratio of i banks
i is number of all commercial banks
t is a year from 2008-2018
α is each variable coefficient
ε is a random error term

The two proxies for internet finance (TPP and P2P) were separated into two models as they are highly correlated with each other.

Empirical Results and Analysis

Based on the annual data of 16 commercial Banks from 2008 to 2018, this study conducts grouping regression to investigate the impact of internet finance on the overall profitability of commercial banks and different types of commercial banks respectively. EViews 12 is used to regress the investigated models. The results of model estimation and regression will be shown in this chapter.

Descriptive Analysis

Table 4: Statistical Descriptive Analysis

Variables	Min	Max	Mean for all	Std. Dev.	State-owned	Joint-stock
Dependent variable						
ROA	0.130	1.410	0.933	0.214	1.085	0.864
Independent variables						
lnTPP	5.614	12.300	8.980	2.162	n.a.	
lnP2P	-2.408	7.939	3.675	3.720		
Control variables						
lnTA	6.162	10.168	8.070	1.221	9.374	7.477
NPLR	0.100	4.320	1.256	0.586	1.504	1.144
lnGDP	10.372	11.408	10.937	0.327	n.a.	

It can be seen from Table 4 that the mean value of the overall average return ROA is 0.933, the minimum value is 0.130, and the maximum value is 1.41, indicating that there is a certain gap in profitability between different banks. Between the two types of banks, the ROA of the five state-owned banks with an average of 1.085 is higher than that of joint-stock banks with 0.864. This indicates that the profitability of the state-owned banks in China is significantly stronger than joint-stock banks, generating more profits.

From the perspective of independent variables, third-party internet payment and P2P online lending are large in scale, and they have certain advantages in the development of their business models, so the scale has been rapidly expanded since their emergence. The standard deviation of the P2P online lending is 3.72, with large fluctuations between the values. This is mainly due to the numerous regulatory policies and strict regulations issued since 2016, which have effectively restrained the occurrence of illegal fund-raising, runaway events and other disorderly events in the industry, and promoted the P2P industry to return to rational growth. From the bank-specific control variables, the asset size of the five state-owned banks is significantly larger than joint-stock banks, and the asset size of different banks varies greatly. The average non-performing loan ratio is 1.256, among which the average non-performing loan ratio of the state-owned banks and joint-stock is 1.504 and 1.144 respectively, indicating that the state-owned

banks are worse in loan risk management than the joint-stock banks, and the amount of non-performing loans is relatively large. From the perspective of macro-control variables, GDP growth in China has not changed much, almost maintaining a high-speed growth. The standard deviations of NPLR, lnTA and lnGDP are 0.586, 1.221 and 0.327 respectively, indicating that the differences between the values of these variables are not too large and have small fluctuations.

Correlation Analysis

Table 5: Correlation Matrix of the Variables

	ROA	lnTPP	lnP2P	lnTA	NPLR	lnGDP
ROA	1.000					
lnTPP	-0.055	1.000				
lnP2P	0.047	0.966	1.000			
lnTA	0.555	0.412	0.417	1.000		
NPLR	-0.091	0.287	0.228	0.434	1.000	
lnGDP	0.026	0.784	0.785	0.419	0.210	1.000

Table 5 above shows that the correlation coefficients between ROA and third-party payment scale is -0.05457, showing a relatively obvious negative correlation. The transaction volume of third-party payment has a reverse relationship with total asset returns under other conditions unchanged. While the transaction volume of P2P online lending is positively correlated with ROA, indicating that they move in same direction. Additionally, the correlation between lnTPP and lnP2P is relatively strong, and the correlation coefficients are above 0.95. When we test multicollinearity issues in regression models, the problem can be viewed serious if the correlation coefficient between the two variables are higher than 0.8 (Gujarati, 2002). Therefore, to avoid serious multicollinearity problems in the model, they are separately regressed with the return on total assets.

Regression Results and Analysis

Model 1 – Bank profitability and TPP

Table 6: The Regression Results of Model 1 for Full Sample Banks

Variable	Coefficient
C	-15.974***
	(1.818)
lnTPP	-0.287***
	(0.029)
lnTA	0.128***
	(0.019)
NPLR	-0.008
	(0.023)
lnGDP	1.688***
	(0.192)
R square	0.519
Adj R square	0.508
F-statistic	46.214
Prob (F-statistic)	0.000
Durbin Watson stat	1.119
Est. tech	REM

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% level respectively. Figures in parentheses ( ) are standard error.

Model 1 uses Random Effect Model (REM) under panel regression analysis. The regression coefficient of the third-party transaction (TPP) is -0.286702, and it has a negative relationship with the return on total assets (ROA) at the 1% significance level. The third-party payment and the profitability of commercial banks show a significant inverse relationship, supporting that hypothesis 1. The result is consistent with previous studies (Chen *et al.*, 2019; Zhu, 2019; Zhang, 2019). The results indicate that the when third-party transaction scale increases by 1%, it can cause the bank's total asset return to decrease 28.67%, that is, the expansion of the third-party transaction scale has a negative impact on the bank's profitability. The results of the panel data analysis are shown in Table 6.

Third-party payment platforms have squeezed the share of commercial banks' debt business and intermediate business, in terms of clearing and settlement and third-party financial management sales. In order to strengthen the management of payment and clearing business, the Central Bank of China has issued the provisions of the Customer Reserve Deposit Management Measures for Payment Institutions, which requires that all the customer reserve funds obtained by the third-party payment platform need to be paid to the account of the depository bank that cooperates with it, and become the bank's current deposit. The Central Bank also stipulates that it can deposit the relatively stable part of its reserve as fixed deposits. Since the interest rate of fixed deposits are higher than that of demand deposits, this led to an increase in the cost for the commercial banks. Therefore, third-party internet payment increases the cost of obtaining capital and reduces the interest income of commercial banks through the depository of provisions and other third-party business precipitation funds (Chen, 2018).

Model 2 – Bank profitability and P2P

Table 7: The Regression Result of Model 2 for the Full Sample

Variable	Coefficient
C	8.395***
	(2.195)
lnP2P	0.056***
	(0.018)
lnTA	0.163***
	(0.020)
NPLR	-0.148***
	(0.024)
lnGDP	0.805***
	(0.208)
R square	0.346
Adj R square	0.330
F-statistic	22.591
Prob (F-statistic)	0.000
Durbin Watson stat	0.979
Est. tech	REM

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% level respectively. Figures in parentheses ( ) are standard error.

Model 2 uses REM under panel regression analysis. From Table 7, it can be seen that the regression coefficient show that P2P online lending has a positive impact on the profitability of commercial banks. This is in line with Cai (2017) and Han (2018). The increase in P2P online loan transaction volume leads to an increase in bank profitability. When P2P online loan transaction volume increases by 1%, it will bring about a 5.6% increase the bank's return on total assets. The result shows that the emergence of P2P does not divert much assets, liabilities and intermediary business from commercial banks but improves the performance of commercial banks. Han (2018) discusses the future development of P2P and commercial banks, and concluded that P2P and commercial banks will experience a stage of integration and then differentiation. It is unlikely that the P2P online lending will have a negative effect on commercial banks Although the internet financial loan platforms are more convenient and have lower threshold than that of traditional commercial banks, it possesses many drawbacks due to loose regulation. When the internet financing platform regulation was strengthened, many of the P2P providers with insufficient qualifications were forced to withdraw from operation. Their customers return to the bank, so it has a positive impact on the profitability of the bank.

In addition, the customers who are being targeted by banks and P2P online lending are not from the same market segment. The high-quality customers who meet the loan requirements of commercial banks will choose commercial banks with lower interest rates instead of P2P online lending platforms. Those who do not meet the loan requirements of commercial banks are usually those with higher default risk. This may, indirectly, help banks reduce the non-performing loan rate of commercial banks and improve banks' performance.

Additionally, the magnitude of the coefficient of Third-Party Payment (TPP) is greater than that of P2P ($0.287 > 0.056$). This shows that the third-party payment has a greater impact on commercial banks. Compared with the third-party payment, the P2P model has an imperfect system, higher risks, and lack of standardisation, which are likely to affect the way customers borrow. In terms of the absolute value of the coefficient, the estimated coefficient of the third-party internet payment is much bigger than that of the P2P online loan, that is, the third-party internet payment has the greater impact on overall profitability of commercial banks. From the two models

above, we can observe that third-party payment (TPP) has much higher impact on the overall profitability of commercial banks. As internet finance encroaches on the traditional business of commercial banks, it weakens the profitability of commercial banks.

EMPIRICAL RESULTS AND ANALYSIS OF DIFFERENT COMMERCIAL BANKS BY TYPES

In order to observe whether internet finance has different effects on different types of banks, this study analyses the effect of the internet finance on a) state-owned commercial banks and b) joint-stock commercial banks via panel regression similar to models (1) and (2) for these two types of banks.

Results for State-owned Commercial Banks

Table 8: Regression Results of Model 1 and 2 for State-owned Banks

Variable	ROA (State-owned Banks)	
	Model 1 (P2P)	Model 2 (TPP)
C	-12.909***	10.652***
	(2.548)	(2.474)
lnTPP	-0.249***	n.a.
	(0.038)	
lnP2P	n.a.	0.061***
		(0.020)
lnTA	0.157**	0.136*
	(0.077)	(0.078)
NPLR	-0.037	-0.168***
	(0.029)	(0.026)
lnGDP	1.355***	-0.989***
	(0.268)	(0.244)
R squared	0.608	0.416
Adj R squared	0.577	0.370
F-statistic	19.383***	8.918***
Durbin Watson stat	1.715	1.858
Est. tech	REM	REM

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% level respectively. Figures in parentheses ( ) are standard error.

Both models in Table 8 use REM under panel regression analysis. It can be seen from Table 8 that internet finance affects the profitability of state-owned banks. Third-Party Payment (TPP) has a negative effect on the profitability of state-owned banks, indicating that they move in inverse direction. This is also because the third-party internet payment has the most overlap with the business of commercial banks, which not only have an impact on the non-interest income of banks, but also to increases the cost of obtaining capital for banks which reduces the interest income. For every 1% increase in third-party payment, ROA decreases by 24.9% On the other hand, P2P online lending has a promoting effect on state-owned banks' profits. For every 1% increase in P2P online lending, ROA raises by 6.1%. In terms of the magnitude of the coefficients, the estimated coefficient of the Third-Party Payment (TPP) is greater than that of the P2P online lending, that is, the third-party internet payment has the greater impact on the state-owned banks compared to TPP.

Results for Joint-stock Commercial Banks

Table 9: Regression Results of Model 1 and 2 for Joint-stock Banks

Variable	ROA (Joint-stock Commercial Banks)	
	Model 1 (P2P)	Model 2 (TPP)
C	-16.717***	7.732***
	(2.421)	(2.815)
lnTPP	-0.295***	n.a.
	(0.039)	
lnP2P	n.a.	0.057**
		(0.024)
lnTA	0.126***	0.170***
	(0.035)	(0.036)
NPLR	-0.006	-0.175***
	(0.035)	(0.035)
lnGDP	1.764***	-0.745***
	(0.259)	(0.268)
R squared	0.471	0.284
Adj R squared	0.446	0.259
F-statistic	25.118***	11.485***

Durbin Watson stat	1.033	0.880
Est. tech	REM	REM

Note: ***, ** and * indicate significance at the 1%, 5%, and 10% level respectively. Figures in parentheses ( ) are standard error.

Both models in Table 9 use REM under panel regression analysis. It can be seen from Table 9 that there is an inverse relationship between profitability of joint-equity commercial banks and TPP. When transaction volume of third-party payment changes by 1%, the return on assets accordingly changes by 29.5% in the opposite direction. However, P2P online lending has a positive impact on commercial banks' profit. For every 1% increase in scale of P2P online lending, the ROA would increase by 5.7%. From the magnitude of the coefficients, it can be seen that the estimated coefficient third-party internet payment (TPP) is greater than that of the P2P online loan (P2P). This result is similar with that of the as the state-owned banks.

CONCLUSION AND RECOMMENDATIONS

Traditional financial institutions are affected by internet finance. Traditional finance managed to integrate the traditional financial industry with the internet technology. This has spawned many high-tech financial products and services, which have made people's lives more convenient. It has altered many people's ideas in investment and financial management. Internet finance has continuously reduced the original market share of the traditional financial business of commercial banks, which has affected their profits. This research studies the impact of internet finance on the profits of commercial banks.

This study discusses influence mechanism of internet finance on the commercial bank's business, and analyses its effects on the profitability of commercial banks from the two dimensions of internet wealth; Internet financing and internet payment businesses. It can be concluded that P2P online lending reduces the amount of bank loans by capturing the market share of the loan business of commercial banks, thus reducing the loan interest income and the profit margin of commercial banks. Internet finance reduces the intermediary business income by attracting deposits and

preempting fee income away from the commercial banks. This decreases the profit margins for commercial banks. Hence, external internet financial companies have a negative impact on the profitability of traditional commercial banks to a certain extent.

In terms of the internet payment business, third-party payment has negative influence on overall profitability of commercial banks. While for the internet financing business, P2P online lending has a positive effect on commercial banks' profitability. These indicate that the development of internet finance has both positive and negative impacts on the revenue of traditional commercial banks. However, the third-party payment has a greater impact on banks' profitability in comparison to P2P online lending. It is mainly because P2P online loans and commercial banks serve different market groups. Third-Party internet Payment (TPP) has formed fierce competition with commercial banks in assets, liabilities and intermediary business, which has been reflected in the diversion of bank deposits, substitution of bank transactions, increase of interest payment costs, and reduction of intermediate business income.

When the analysis is broken into different types of banks, Third-Party Payment (TPP) is found to be negatively related with both state-owned and joint-stock commercial banks while P2P online lending exhibits a positive relationship with the two types of banks. Since state-owned banks and joint-stock banks are different in asset size, profitability efficiency, cost management, target customers, and risk control, the degree of shock they suffer from internet finance is different. Large state-owned banks, with huge assets, government and policy support, large and sticky customer base, and diversified profit channels, are less affected by internet finance. The profitability of state-owned banks with their unique advantages is generally greater than the joint-stock banks'.

Above all, the internet finance meets the personalised needs of different customers with its rich and diversified business forms, products and services. With the improvement of the relevant legal system and regulations, internet finance will gradually become stronger, and will have a substantial impact on traditional finance. Overall, commercial banks should actively respond to the impact of the internet finance development and turn it into opportunity. Commercial banks should make appropriate adjustments especially their

operations to ensure satisfactory experience for their customers. It is necessary for the commercial banks to seize the opportunities from internet finance and strengthen cooperation with internet financial platforms, and finally achieve a win-win cooperation.

IMPLICATION OF THE STUDY AND SUGGESTION ON FUTURE STUDY

Commercial banks, as traditional financial institutions, occupy a dominant position in China's financial system. Profitability is the basis for the survival and sustainable development of commercial banks, and the sustained and healthy development of commercial banks can promote the stability of the financial market and the prosperity of the real economy. The existence of commercial banks is of great significance to the stability of China's entire financial system. Since internet finance emerges, it has posed a huge challenge to traditional financial institutions, especially commercial banks. Internet finance gradually captures part of the business of commercial banks through its own cost and information advantages. In spite of this, Internet finance is also an opportunity for commercial banks. Under the threat, commercial banks are compelled to actively take measures to reform and innovate to preserve their profitability and existence.

Commercial banks are important financial intermediaries for the economy and it is imperative that they ensure healthy and stable operation. The commercial banks in China are different in assets scale, property structure, and operating conditions. The impacts from the development of internet finance varies for different types of banks. The current study also conducts analysis for different types of banks and explores how much are they affected by internet finance. In general, this research provides basic guidance for commercial banks, regulatory agencies to fulfill their aims through planning, development and operations in light of the emergence of internet finance.

It is interesting if the impact of internet finance to be investigated further. Hence, for future study purposes, researchers can look into the impact that China's internet finance has on smaller financial institutions, such as development financial institutions and saving institutions. Furthermore,

on a macro-level; a study on the impact of China's internet finance has on the country's economic growth is also warranted.

NOTES:

[1.] This mainly consists of P2P with large volume of transaction which emerged earlier, which have developed more maturely.
[2.] Proxied by the magnitude P2P (peer-to-peer lending) lending and third party payment.
[3.] Refer to Table 5 for the results of the correlation analysis.

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