creative commons

COMMONS DEED

저작자표시-비영리-변경금지 2.0 대한민국

이용자는 아래의 조건을 따르는 경우에 한하여 자유롭게

- 이 저작물을 복제, 배포, 전송, 전시, 공연 및 방송할 수 있습니다.

다음과 같은 조건을 따라야 합니다:

저작자표시. 귀하는 원저작자를 표시하여야 합니다.

비영리. 귀하는 이 저작물을 영리 목적으로 이용할 수 없습니다.

변경금지. 귀하는 이 저작물을 개작, 변형 또는 가공할 수 없습니다.

- 귀하는, 이 저작물의 재이용이나 배포의 경우, 이 저작물에 적용된 이용허락조건을 명확하게 나타내어야 합니다.
- 저작권자로부터 별도의 허가를 받으면 이러한 조건들은 적용되지 않습니다.

**저작권법에 따른 이용자의 권리는 위의 내용에 의하여 영향을 받지 않습니다.**

이것은 이용허락규약(Legal Code)을 이해하기 쉽게 요약한 것입니다.

Disclaimer

dCollection

**Master's Thesis of International Studies**

# Study on the effect of Internet Finance on Profitability of Commercial Banks in China

인터넷 금융이 중국 상업은행의 수익성에
미치는 영향에 관한 연구

August 2020

Graduate School of International Studies

Seoul National University

International Commerce Major

Du Yushan

국제학석사 학위논문

# Study on the effect of Internet Finance on Profitability of Commercial Banks in China

## 인터넷 금융이 중국 상업은행의 수익성에 미치는 영향에 관한 연구

**2020** 년 **8** 월

서울대학교 국제대학원

국제학과 국제통상전공

Du Yushan

# Study on the effect of Internet Finance on Profitability of Commercial Banks in China

**Examiner Ahn Jaebin**

**Submitting a master's thesis of International Studies**

**August 2020**

**Graduate School of International Studies**

**Seoul National University**

**International Commerce Major**

**Du Yushan**

**Confirming the master's thesis written by Du Yushan**

**August 2020**

Chair MOON Woosik (Seal)

Vice Chair RHEE Yeongseop (Seal)

Examiner AHN Jaebin (Seal)

Copyright © 2020 by Du Yushan

All Rights Reserved

# Abstract

## Study on the effect of Internet Finance on Profitability of Commercial Banks in China

Du Yushan

International Commerce Major

Graduate School of International Studies

Seoul National University

Driven by the interest rate liberalization in China, the profit from interest income will certainly be unsustainable, commercial banks will be facing severe profit dilemma. The Internet financial platform such as Alipay and Caifutong have been changing the traditional financial ecosystem dominated by traditional commercial banks for several years.

Firstly, the current situation of Internet Finance and commercial banks in China will be analyzed, then discussion of influence mechanism of three major Internet Financial models about the profitability of commercial banks from the perspective of net interest income & non-interest income will be followed. Then, the proportion of net interest income on interest bearing assets and the proportion of non-interest income on total assets are selected as the dependent variables, respectively, and the scale of Internet monetary fund, P2P

Internet lending, and third-party payment are selected as three main independent variables, this thesis does an empirical test on the basis of the data from 2013-2018 of 30 listed commercial banks in China.

Empirical evidence shows that Internet monetary fund, P2P internet lending and third-party payment all negatively and significantly affect the net interest income of commercial banks. Third-party payment acts a positive and significant role in non-interest income of commercial banks, while Internet monetary fund and P2P internet lending have a positive but insignificant influence. From the perspective of bank ownership, Internet monetary fund, P2P Internet lending and third-party payment hurt more on the joint-equity banks than the state-owned banks when it comes to the net interest income, while Internet monetary fund, P2P interest lending and third-party payment contribute positively on joint-equity banks, but damage on the state-owned banks when it comes to non-interest income. Finally, this paper analyzes the influence results of the three Internet financial models on different profit sources and different types of commercial banks, puts forward the recommendations for commercial banks to manage the challenges and opportunity from Internet Finance.

**Keywords:** Internet Finance, E-finance, Commercial Banks, Profit, Internet monetary fund, P2P Internet lending, Third-party payment

**Student Number**: 2018-22022

# Table of Content

# List of figures and tables

# I. Introduction

## 1. Definition of Internet Finance

Internet Finance is a combination of Internet technology and financial functions. It is also known as E-finance. According to Allen et al.(2002), E-finance refers to the provision of financial services and markets using electronic communication and computation. People's Bank of China define the Internet Finance from two ways. In a broad way, Internet Finance includes not only the financial services offered by Internet enterprises as non-financial institutions, but the business of financial institutions by Internet. Narrowly speaking, Internet Finance only contains the financial services served by Internet companies through Internet technology Considering the research topic and the availability of relevant data, the Internet Finance will adopt the narrow definition in this thesis.

The advantages and disadvantages of the three main financial models are compared as shown in Table 1 (Jin, 2017). Internet Finance has the advantages including faster payment, lower financing cost, wider coverage, and more information symmetry.

**Table 1**. Comparison of Advantages and Disadvantages of Three Financial Models

| | **Capital Market** | **Bank** | **Internet Finance** |
|---|---|---|---|
| Advantages | 1.Low financing risk<br>2.Permanent financing<br>3. No interest payment | 1.Strong financial strength<br>2.Wide customer resources<br>3.Strong risk control ability | 1. Fast and convenient<br>2. Low financing cost<br>3. Wide coverage<br>4. Information symmetry |
| Disadvantages | 1. High financing cost<br>2. Long financing time span | 1. Harsh application conditions<br>2. Limited amount of fund for application | 1. Poor risk control<br>2. Immature Internet technology |

(Table 1: The table illustrates the advantages & disadvantages of Capital Market, Bank, and Internet Finance)

The main services that Internet Finance provides are online payment, online financing and online investment. Online payment means third-party payment institutions provide the on-line and off-line payment channels for users to do the business including online payment, fund clearing, or other business from users to the merchant. Online financing indicates the financing behavior completed through Internet intermediary institutions, which has three main forms: P2P, which is individuals borrow money from individuals, "small loan company + platform", which is the qualified small loan company provides loan to borrowers through e-commerce platform, the last one is crowdfunding mode, which is a

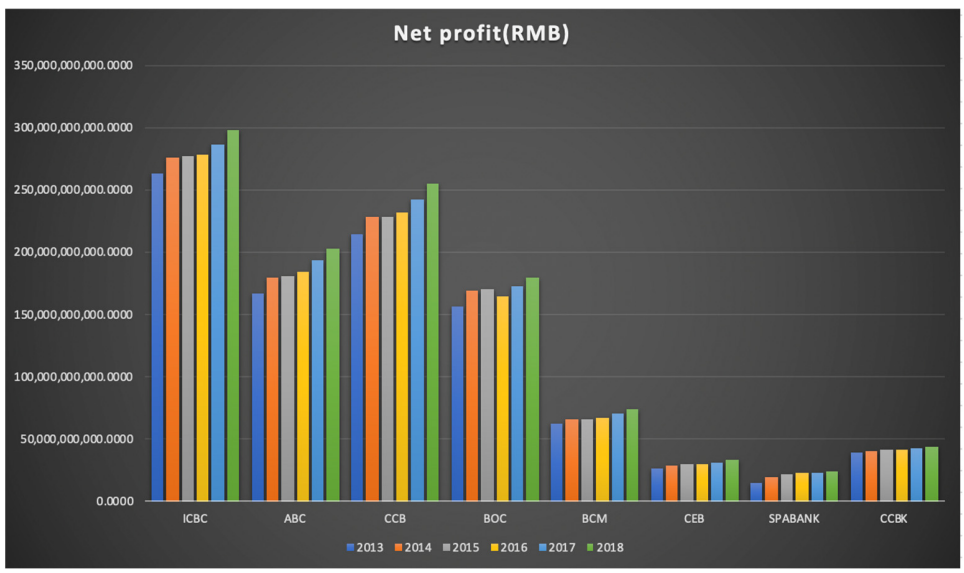
form of using the third party to provide financing platform, in which many network individual users gather small amount of fund to achieve financing purposes. Additionally, online investment is a new model of investment based on the Internet platform. One is to invest money on P2P and other financing platforms, the other is to purchase various Internet financial products (Dong, 2019)

## 2. Background

Before 2005, Internet Finance only involved in technology application in China. Then, with the occurrence of the third-party payment, Internet Finance began to take off in China. 2013 is the fastest growing year for Internet Finance industry. In June 2013, Yu'ebao, was jointly produced by Alipay and TianHong asset management. 50 million RMB monetary fund purchase was achieved in the first day. Likewise, Baidu financial management platform went online in June 2013. Just several hours later, more than 120,000 investors purchased its product "Baifa", with a selling more than 1 billion RMB (Peng, 2014). Although from the year of 2017 to 2018, due to the impact of macroeconomic downturn, liquidity shortage, and a series of regulatory policies for Internet Finance, Internet Finance has been hit to some extent, the trading volume of the top three products still reached 8.15 trillion RMB (Internet monetary fund), 1.79 trillion RMB (P2P Internet lending) and 219.6 trillion RMB (third-party payment), with an increase of 15%, - 36% and 48%, respectively. In just a few years, Internet Finance has rapidly seized the market share of commercial banks in settlement function, financing function and financial management, breaking traditional and stable business environment.

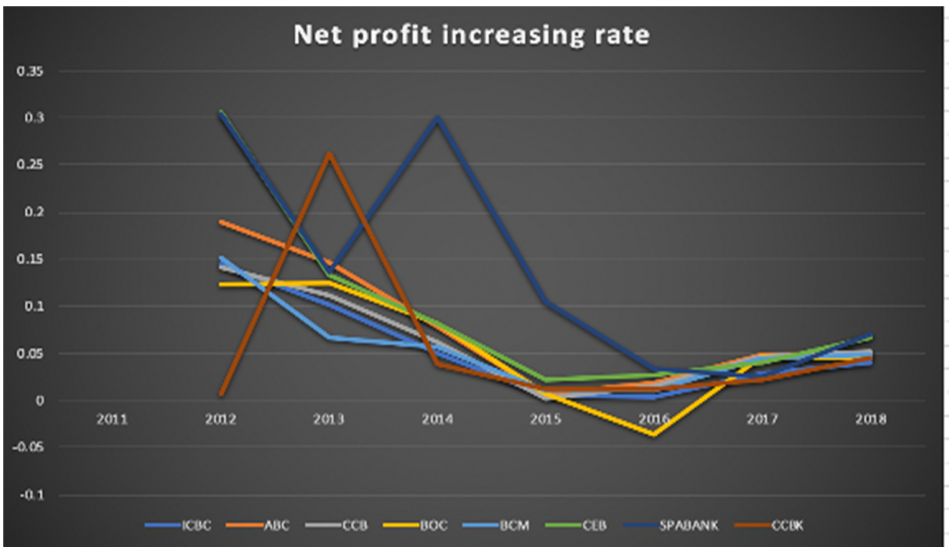
Looking back to performance of commercial banks in China, taking 5 state-owned banks and 3 joint-equity banks as examples, Figure 1 shows that the net profit growth of these banks in 2013-2018 have maintained a relatively stable level, the growth rates still show a trend of slowing down or even declining (Figure 2).

**Figure 1**. Net Profit




(Figure 1: The graph illustrates the growth of net profit of 5 state-owned banks & 3 joint-equity banks from 2013 to 2018. Data retrieved from Annual Report)

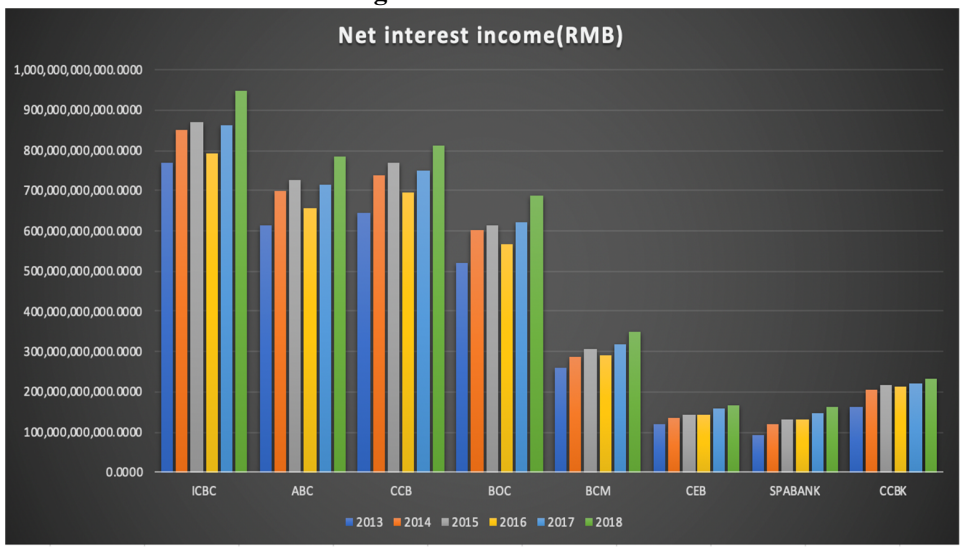
**Figure 2**. Net Profit Increasing Rates




(Figure 2: The graph illustrates the growth of net profit increasing rates of 5 state-owned banks & 3 joint-equity banks from 2011 to 2018. Data retrieved from Annual Report)

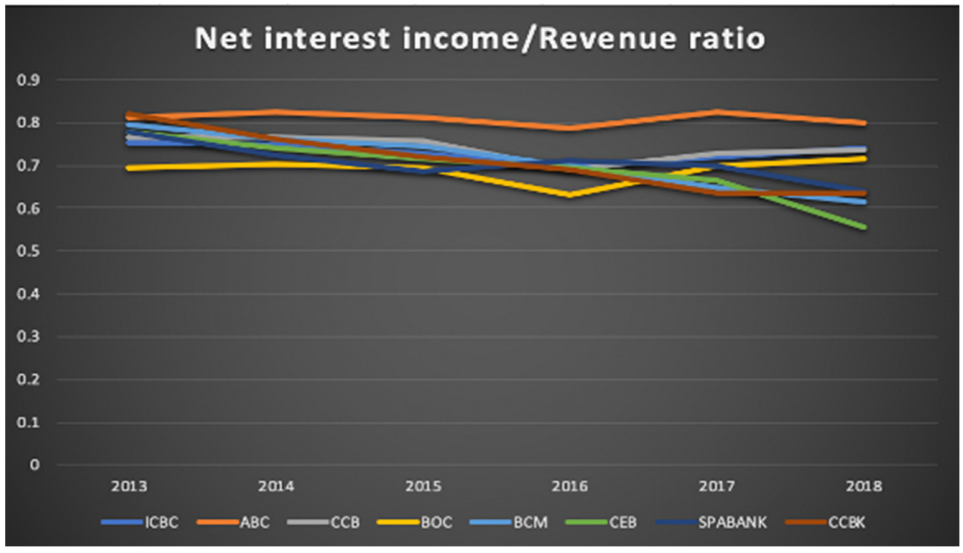
As the primary income, the net interest income increases with an upward trend every year (Figure 3). However, in Figure 4, generally speaking, the ratio of net interest income on revenue has a slight downward trend, especially for those joint equity banks.

**Figure 3**. Net Interest Income




(Figure 3: The graph illustrates the growth of net interest income of 5 state- owned banks & 3 joint-equity banks from 2013 to 2018. Data retrieved from Annual Report)

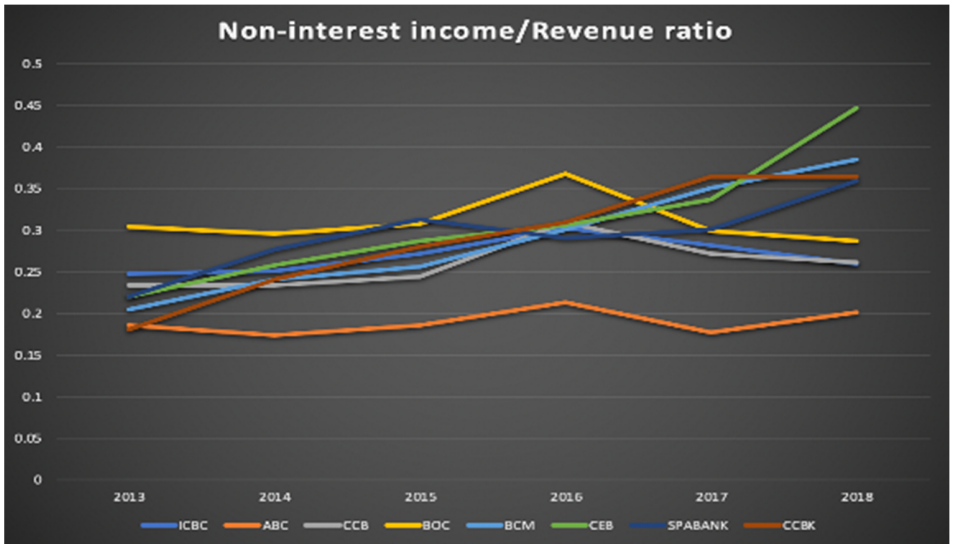
**Figure 4.** The Proportions of Net Interest Income on Revenue




(Figure 4: The graph illustrates the proportions of net interest income on revenue about 5 state- owned banks & 3 joint-equity banks from 2013 to 2018. Data retrieved from Annual Report)

Correspondingly, the overall ratio of non-interest income on revenue keeps rising, especially among those joint equity banks (Figure 5).

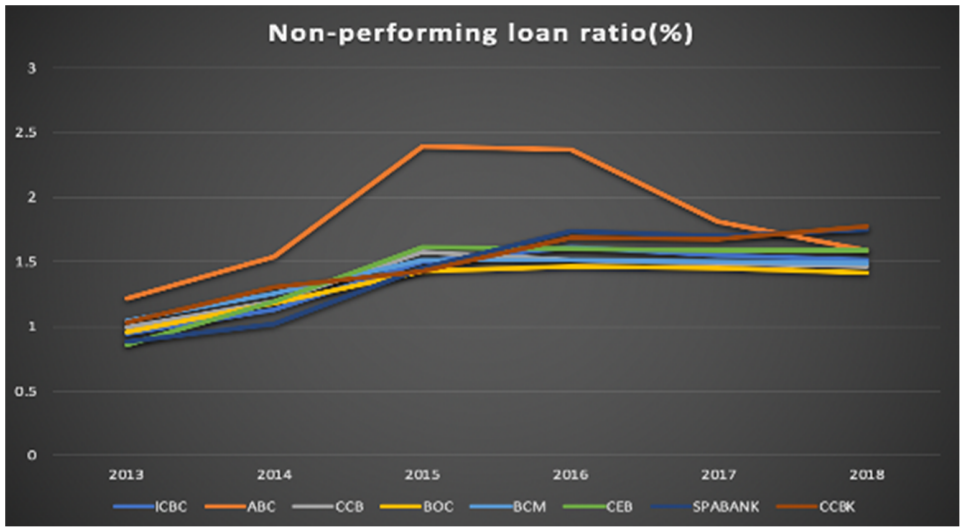
**Figure 5**. The Proportions of Non-interest Income on Revenue




(Figure 5: The graph illustrates the proportions of non-interest income on revenue of 5 state-owned banks & 3 joint-equity banks between 2013 & 2018. Data retrieved from Annual Report)

At the same time, coupled with the supply side structural reform, the non-performing loan rate also soared significantly. (Seen from Figure 6)

**Figure 6**. Non-performing Loan Ratios




(Figure 6: The graph illustrates the non-performing loan ratios of 5 state-owned banks & three joint-equity banks between 2013 & 2018. Data retrieved from Annual Report)

# II. Literature Review

The majority of scholars support the idea that Internet Finance's inhibited the development of commercial banks. Whinston et al. (2002) deems that E-finance makes the financial industry more competitive as it blurs the boundaries between different financial institutions. Therefore, traditional financial institutions have to find competitive strength. Specifically speaking, Berger and Fabian (2009) mainly studies the effects of electronic P2P (peer-to-peer) lending platform on credit rate by using 14,321 credit transactions between 2005-2009 in the United States. They deems that P2P financial intermediaries considerably change borrowers' credit condition via reducing information asymmetries, which gradually hurts the credit business of banks. Then, Fu (2012) identify that Internet Finance hurts the bank's payment & settlement business through the case of third-party payment. Moreover, through the analyzing of Yu'ebao, Qiu (2013) concludes that Yu'ebao monetary fund has jeopardized the market share of banks and also increased interest expense from banks.

Nonetheless, there are still some scholars think that Internet Finance has the ability to improve the business of banks. Ramsey (2014) puts forward the innovative concept and management efficiency of Internet Finance, which will accelerate the integration of banks & Internet. Based on the data of 16 listed banks in China between 2002 and 2013, with ROA as the dependent variable and the growth rate of Internet Finance as the main independent variable, Geng (2014) concludes that there is a time lag effect of the Internet Finance's influence on the whole profit of listed banks in China. The growth of Internet Financial industry is eventually conducive to banks.

Through the literature review, it's clear to see that most of the studies show that Internet Finance's jeopardized the development of traditional financial institutions. Primarily, it adopts relatively loose credit conditions, comparatively high investment interest rates and convenient settlement methods. However, most of the literatures are studying the reasons and effects through qualitative analysis. Not many researches did the empirical analysis by quantitative method. In addition, for those quantitative researches, they are limited to the analysis of the impact of Internet Finance on the bank's overall profit or non-interest income, lacking the analysis of net interest income, which is the major income of commercial banks in China. What's more, Pi and Zhao (2014) classify Internet Finance in China into 3 categories based on the popularity, which are third-party payment, online investment, and P2P Internet lending. So far, there is no study including all of these three factors.

Therefore, this thesis will firstly discuss the influence of Internet Finance (Internet monetary fund, P2P Internet lending and third-party payment) on different profits of commercial banks through cases and relevant data. Then, based on the financial data of 30 listed commercial banks in China between year 2013 and 2018, the ratio of net interest income to interest bearing assets and the ratio of non-interest income to total assets are selected as the measurement indicators of profit structure, Internet monetary fund, P2P Internet lending and third-party payment are the major independent variables, and other important factors of bank characteristics are selected to conduct the qualitative empirical research.

# III. Mechanism Analysis

Internet Finance involves in a broad range of fields and has various types. The three Internet Finance modes that produce primary effects on the profit structure of banks are as following: Internet monetary fund(IF), P2P Internet lending(P2P), and third-party payment(TPP).

## 1. Internet monetary fund

### 1-1. The development of Internet monetary fund

According to the definition of Internet monetary fund given by China Banking Regulatory Committee in March 2014, online investment products are the Internet monetary fund products represented by Yu'ebao, Tencent Licaitong, Xianjinbao, Huoqitong, and Baidu baifa launched by Internet enterprises with fund companies. They do not include monetary fund products sold on a commission basis through traditional channels like bank websites. In terms of its advantages, Internet monetary fund is not limited by place & time, simple & fast operation, low entry threshold, wide range of options and so on.

### 1-2. Influence mechanism analysis

#### 1-2-1. Net interest income

Internet monetary fund mainly affects the deposit field of traditional banks. As the

traditional offline financing not only has complex subscription procedure, but also a high minimum purchase amount. Internet enterprises and fund companies have cooperated to launch the popular Internet financing products. This kind of financial products have strong liquidity, generally there is no or very low purchase starting point, the purchase process is easy to operate, and the handling fee is also low, which attracts many investors. At the same time, some Internet fund sales platforms provide very affordable fund purchase rates. Take the Huaxia Growth Fund rate as an example, if the investor buy less than 10 million RMB, Tiantian Fund will reduce investor's investment with a 10% discount rate. For small and medium-sized investors, Tiantian Fund's subscription fee is far lower than the bank's subscription fee, as shown in Table 2, thereafter, it has taken a lot of deposit from commercial banks gradually.

**Table 2**. Huaxia Growth Fund Rate

| Subscription Amount | Normal Rate | Tiantian Rate |
|---|---|---|
| Less than 1 million RMB | 1.5% | 0.15% |
| 1 million RMB to 5 million RMB | 1.2% | 0.12% |
| 5 million RMB to 10 million RMB | 0.8% | 0.08% |
| More than 10 million RMB | 1000 RMB/per transaction | |

(Table 2: The table illustrates the comparison of the subscription rate of Huaxia Growth Fund in Banks and Tiantian Fund website. Data retrieved from Tiantian Fund website)

### 1-2-2. The intermediary business

In the traditional financial industry, banks have been monopolizing the fund sales market with their own credit system and huge customer scale, and charging high commission. With the improvements in third-party payment, investors begin to purchase Internet monetary fund through the third-party platform due to the habits. However, because the agency business occupies the intermediary business in a large amount, banks attach great importance to this business, constantly innovate their agency model, and sell fund through mobile app, online banking and other platforms. In addition, it also provides regular fund profit and information, gives advice to customers on market trends, product features, etc. (Zhang, 2016)

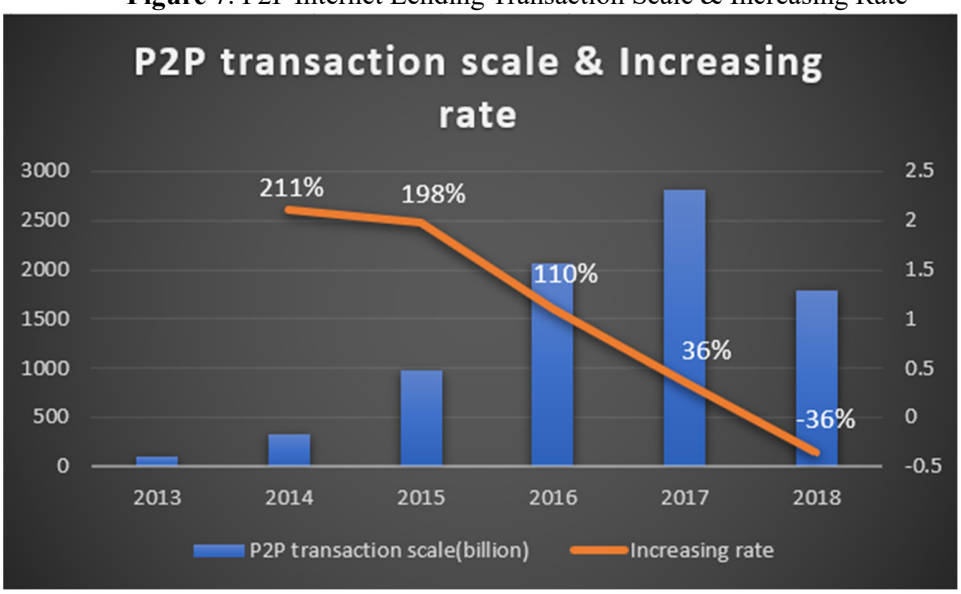
## 2. P2P Internet lending

### 2-1. The development of P2P Internet lending

P2P Internet lending can be traced back to the Internet lending in the UK. P2P means individual to individual. P2P Internet lending stands for the network platform provided by third-party institutions, which provides convenience for individuals to borrow money and charges certain intermediary fees. Compared with traditional commercial banks, its lending threshold is lower and the lending speed is faster, which can help lots of small or micro enterprises to solve their funding problems (Zhang, 2019).

From 2007, P2P began to appear in China. As of 2018, the turnover has reached 1794.8 billion RMB. From the Figure 7, the scale of P2P Internet lending market gradually increased in China between the year of 2013 and 2018. However, with the introduction of relevant regulatory documents, the number of P2P Internet lending operation platforms has gradually declined since 2015. As of 2018, only 1021 are still in operation, with a turnover of 1794.8 billion RMB.

**Figure 7**. P2P Internet Lending Transaction Scale & Increasing Rate




(Figure 7: The figure illustrates the P2P Internet lending transaction value from 2013 to 2018. Data retrieved from iResearch)

## 2-2. Influence mechanism analysis

### 2-2-1. Net interest income

P2P Internet lending mainly affects the loan business. The loan conditions of commercial banks are strict, therefore many individuals and micro and small enterprises which can't meet the conditions can't get loan from banks. Nevertheless, P2P Internet lending condition is low, the financing transaction parties can directly connect, and the loan amount and repayment term can be freely negotiated. Moreover, P2P Internet lending company approval process is more flexible and simple. Therefore, it has attracted some enterprises who can not meet the conditions to borrow.

Hence, it has become a popular financial management platform recently. In the current market downturn, some investors turn to invest in P2P, which to some extent affects the banks' deposit business.

**Table 3**. The Characteristics of P2P Wealth Management & Bank Wealth Management

| Characteristic | P2P wealth management | Bank wealth management |
|---|---|---|
| Threshold | 100-1000RMB | 50000RMB |
| Annual interest rate | 10% or higher | 3%-6% |
| Risk Level | High risk | Low risk |
| Client type | Risk seeker | Sound investor |

(Table 3: The table illustrates the characteristics of P2P wealth management & Bank wealth management**.** Data retrieved from P2PEYE.COM)

### 2-2-2. The intermediary business

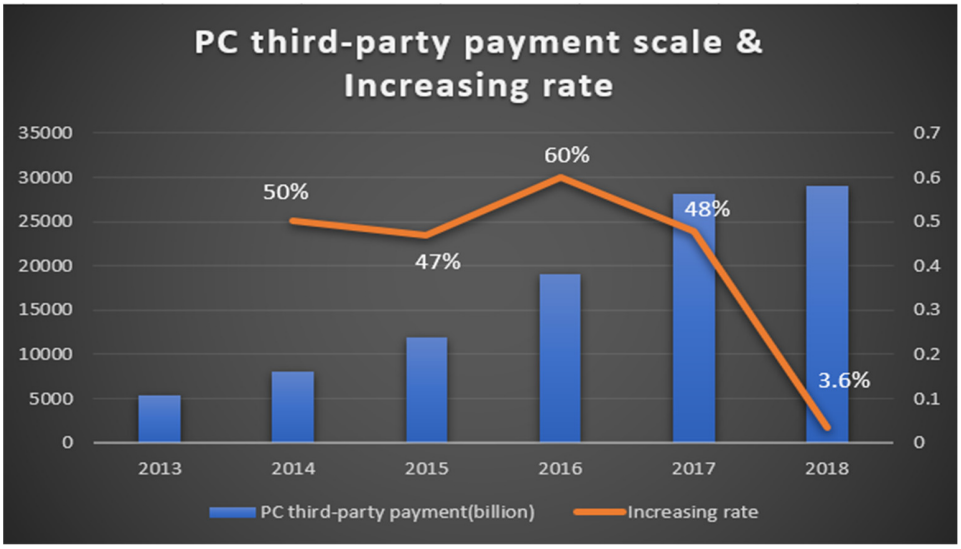
However, from the Table 3, P2P Internet lending and banks are different from each other in terms of investors, hence the influence on banks' intermediary field is limited.

## 3. Third-party payment

### 3-1. The development of third-party payment

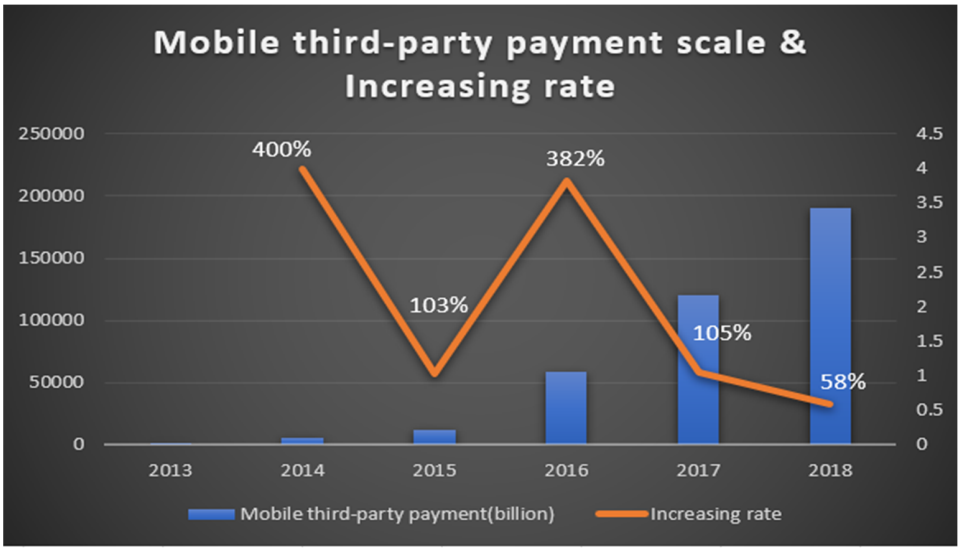
The People's Bank of China defines that third-party payment is a non-financial intermediary that provides money transfer service. Basically, the money transfer service includes PC third-party payment, mobile third-party payment, fixed-line telephone payment, prepaid card issuance & acceptance, bank card receipt and digital TV payment service. Among them, Internet Finance primarily relates to PC third-party payment and mobile third-party payment. Their representative platforms contain "Alipay", "WeChat payment", "Tenpay", "Lakala payment" and "99Bill". These kind of payment methods are not limited by the payment terminal, and have various and cheap payment and transfer alternatives. Based on iResearch, the scale of PC third-party payment has risen from 5,373 billion RMB in 2013 to 29,100 billion RMB in 2018. Additionally, mobile third-party payment reveals a leap forward growth. Since 2013, the number of transactions has increased by more than twice each year. By the end of 2018, it has reached 190,500 billion RMB, about 6.5 times of the PC third-party payment, as shown in Figure 8 and Figure 9.

**Figure 8**. PC Third-party Payment Scale & Increasing Rate




(Figure 8: The graph illustrates PC third-party payment scale & Increasing rate between 2013 and 2018. Data retrieved from iResearch)

**Figure 9**. Mobile Third-party Payment Scale & Increasing Rate




(Figure 9: The graph illustrates mobile third-party payment scale & Increasing rate between 2013 and 2018. Data retrieved from iResearch)

## 3-2. Influence mechanism analysis

### 3-2-1. Net interest income

Taking Alipay as an example, money will not be directly and immediately transferred to the seller after consumers spend money on Taobao. Instead, it will be staying in Alipay's account for around 7 days, which means Alipay would receive millions of customer provisions each day. And within this 7 days, Alipay can deposit those unpaid customer provisions into banks in the form of short-term fixed deposit or current deposit, so as to obtain huge interest income. Moreover, due to habits and convenient reasons, people will put some fund on the third-party payment account for daily small transaction. Taking Alipay's sedimentation deposit as an example, data shows that the average daily precipitation of Alipay has reached 10 billion in recent years (Dong, 2019). By 2018, the capital scale of Yu'ebao reached 1.9 trillion RMB, which exceeded the total current deposit of many banks, like China Merchants Bank, Bank of Communications & Everbright Bank. Hence, it increases interest expense, meanwhile, it diverts part of the deposit of banks, reducing the interest income eventually.

### 3-2-2. The intermediary business

The intermediary business of a commercial bank means the income obtained by handling the collection and payment settlement business for the client, completing the client's principal-agent business and providing various possible financial services. It mainly

includes: service fee and commission income, consulting business income, bank card fee income and handling transfer and settlement business, etc (Dong, 2019).

The third-party payment becomes very convenient in those fields. The two giants, Alipay and WeChat Pay, provide payment, settlement, cash withdrawal and other payment business, which is convenient, fast, and cheap. Taking customers' online consumption or payment as an example, the bank payment accepted by each e-commerce is different, and it can not cover all commercial banks, which requires customers to install U shield and mobile App of different banks, which is very complicated and inconvenient. However, if the customer bind the bank card with Alipay, they can directly use Alipay to pay, which significantly simplifies the payment process (Jin, 2017). Furthermore, Alipay supports interbank transfer within 2 hours to arrive, the actual situation generally only take 5 minutes. Also, users can pay water, electricity, gas, and mobile phone bill by Alipay or Wechat Pay. Eventually, they divert customers and seize the market share of the banking industry in those field.

Nevertheless, third-party payment still depends on commercial banks to a certain extent since the huge numbers of third-party payment users bind their bank cards on it, which means they still use bank cards for consumption payment. What's more, in Table 4 , third party payment is largely for small batch transfer. For instance, the Alipay mobile phone payment only provides 20,000 RMB transfer limit a day, and PC terminal also provides only 50,000 RMB limit. For large amount of payment system business, domestic & foreign currency payment system business are less involved. Hence, commercial banks and third-party payment are more cooperative in intermediary field.

**Table 4**. Comparison of the Transfer Fee of ICBC & Alipay through Different Terminal

| | **ICBC** | **Alipay** |
|---|---|---|
| Mobile phone transfer | No service charge for any banks | To Alipay account: No service charge<br>To bank account:: No service fee under 20000RMB per day, 0.1% charge if over 20000 RMB |
| PC transfer | Intra-bank transfer: No service charge<br>Inter-bank transfer:<br>(1) under 5000RMB: No service charge<br>(2) 5000RMB-10000RMB: 5 RMB/per transaction<br>(3) 10000RMB-50000RMB: 7.5RMB/per transaction<br>(4)over 50000RMB: 0.015% charge, maximum charge: 25RMB/per transaction | To Alipay account: 0.1% charge, maximum 50000RMB transfer |

(Table 4: The table illustrates the service charge of Industrial and Commercial Bank of China & Alipay via Mobile phone and PC. Data retrieved from ICBC and Alipay official website)

# IV. Methodology

## 1. Hypothesis

Based on the previous analysis, the following research hypotheses are proposed:

Hypothesis 1: Internet monetary fund, P2P internet lending, and third-party payment negatively and significantly influence the net interest income of commercial banks in China.

Hypothesis 2: The influences of Internet monetary fund and P2P internet lending on non-interest income of commercial banks in China are limited.

Hypothesis 3: Third-party payment and commercial banks are more cooperative in payment and settlement business in China.

Hypothesis 4: The influence extent of Internet monetary fund, P2P internet lending, and third-party payment on joint-equity banks and state-owned banks are different.

## 2. Data Selection

The data includes three categories. The first classification is the three main Internet Finance variables, covering the period from 2013 to 2018. This categorical data is obtained from iResearch. Then the bank-specific variables belong to the second category, which is collected from the Annual Report of 30 listed commercial banks in China between 2013 and 2018. The third one is macro factor variables, and those variables are obtained from Wind. The commercial banks include 30 listed banks operating in China within 2013 to 2018, of which 5 are state-owned banks, 25 are joint-equity banks.

## 2-1. Dependent Variables

This paper chose the ratio of Net Interest Income to Interest Bearing Assets (NIM) (HO & Saunders, 1981) and the ratio of Non-Interest Income to Total Assets (NIIR) (DeYoung & Rice, 2004) as the dependent variables, respectively. On the one hand, the Net Interest Income is still considered as the primary source of bank profit. The net interest margin level of commercial banks has been regarded. On the other hand, The importance of promoting intermediary business has been stressed recently. The increase of Non-Interest Income can accelerate the innovation of commercial banks. Meanwhile, it has small binding force on the use of fund, small financial exchange risk, and weak impact by the economic cycle, relatively. Therefore, it acts an unignorable role in the sustainability of banks' profits (Wang, 2017).

## 2-2. Explanatory variables

### 2-2-1. Determinants of Internet Finance

According to the Research Report of Internet Financial Index of Peking University and the previous analysis, this paper selected Third-party Payment(TPP), Internet monetary fund(IF), and Peer to Peer internet lending(P2P), as the three main independent variables.

### 2-2-2. Bank-specific variables

Besides TPP, IF and P2P, it's also necessary to find other determinants of NIM and NIIR.

**Assets**: Berger (1987) finds that the increasing size of banks can save cost. Zarruck (1989) concludes the net interest margin of bank has a positive relationship with the amount of capital in bank. However, some recent empirical studies show that opposite view. For example, Demirguc-Kunt et al. (2004) analyze 72 European countries banking industry, which suggests a negative correlation between asset size and NIM. As for NIIR, based on Pelton (1960) study in the 1508 American banks during 1988-2008, finding that the asset size positively contributed to NIIR, which are also proved by DeYoung and Hunter (2002).

**Operating cost ratio(OPC)**: It reflects the proportion of operating cost on total asset. Maudos & Guevara (2004) conclude that the net interest margin will be reduced by 43% as the average operating cost is reduced by 10% from the analysis of banking field in 4 countries during 1993-2000. Similarly, Han & Wang (2017) also prove that the operating cost possesses a positive correlation with NIM in Chinese banking sector. In the case of NIIR, Davis and Tuori (1998) conclude that less cost-effective like small banks with higher operating cost have a higher propensity to expand the revenue sources by expanding their intermediary business.

**Loan-deposit ratio(LD)**: The study from Li & Chen (2017) suggests that larger banks incline to have a high LD ratio on the purpose of pursuing more profit, which in turn

motivate them to enhance their intermediary business to diversify the shocks causing by high loan. From the aspect of NIM, Han & Wang (2017) discover that the smaller LD the bank has, the lower liquidity risk the bank faces. Meanwhile, the opportunity cost for banks to hold these more liquid asset will become larger, which would cause banks to set a higher interest margin to cover those opportunity cost. Therefore, the higher the LD is, the lower NIM is.

**Capital adequacy ratio(CAR)**: Angbazo (1997) uses Call report data from the Federal Reserve to study 286 banks of different scales from 1989 to 1993, summarizing that NIM positively correlated with CAR. Likewise, Saunders & Schumacher (2000) find capital adequacy ratio correlated with NIM positively. According to the analysis of Wang (2017), if commercial banks want to obtain larger output, they need to have sufficient capital. The greater the risk is, the higher the bank's profit level will be. The higher percentage of non-interest income is, the stronger its profitability will have. Therefore, CAR is positively correlated with NIIR as well.

**Non-performing loan ratio(NPL)**: NIM was found positively correlated with it in Money-center Bank, Super-regional Bank, Regional-bank, and Local bank (Angbazo, 1997). Li and Chen (2017) conclude that banks have the propensity to promote their non-interest income business to offset the high liquidity risk through the study of 16 commercial banks in China from the first quarter of 2013 to the second quarter of 2016.

### 2-2-3. Macroeconomic environment

**GDP growth rate(GGDP)**: With the continuous improvement of living standards, people tend to spend more money on investment and consumption, which reduces the source of savings in banks, thus reducing NIM, therefore Zhang (2007) concludes that with every unit of GDP growth, NIM will decrease by 0.0001. For NIIR, no correlation was found through the analysis of Abdelaziz et al. (2012)

**CPI**: Boyd et al. (2001) deem strong negative correlation between inflation and bank lending, which eventually damage NIM. Using the data of 94 Chinese banks between 2011 and 2015, Zhao & Liu (2018) find that CPI poses positively on NIIR as the business volume, service charge and commission of commercial banks, and the income level of investment business will continue to grow with the improvement of economic development level and the rise of inflation rate.

## 3. Data description

**Table 5**. Descriptive Statistics of All Banks

| **All banks** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Variable | Definition | Obs | Mean | Std.Dev | Min | Max |
| **Dependent Variables** | NIM(%) | Net interest income/Interest bearing assets | 174 | 2.2804 | 0.4836 | 1.32 | 3.93 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | NIIR(%) | Non-interest income/Total Assets | 174 | 20.9458 | 10.1913 | 3.5829 | 51.09 |
| **Independent Variables** | LNIF | The natural logarithm of Interent monetary fund | 174 | 10.4298 | 0.8123 | 8.9226 | 11.3083 |
| | LNP2P | The natural logarithm of peer to peer lending | 174 | 9.0379 | 1.1604 | 6.9641 | 10.2416 |
| | LNTPP | The natural logarithm of third-party payment | 174 | 12.9487 | 1.2761 | 11.0821 | 14.6021 |
| | LNASSETS | The natural logarithm of total assets | 174 | 9.4847 | 1.7667 | 6.4056 | 12.5317 |
| | LD(%) | Loan/Deposit | 174 | 71.3627 | 12.8023 | 38.9712 | 109.984 |
| | CAR(%) | Core capital/Risk weighted assets | 174 | 12.9193 | 1.4198 | 9.88 | 17.19 |
| | OPC(%) | Operating cost/total assets | 174 | 1.5352 | 0.3380 | 0.8224 | 2.6830 |
| | NPL(%) | Non-performing loan/total loan | 174 | 1.4005 | 0.4347 | 0.53 | 2.9 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | GGDP(%) | Growth of GDP | 174 | 7.1 | 0.3840 | 6.7 | 7.8 |
| | CPI | Consumer Price Index | 174 | 101.951 | 0.3830 | 101.4 | 102.6 |

(Table 5: The table illustrates the descriptive statistics of all variables**.** Data retrieved from Annual report of banks, iResearch and Wind)

Table 5 reveals the average proportion of NIIR is 20.9458%, in another words, the non-interest income makes up about 20.95% of the total assets of the bank. The minimum value 3.5829% is from Bank of Zhengzhou in 2013, and the maximum value 51.09% is from Minsheng Bank in 2018. The high value reveals that Minsheng Bank actively promotes the diversification of profit structure and accelerates business innovation in recent years. In addition, averagely speaking, net interest income accounts for 2.2804% of interest bearing assets. The minimum value is 1.32% from Everbright Bank in 2017, and the maximum value is 3.93% from Guiyang Bank in 2014. The three main independent variables are LNIF, LNP2P and LNTPP, with a mean of 10.4298, 9.0379 and 12.9487, respectively. The average GDP growth rate(GGDP) is 7.1%, which shows that China's economy is developing rapidly. The average level of CPI is 101.9505, with a maximum of 102.6 and a minimum of 101.4, indicating that China is experiencing relative moderate inflation.

**Table 6**. Descriptive Statistics by Bank Types

| **Types** | **State-owned banks (Obs.=30)** | | | | **Joint-equity banks (Obs.= 144)** | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | Mean | Std.Dev | Min | Max | Mean | Std.Dev | Min | Max |
| NIM(%) | 2.1854 | 0.3166 | 1.39 | 2.76 | 2.3002 | 0.5102 | 1.32 | 3.93 |
| NIIR(%) | 26.3611 | 5.4110 | 17.4648 | 38.4408 | 19.8176 | 10.5963 | 3.5829 | 51.09 |
| LNIF | 10.4298 | 0.8238 | 8.9226 | 11.3083 | 10.4298 | 0.8128 | 8.9226 | 11.3083 |
| LNP2P | 9.0379 | 1.1768 | 6.9641 | 10.2416 | 9.0379 | 1.1611 | 6.9641 | 10.2416 |
| LNTPP | 12.9487 | 1.2942 | 11.0821 | 14.6021 | 12.9487 | 1.2769 | 11.0821 | 14.6021 |
| LNASSETS | 11.9876 | 0.4223 | 10.9955 | 12.5317 | 8.9633 | 1.4669 | 6.4056 | 11.1192 |
| LD(%) | 75.1633 | 7.1430 | 61.1672 | 90.3976 | 70.5709 | 13.5747 | 38.9712 | 109.984 |
| CAR(%) | 14.1683 | 1.1422 | 11.86 | 17.19 | 12.6591 | 1.3337 | 9.88 | 16.6 |
| OPC(%) | 1.4701 | 0.1352 | 1.2495 | 1.8148 | 1.5488 | 0.3653 | 0.8224 | 2.683 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NPL(%) | 1.4543 | 0.3310 | 0.94 | 2.39 | 1.3893 | 0.4535 | 0.53 | 2.9 |
| GGDP(%) | 7.1 | 0.3895 | 6.7 | 7.8 | 7.1 | 0.3843 | 6.7 | 7.8 |
| CPI | 101.9505 | 0.3884 | 101.4 | 102.6 | 101.9505 | 0.3832 | 101.4 | 102.6 |

(Table 6: The table illustrates the descriptive statistics of all variables by banks**.** Data retrieved from Annual report of banks, iResearch and Wind)

Table 6 shows in general, the 5 state-owned banks have a better performance than joint-equity banks in China. However, the risk of state-owned banks ranks higher than join-equity banks when it comes to Non-performing loan (NPL).

## 4. Analytical Method

This thesis takes the natural logarithm of Internet monetary fund (LNIF), P2P internet lending(LNP2P), the third-party payment (LNTPP) as independent variables, takes net interest income/interest bearing assets (NIM), non-interest income/total assets (NIIR) as the key dependent variables, respectively. Micro-wise speaking, assets (LNASSETS), loan/deposit (LD), core capital/risk weighted assets (CAR), operating cost/total assets (OPC), non-performing loan/total loan (NPL), macro-wise speaking, the growth of GDP (GGDP), and CPI are chosen as control variables at the same time.

Based on the F test and the Hausman (1987) test. The test results tell that fixed effect model

is appropriate as P-value is less than 0.05. Panel data is used in this study as our data include time series observations (T) and a number of banks(I).

NIM=F(Internet montary fund / P2P internet lending / third-party payment, bank-specific variables, macroeconomic factors)

$NIMit= \alpha i + \beta 1 * LNIFt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

$NIMit= \alpha i + \beta 1 * LNP2Pt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

$NIMit= \alpha i + \beta 1 * LNTPPt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

NIIR=F(Internet monetary fund / P2P internet lending / third-party payment, bank-specific variables, macroeconomic factors).

$NIIRit= \alpha i + \beta 1 * LNIFt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

$NIIRit= \alpha i + \beta 1 * LNP2Pt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

$NIIRit= \alpha i + \beta 1 * LNTPPt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

where i= 1, 2, … N stands for different banks, t = 2013, 2014, … T stands for year. $\alpha i$ represents the individual differences of different banks, and $\varepsilon it$ represents the error term.

Among banking characteristics, LNASSETSit measures the size of banks. LDit reveals the

liquidity risk (Han & Wang, 2017). the capital adequacy and the asset quality & default risk are represented by CARit and NPLRit, respectively (Angbazo, 1997). OPCit reveals the operation efficiency.

Additionally, in order to investigate whether the Internet Monetary fund, P2P Internet lending and third-party payment affect differently across bank types, this paper also do the regressions separately according to the different bank types. With respect to the sample included, this 30 listed commercial banks can be separated into two groups, the 5 state-owned banks and 25 joint-equity banks.

# V. Results and Discussions

Firstly, this section shows the empirical results to explore the determinant factors of banks' NIM and NIIR, especially the effect of Internet monetary fund (IF), P2P Internet lending (P2P) and third-party payment(TPP) on NIM and NIIR. Then, the exploration of whether the effects on NIM and NIIR are different in different types of bank.

## 1. Results

### 1-1. NIM & NIIR

**Table 7.** NIM and IF & P2P & TPP

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIM** | **NIM** | **NIM** |
| LNIF | -0.176** | | |
| | (0.0840) | | |
| LNP2P | | -0.144** | |
| | | (0.0567) | |
| LNTPP | | | -0.116*** |
| | | | (0.0409) |
| LNASSETS | -0.624*** | -0.675*** | -0.547*** |
| | (0.132) | (0.119) | (0.136) |
| LD | 0.00299 | 0.000842 | 0.00374 |
| | (0.00271) | (0.00248) | (0.00268) |
| CAR | 0.00180 | -0.00852 | 0.00449 |

| | | | |
|---|---|---|---|
| | (0.0186) | (0.0181) | (0.0184) |
| OPC | 0.691*** | 0.594*** | 0.637*** |
| | (0.0867) | (0.0957) | (0.0884) |
| NPL | -0.365*** | -0.305*** | -0.341*** |
| | (0.0639) | (0.0668) | (0.0634) |
| GGDP | -0.219 | -0.297* | -0.203 |
| | (0.148) | (0.156) | (0.125) |
| CPI | -0.117** | -0.143** | -0.0157 |
| | (0.0524) | (0.0551) | (0.0501) |
| Constant | 22.71*** | 26.23*** | 11.19** |
| | (5.701) | (6.175) | (4.928) |
| Observations | 174 | 174 | 174 |
| R-squared | 0.788 | 0.791 | 0.794 |
| Number of Number | 29 | 29 | 29 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 7: The table illustrates correlation between NIM and each variable. Data retrieved from Annual report of banks, iResearch and Wind)

**Table 8.** NIIR and IF & P2P & TPP

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIIR** | **NIIR** | **NIIR** |
| LNIF | 2.951 | | |
| | (2.046) | | |
| LNP2P | | 1.101 | |

| | | | |
|---|---|---|---|
| | | (1.397) | |
| LNTPP | | | 1.710* |
| | | | (1.006) |
| LNASSETS | 9.131*** | 10.76*** | 8.275** |
| | (3.215) | (2.935) | (3.347) |
| LD | 0.0840 | 0.121** | 0.0776 |
| | (0.0660) | (0.0610) | (0.0658) |
| CAR | 0.511 | 0.665 | 0.489 |
| | (0.453) | (0.446) | (0.452) |
| OPC | 4.001* | 4.648* | 4.766** |
| | (2.112) | (2.361) | (2.174) |
| NPL | 4.112*** | 3.608** | 3.749** |
| | (1.566) | (1.647) | (1.558) |
| GGDP | 2.897 | 1.458 | 2.204 |
| | (3.602) | (3.847) | (3.075) |
| CPI | 3.492*** | 3.255** | 1.906 |
| | (1.275) | (1.359) | (1.232) |
| Constant | -497.5*** | -462.6*** | -314.1** |
| | (138.8) | (152.3) | (121.2) |
| Observations | 174 | 174 | 174 |
| R-squared | 0.599 | 0.595 | 0.601 |
| Number of Number | 29 | 29 | 29 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 8: The table illustrates correlation between NIIR and each variable. Data retrieved from Annual report of banks, iResearch and Wind)

## 1-2. NIM & NIIR in different bank groups

**Table 9.** NIM and IF & P2P & TPP : Differences in Bank Groups

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIM** | **NIM** | **NIM** |
| LNIF | -0.121 | | |
| | (0.133) | | |
| LNP2P | | -0.192* | |
| | | (0.1) | |
| LNTPP | | | -0.0849 |
| | | | (0.0599) |
| LNASSETS | 0.00539 | 0.0895 | 0.026 |
| | (0.172) | (0.167) | (0.168) |
| LD | -0.0193 | -0.0154 | -0.0188 |
| | (0.0122) | (0.0116) | (0.0118) |
| CAR | 0.110* | 0.0815 | 0.105* |
| | (0.0569) | (0.0545) | (0.0551) |
| OPC | 0.782*** | 0.639** | 0.717** |
| | (0.324) | (0.317) | (0.321) |
| NPL | -0.00356 | 0.0567 | -0.000739 |
| | (0.189) | (0178) | (0.183) |
| GGDP | 0.318 | 0.0924 | 0.272 |
| | (0.317) | (0.299) | (0.27) |
| CPI | -0.0775 | -0.147 | -0.00288 |
| | (0.109) | (0.111) | (0.108) |
| Constant | 7.771 | 16.14 | 0.214 |
| | (14.11) | (13.99) | (12.42) |
| Observations | 30 | 30 | 30 |
| R-squared | 0.795 | 0.814 | 0.804 |
| Number of Number | 5 | 5 | 5 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 9: The table illustrates correlation between NIM and each variable in state-owned banks in China. Data retrieved from Annual report of banks, iResearch, and Wind)

**Table 10.** NIM and IF & P2P & TPP in Joint-equity Banks

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIM** | **NIM** | **NIM** |
| LNIF | -0.311*** | | |
| | (0.0837) | | |
| LNP2P | | -0.187*** | |
| | | (0.0638) | |
| LNTPP | | | -0.172*** |
| | | | (0.0391) |
| LNASSETS | -0.227*** | -0.225*** | -0.217*** |
| | (0.0397) | (0.0404) | (0.0395) |
| LD | 0.00439* | 0.00135 | 0.00454* |
| | (0.00253) | (0.00248) | (0.00246) |
| CAR | -0.000460 | -0.0132 | 0.00327 |
| | (0.0197) | (0.0198) | (0.0194) |
| OPC | 0.755*** | 0.691*** | 0.680*** |
| | (0.0839) | (0.0948) | (0.0868) |
| NPL | -0.367*** | -0.297*** | -0.335*** |
| | (0.0680) | (0.0729) | (0.0670) |
| GGDP | -0.166 | -0.0654 | -0.128 |
| | (0.167) | (0.174) | (0.138) |
| CPI | -0.180*** | -0.200*** | -0.00943 |
| | (0.0558) | (0.0613) | (0.0575) |
| Constant | 26.15*** | 26.32*** | 7.403 |
| | (6.402) | (7.109) | (5.343) |
| Observations | 144 | 144 | 174 |
| R-squared | 0.790 | 0.777 | 0.798 |
| Number of Number | 24 | 24 | 24 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 10: The table illustrates correlation between NIM and each variable in joint-equity banks in China. Data retrieved from Annual report of banks, iResearch and Wind)

**Table 11.** NIIR and IF & P2P & TPP in State-owned Banks

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIIR** | **NIIR** | **NIIR** |
| LNIF | -5.495** | | |
| | (2.691) | | |
| LNP2P | | -2.774 | |
| | | (2.282) | |
| LNTPP | | | -2.732** |
| | | | (1.224) |
| LNASSETS | 12.56*** | 13.82*** | 13.24*** |
| | (3.472) | (3.803) | (3.428) |
| LD | 1.018*** | 1.094*** | 1.043*** |
| | (0.246) | (0.263) | (0.242) |
| CAR | -3.566*** | -4.166*** | -3.814*** |
| | (1.152) | (1.240) | (1.127) |
| OPC | 1.110 | 0.361 | -0.429 |
| | (6.549) | (7.206) | (6.566) |
| NPL | -4.622 | -3.126 | -4.265 |
| | (3.824) | (4.046) | (3.746) |
| GGDP | -16.32** | -12.43* | -14.77*** |
| | (6.424) | (6.799) | (5.520) |
| CPI | 0.819 | 0.626 | 3.566 |
| | (2.205) | (2.522) | (2.207) |
| Constant | -55.44 | -109.1 | -373.2 |
| | (285.6) | (318.6) | (254.0) |
| Observations | 30 | 30 | 30 |
| R-squared | 0.557 | 0.515 | 0.569 |
| Number of Number | 5 | 5 | 5 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 11: The table illustrates correlation between NIIR and each variable in state-owned banks in China. Data retrieved from Annual report of banks, iResearch and Wind)

**Table 12.** NIIR and IF & P2P & TPP in Joint-equity Banks

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIIR** | **NIIR** | **NIIR** |
| LNIF | 5.159*** | | |
| | (1.953) | | |
| LNP2P | | 1.573 | |
| | | (1.474) | |
| LNTPP | | | 2.558*** |
| | | | (0.915) |
| LNASSETS | 5.570*** | 5.554*** | 5.483*** |
| | (0.656) | (0.666) | (0.657) |
| LD | 0.0342 | 0.0719 | 0.0370 |
| | (0.0539) | (0.0534) | (0.0534) |
| CAR | 0.851* | 1.060** | 0.814* |
| | (0.451) | (0.453) | (0.451) |
| OPC | 3.740** | 3.705* | 4.546** |
| | (1.758) | (1.939) | (1.829) |
| NPL | 2.452 | 1.820 | 2.027 |
| | (1.524) | (1.620) | (1.524) |
| GGDP | 3.104 | -2.490 | 1.631 |
| | (3.945) | (4.038) | (3.296) |
| CPI | 4.219*** | 3.932*** | 1.550 |
| | (1.302) | (1.430) | (1.387) |
| Constant | -558.5*** | -454.1*** | -254.8** |
| | (149.0) | (165.0) | (128.2) |
| Observations | 144 | 144 | 144 |
| R-squared | 0.629 | 0.609 | 0.631 |
| Number of Number | 24 | 24 | 24 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 12: The table illustrates correlation between NIIR and each variable in joint-equity banks in China. Data retrieved from Annual report of banks, iResearch and Wind)

# 2. Discussions

## 2-1. NIM & NIIR

According to the results from Table 7, R-squared of the three models are 0.788, 0.791 and 0.794, respectively, indicating that the models have a goodness of fit.

In the first place, the growth of the explanatory variable IF negatively affect NIM, and passes the significance test with a confidence level of 5%, which reveals that IF negatively and significantly affect NIM. To be specific, NIM decreases by 0.176 % for every 1% increase of IF. Similarly, P2P presents the significantly (5%) negative influence on NIM. For every 1% increase in TPP, NIM drops by 0.144%. Moreover, TPP also significantly (1%) damage on the NIM through the decreasing by 0.116% with every increase of 1%.

The reason is that TPP and IF both raise the cost of deposit of commercial banks, they are diverting the current deposit. At the same time, TPP, relying on online shopping website, deposit a huge amount of customer provisions into the bank in current or fixed deposit, thus increasing interest expenditure. Likewise, P2P Internet lending reduces the bank's net interest income through competing with the bank's loan business.

Among banking factors, OPC contributes to NIM positively and significantly, which in line with the research results from Maudos & Guevara (2004). Moreover, the empirical study results present a negative and significant effect of Assets, NPL and CPI on NIM.

From Table 8, R-squared of the three models are 0.599, 0.595 and 0.601, respectively, demonstrating that the models have a goodness of fit as well.

Firstly, the growth of the explanatory variable IF positively affects NIIR, but has not passed

the significance test, which reveals that IF has a positive and but insignificant effect on NIIR. Detailly, NIIR increased by 2.951% for every 1% increase in IF. Similarly, the growth of the explanatory variable P2P contributes NIIR positively, but has not passed the significance test, which shows that TPP is positively but insignificantly contributed to NIIR. To be specific, NIIR increased by 1.101% with every 1% increase in P2P,. What's more, the independent variable TPP presents a positive influence on NIIR, and also has passed the significance test with 10%.

TPP has significantly and positively affect NIIR. The cooperative effect of TPP and commercial banks is mainly reflected in payment & settlement. Commercial banks are opening the settlement channels for TPP , while TPP expands intermediary business for banks, bringing more intermediary business for banks, which eventually promotes the non-interest income of commercial banks. What's more, as the liberalization of interest rate recently, increasing amount of Chinese commercial banks have begun to vigorously promote intermediary business, the impact of Internet monetary fund and P2P Internet lending on their non-interest income is limited.

For banking specific characteristics, Assets, OPC and NPL all exert significantly and positively effect on NIIR. This result show that the banks with larger assets have a higher propensity to realize economies of scale and then gain more NIIR (DeYoung & Hunter, 2002). The banks own high NPL have to diversify their business, for instance, expand the intermediary business, for the purpose of offsetting the bad debt risk, which in line with the study by (Li & Chen, 2017).

For the macro determinants, CPI presents the significantly and positively influence on NIIR,

which was proven by Zhao & Liu (2018). However, the growth of GDP does not show the significant effect.

## 2-2. NIM & NIIR in different bank groups

Based on the regression results of different banks, the three main variables have a weaker negative influence on NIM of state-owned banks than joint-equity banks as a whole. Moreover, they produce negatively on NIIR of state-owned banks, but a positively on NIIR of joint-equity banks.

The underlying reasons firstly, thanks to the large scale of assets, the wide range of clients and the support of government, the deposit and loan field of state-owned banks are more prominent than joint-equity banks, the shocked from Internet Finance is limited. But at the same time, since the limited impact and comprehensive management structure, it lacks the propensity to expand its non-interest income business, the shock to intermediary business is considerable.

Secondly, for joint-equity banks, the positive influence on their non-interest income is more comprehensive. As the corporate governance structure of joint-stock banks is relatively simple, and at the same time, they actively innovate and pay concentration on the development of their intermediary business, the better user experience and service have been attracting more and more young and middle aged-group, which are the main user groups in transaction and consumption (Xia & Chunsom, 2018), so that their non-interest income business is in the forefront of development in banking industry. Additionally, joint-

equity banks can actively integrate and innovate with Internet Finance, and rapidly improve non-interest income business through Internet Finance. According to Xiao & Deng, the growth of non-interest income has exceeded the growth of net interest income from 2008 to 2016. Among them, the non-interest income of state-owned banks increased by about two times, and that of joint-equity banks by six times. In terms of the intermediary business involved, joint-equity banks are also the most extensive one.

# VI. Conclusion and Implication

## 1. Conclusion

Based on the panel data of 30 listed commercial banks in China between 2013 and 2018, this thesis analyzes the influence of the three major models of Internet Finance on the net interest and non-interest income of banks.

The results reveal that: firstly, IF, P2P and TPP all negatively and significantly affect the NIM of commercial banks. Secondly, TPP acts a positive and significant role in NIIR of commercial banks, while IF and P2P Internet lending leave a positive but insignificant impact. The cooperative relationship between TPP and banks are more apparent. Commercial banks are opening the settlement channels for third-party payment, whereas third-party payment expands intermediary business for banks through network, bringing more intermediary business for banks, which eventually promotes the non-interest income of commercial banks. Furthermore, increasing number of banks have begun to vigorously develop their intermediary business as the interest rate liberalization, the impacts of IF and P2P Internet lending on their non-interest income are limited.

Thirdly, Internet Finance has a significant heterogeneous impact on the profitability of different banks. From the view about the negative influence on interest income of different commercial banks, IF, P2P Internet lending, and TPP contribute more on the joint-equity banks than the state-owned banks, which is mainly due to the support from the government to the state-owned banks. From the view of the impact on non-interest income of banks, IF, P2P Internet lending, and TPP leave a positive effect on joint-equity banks, but damage on

the non-interest income of state-owned banks. Joint-equity bank's increasing innovation and using the network to improve the intermediate service in the recent years.

## 2. Implication

There's not a simple competitive relationship between Internet Finance and traditional banks, instead, there's a great space for integration between them. (Liu, 2013)

First of all, commercial banks can learn from Internet Financial enterprises and develop Internet information technology to deeply dig customer groups, develop their own characteristic products and improve the overall operating efficiency.

Secondly, the government should actively encourage the communication and cooperation between them. Compared with commercial banks, Internet Financial enterprises have relatively high information technology capabilities, which can promote the absorption of technology spillover effects by commercial banks (Zhao & Liu, 2018). At the same time, banks can use their own advantages in network and credit to attract more customers for e-commerce (Shen & Zhao, 2017).

Last but not the least, the government and other regulatory agencies should regulate the development of Internet financial enterprises, incorporate them into standardized development, and pay attention to prevent all kinds of risks brought by Internet Finance. As for the overall risk level, regulators should pay close concentration on the changes of relevant risk indicators so as to avoid financial crisis (Zhao & Liu, 2018).

# VII. Limitations

Firstly, there may be a deviation between the current research conclusions and the actual impact results in the future as the fast development. This paper only expounds and verifies Internet Finance and listed banks from 2013 to 2018, but with the progress and change of Internet Finance and banks in the future, the accuracy of the research results of this thesis could be reduced.

Secondly, due to the limited development time and the different calculation methods of data from different institutions, the empirical analysis results will also be affected to some extent.

# References

Allen, J., & Mcandrews, J., & Strahan, P. (2002). E-finance: An Introduction. Journal of financial Services Research, 2002(22), 5-27

Financial stability analysis group of the people's Bank of China. "2014 China Financial Stability Report". Retrieved from http://www.financialnews.com.cn/jrts/xstj/201407/t20140707_58885.html

Jin, Y. H. (2017). Research on the influence of Internet Financial Development on traditional commercial banks. *Theory Monthly,* 2017(4), 168-182

Dong, Q. (2019). The influence of Internet Finance on commercial banks and Its Countermeasures. *China Economic & Trade Herald*, 2019(7), 43-44.

Peng, Y. (2014). "Study on the Effect of Internet Finance on Commercial Banks' Profits in China*"*. (Master's thesis, Xiamen University)

Lin, L. H., & Geng, X. J., & Whinston, A. (2002). A new perspective to finance and competition and challenges for financial institutions in the internet era. *BIS,* 2002(7), 13-25

Berger, S. C., & Fabian, G. (2009). Emergence of Financial Intermediaries in Electronic Markets: The Case of Online P2P Lending. *BuR-Business Research*, 2009, 2(1), 39-65

Fu, J. P. (2012). The influence of third party payment on the development of online banking. *Financial Theory & Practice*, 2012(10), 116-118

Qiu, X. (2013). Internet Based Fund: Challenges and Enlightenments to Commercial Banks- A Case Study of YueBao. *Journal of Shanghai Finance University,* 2013(4), 75-83

Geng, P. J. (2014). "Internet Financial research on the influence of the commercial banks in China". (Master's thesis, Henan University)

Zhang, H. Y. (2016). An analysis of the way of seeking innovation in the business of selling funds on behalf of commercial banks. *Financial Insights,* 2016(2), 105-106

Zhang, Z. W. (2019). "The influence of Internet Finance on the Business of China's Commercial Banks and its Countermeasures". (Master's thesis, Anhui University)

Ho S.Y., & Saunders A. (1981). The determinants of bank interest margins: theory and empirical evidence. *Journal of Financial and Quantitative Analysis,* 1981, 16(4), 581-600

DeYoung, R., Rice, T. N. (2004). Noninterest income and Financial Performance at U.S. Commercial Banks. *Financial Review,* 2004, 39(1), 101-127

Wang, X. Y. (2017). "Study on the effect of Internet finance on profitability of commercial banks". (Master's thesis, Beijing Jiaotong University)

Zarruck E. R. (1989). Bank margin with uncertain deposit level and risk aversion. *Banking and Finance*, 1989, 13(6), 797-810

Asli Demirguc-Kunt., & Luc Laeven., & Ross Levine. (2004). Regulations, Market Structure, Institutions, and the Cost of Financial Intermediation. *Journal of Money, Credit and Banking,* 2004, 36(3), 593-622

Pelton, W. J. (1960). The determinant of banks' non-interest income. *American Journal of Public Health and the Nations Health,* 1960, 50(1), 21

DeYoung, R., & Hunter, W.C. (2002). Deregulation, the Internet, and the Competitive Viability of Large Banks and Community Banks. *THE FUTURE OF BANKING,* 312-322

Maudos J., & Klein M.A. (2004). Factors explaining the interest margin in the banking sectors of the European union. *Banking and Finance*, 2004, 28(9), 2259-2281

Han, Z. G, & Wang, Y, J. (2017). Factors Affecting Commercial Bank Spreads Under Interest Rate Liberalization. *Journal of Capital University of Economics and Business,* 2017, 19(1), 18-24

Davis, E. P., & Tuori, K. (1998). The Changing Structure of Banks' Income - an Empirical Investigation 1. *International Affairs*

Li, S. J., &., & Chen, Y. F. (2017). The impact of third-party Internet payment on the net interest margin of commercial banks. *Journal of Shandong Technology and Business University*, 2017, 31(5), 94-100

Angbazo L. (1997). Commercial bank net interest margins, default risk, interest rate risk and off balance sheet banking. *Banking and Finance*, 1997, 21(1), 55-87

Saunders A., & Schumacher L. (2000). The determinants of bank interest rate margins: an international study. *Department of Finance Working Paper Series,* 2000, 19(6), 813-832

Zhang, L. H. (2007). An empirical study on the determinants of net interest margin of

commercial banks in China. *Shanghai Finance,* 2007(5), 21-25

Abdelaziz, H., Helmi, H., & Mouldi, D. (2012). Modelling Non-interest income at Tunisian Banks. *Asian Economic and Financial Review,* 2012, 2(1), 88-99

Boyd, J. H., Levine, R., & Smith, B.D. (2001). The impact of inflation on financial sector performance. *Journal of Monetray Economics,* 2001, 47(2), 221-248

Zhao, S. M., & Liu, X. T. (2018). Does Internet Finance Affect the Non-Interest Income of Commercial Banks? *Contemporary Finance & Economics,* 2018(2), 49-61

DeYoung, R., & Hunter, W.C. (2002). Deregulation, the Internet, and the Competitive Viability of Large Banks and Community Banks. *THE FUTURE OF BANKING,* 312-322

Xia, H., & Chunsom, N. (2018). Third-Party Payments Impact on Commercial Banks' Non-Interest Income: Evidence from China. *International Journal of Economics and Finance,* 2018, 10(8), 190-203

Liu, Z. B. (2013). Rethinking On the Second Wave of China's Economic Globalization Strategy. *Academic Monthly,* 2013, 45(1), 88-96

Shen, C., & Zhao, M. (2017). Research on the influence of Internet Finance on commercial banks' income - Based on the analysis of 101 commercial banks in China. *Modern Economic Research*, 2017(6), 32-55

# Appendix 1

Appendix 1. Correlation Matrix

| | NIM | LNIF | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIM** | 1.0000 | | | | | | | | |
| **LNIF** | -0.5119 | 1.0000 | | | | | | | |
| **LNASSETS** | -0.4528 | 0.1378 | 1.0000 | | | | | | |
| **LD** | -0.4395 | 0.2533 | 0.4529 | 1.0000 | | | | | |
| **CAR** | -0.0373 | 0.4176 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.3605 | 0.3605 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | -0.1557 | 0.4854 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | 0.4888 | -0.9674 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | 0.1922 | -0.6104 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIM | LNP2P | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIM** | 1.0000 | | | | | | | | |
| **LNP2P** | -0.5224 | 1.0000 | | | | | | | |
| **LNASSETS** | -0.4528 | 0.1348 | 1.0000 | | | | | | |
| **LD** | -0.4395 | 0.2091 | 0.4529 | 1.0000 | | | | | |
| **CAR** | -0.0373 | 0.3834 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.3605 | -0.0020 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | -0.1557 | 0.5091 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | 0.4888 | -0.9634 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | 0.1922 | -0.6563 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIM | LNTPP | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIM** | 1.0000 | | | | | | | | |
| **LNTPP** | -0.5587 | 1.0000 | | | | | | | |
| **LNASSETS** | -0.4528 | 0.1409 | 1.0000 | | | | | | |
| **LD** | -0.4395 | 0.2760 | 0.4529 | 1.0000 | | | | | |
| **CAR** | -0.0373 | 0.4033 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.3605 | -0.0494 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | -0.1557 | 0.4372 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | 0.4888 | -0.9160 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | 0.1922 | -0.3836 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIIR | LNIF | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIIR** | 1.0000 | | | | | | | | |
| **LNIF** | 0.4121 | 1.0000 | | | | | | | |
| **LNASSETS** | 0.7103 | 0.1378 | 1.0000 | | | | | | |
| **LD** | 0.5751 | 0.2533 | 0.4529 | 1.0000 | | | | | |
| **CAR** | 0.0245 | 0.4176 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.1126 | 0.3605 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | 0.1306 | 0.4854 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | -0.4026 | -0.9674 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | -0.1567 | -0.6104 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIIR | LNP2P | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIIR** | 1.0000 | | | | | | | | |
| **LNP2P** | 0.3887 | 1.0000 | | | | | | | |
| **LNASSETS** | 0.7103 | 0.1348 | 1.0000 | | | | | | |
| **LD** | 0.5751 | 0.2091 | 0.4529 | 1.0000 | | | | | |
| **CAR** | 0.0245 | 0.3834 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.1126 | -0.0020 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | 0.1306 | 0.5091 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | -0.4026 | -0.9634 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | -0.1567 | -0.6563 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIIR | LNTPP | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIIR** | 1.0000 | | | | | | | | |
| **LNTPP** | 0.4291 | 1.0000 | | | | | | | |
| **LNASSETS** | 0.7103 | 0.1409 | 1.0000 | | | | | | |
| **LD** | 0.5751 | 0.2760 | 0.4529 | 1.0000 | | | | | |
| **CAR** | 0.0245 | 0.4033 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.1126 | -0.0494 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | 0.1306 | 0.4372 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | -0.4026 | -0.9160 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | -0.1567 | -0.3836 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

Appendix 2. Abbreviation

ICBC: INDUSTRIAL AND COMMERCIAL BANK

ABC: AGRICULTURAL BANK OF CHINA

CCB: CHINA CONSTRUCTION BANK

BOC: BANK OF CHINA

BCM: BANK OF COMMUNICATIONS

CEB: CHINA EVERBRIGHT BANK

SPABANK: PING AN BANK

CCBK: CHINA CITIC BANK

# 국문초록

# 인터넷 금융이 중국 상업은행의 수익성에 미치는 영향에 관한 연구

성명: Du Yushan

학과 및 전공: 국제학과 국제통상전공

서울대학교 국제대학관

중국의 금리 자유화로 인해 상업 은행의 이자 수입 이익은 더 이상 지속할 수 없게 될 것이 분명하며, 이에 상업 은행들은 심각한 이윤창출의 딜레마에 빠지게 될 것이다. 알리페이와 차이푸퉁을 대표로 하는 인터넷 금융 플랫폼은 수년 동안 상업 은행에 의해 지배되던 전통적인 금융 생태계를 변화시켰다.

우선, 본 연구에서는 중국의 인터넷금융과 상업 은행의 현황에 대해 분석을 수행하고, 3 대 인터넷금융 모델이 상업 은행의 수익성에 미치는 영향 메커니즘을 순이자이익과 비이자이익의 관점에 입각하여 살펴보도록 한다. 그다음증식자산에서의 순이자이익 비율과 총자산에서의 비이자이익 비율을 각각 종속변수로 설정하고, 인터넷 통화기금, P2P 인터넷 대차, 제 3 자 결제 규모 등을 3 대 독립변수로 설정하였다. 본 연구에서는 중국에서 상장한 30 개

상업 은행의 2013~2018 년 자료를 기반으로 경험적 타당성 분석을 수행하였다.

경험적 타당성 분석에서 인터넷 통화기금, , P2P 인터넷 대차, 제 3 자 결제는 은행의 순이자이익에 부정적이고 현저한 영향을 미치는 것으로 나타났다. 이 중 제 3 자 결제가 상업 은행의 비이자이익에 긍정적이고 현저한 역할을 미치는 반면, 인터넷 통화기금과 P2P 인터넷 대차는 긍정적이지만 미미한 영향을 미치는 것으로 나타났다. 은행 소유권에 입각하여 인터넷 통화기금, P2P 인터넷 대차, 제 3 자 결제는 이자수익 측면에 있어 지분제 상업은행 국유은행보다 지분제 상업은행에 더 많이 손해를 끼치고 있는 것으로 나타났다. 비이자면에서 인터넷 통화기금, P2P 인터넷 대차, 제 3 자 결제는 지분제 상업은행에 긍정적인 영향을 주지만, 국유 은행에 피해를 주는 것으로 나타났다. 마지막으로 본 연구에서는 3 대 인터넷 금융 모델이 서로 다른 수익원과 유형의 상업 은행에 미치는 영향에 대해 분석을 수행하였고 상업 은행들에서 인터넷 금융의 도전에 대처하기 위한 대응책과 제안을 제시하였다.

**주요어**: 인터넷 금융, E-금융, 상업 은행, 이윤, 인터넷 통화기금, P2P 인터넷 대차, 제 3 자 결제

**학번**: 2018-22022

creative commons

COMMONS DEED

저작자표시-비영리-변경금지 2.0 대한민국

이용자는 아래의 조건을 따르는 경우에 한하여 자유롭게

- 이 저작물을 복제, 배포, 전송, 전시, 공연 및 방송할 수 있습니다.

다음과 같은 조건을 따라야 합니다:

저작자표시. 귀하는 원저작자를 표시하여야 합니다.

비영리. 귀하는 이 저작물을 영리 목적으로 이용할 수 없습니다.

변경금지. 귀하는 이 저작물을 개작, 변형 또는 가공할 수 없습니다.

- 귀하는, 이 저작물의 재이용이나 배포의 경우, 이 저작물에 적용된 이용허락조건을 명확하게 나타내어야 합니다.
- 저작권자로부터 별도의 허가를 받으면 이러한 조건들은 적용되지 않습니다.

**저작권법에 따른 이용자의 권리는 위의 내용에 의하여 영향을 받지 않습니다.**

이것은 이용허락규약(Legal Code)을 이해하기 쉽게 요약한 것입니다.

Disclaimer

dCollection

**Master's Thesis of International Studies**

# Study on the effect of Internet Finance on Profitability of Commercial Banks in China

인터넷 금융이 중국 상업은행의 수익성에
미치는 영향에 관한 연구

August 2020

Graduate School of International Studies

Seoul National University

International Commerce Major

Du Yushan

국제학석사 학위논문

# Study on the effect of Internet Finance on Profitability of Commercial Banks in China

## 인터넷 금융이 중국 상업은행의 수익성에 미치는 영향에 관한 연구

**2020** 년 **8** 월

서울대학교 국제대학원

국제학과 국제통상전공

Du Yushan

# Study on the effect of Internet Finance on Profitability of Commercial Banks in China

**Examiner Ahn Jaebin**

**Submitting a master's thesis of International Studies**

**August 2020**

**Graduate School of International Studies**

**Seoul National University**

**International Commerce Major**

**Du Yushan**

**Confirming the master's thesis written by Du Yushan**

**August 2020**

Chair MOON Woosik (Seal)

Vice Chair RHEE Yeongseop (Seal)

Examiner AHN Jaebin (Seal)

Copyright © 2020 by Du Yushan

All Rights Reserved

# Abstract

## Study on the effect of Internet Finance on Profitability of Commercial Banks in China

Du Yushan

International Commerce Major

Graduate School of International Studies

Seoul National University

Driven by the interest rate liberalization in China, the profit from interest income will certainly be unsustainable, commercial banks will be facing severe profit dilemma. The Internet financial platform such as Alipay and Caifutong have been changing the traditional financial ecosystem dominated by traditional commercial banks for several years.

Firstly, the current situation of Internet Finance and commercial banks in China will be analyzed, then discussion of influence mechanism of three major Internet Financial models about the profitability of commercial banks from the perspective of net interest income & non-interest income will be followed. Then, the proportion of net interest income on interest bearing assets and the proportion of non-interest income on total assets are selected as the dependent variables, respectively, and the scale of Internet monetary fund, P2P

Internet lending, and third-party payment are selected as three main independent variables, this thesis does an empirical test on the basis of the data from 2013-2018 of 30 listed commercial banks in China.

Empirical evidence shows that Internet monetary fund, P2P internet lending and third-party payment all negatively and significantly affect the net interest income of commercial banks. Third-party payment acts a positive and significant role in non-interest income of commercial banks, while Internet monetary fund and P2P internet lending have a positive but insignificant influence. From the perspective of bank ownership, Internet monetary fund, P2P Internet lending and third-party payment hurt more on the joint-equity banks than the state-owned banks when it comes to the net interest income, while Internet monetary fund, P2P interest lending and third-party payment contribute positively on joint-equity banks, but damage on the state-owned banks when it comes to non-interest income. Finally, this paper analyzes the influence results of the three Internet financial models on different profit sources and different types of commercial banks, puts forward the recommendations for commercial banks to manage the challenges and opportunity from Internet Finance.

**Keywords:** Internet Finance, E-finance, Commercial Banks, Profit, Internet monetary fund, P2P Internet lending, Third-party payment

**Student Number**: 2018-22022

# Table of Content

# List of figures and tables

# I. Introduction

## 1. Definition of Internet Finance

Internet Finance is a combination of Internet technology and financial functions. It is also known as E-finance. According to Allen et al.(2002), E-finance refers to the provision of financial services and markets using electronic communication and computation. People's Bank of China define the Internet Finance from two ways. In a broad way, Internet Finance includes not only the financial services offered by Internet enterprises as non-financial institutions, but the business of financial institutions by Internet. Narrowly speaking, Internet Finance only contains the financial services served by Internet companies through Internet technology Considering the research topic and the availability of relevant data, the Internet Finance will adopt the narrow definition in this thesis.

The advantages and disadvantages of the three main financial models are compared as shown in Table 1 (Jin, 2017). Internet Finance has the advantages including faster payment, lower financing cost, wider coverage, and more information symmetry.

**Table 1**. Comparison of Advantages and Disadvantages of Three Financial Models

| | **Capital Market** | **Bank** | **Internet Finance** |
|---|---|---|---|
| Advantages | 1.Low financing risk<br>2.Permanent financing<br>3. No interest payment | 1.Strong financial strength<br>2.Wide customer resources<br>3.Strong risk control ability | 1. Fast and convenient<br>2. Low financing cost<br>3. Wide coverage<br>4. Information symmetry |
| Disadvantages | 1. High financing cost<br>2. Long financing time span | 1. Harsh application conditions<br>2. Limited amount of fund for application | 1. Poor risk control<br>2. Immature Internet technology |

(Table 1: The table illustrates the advantages & disadvantages of Capital Market, Bank, and Internet Finance)

The main services that Internet Finance provides are online payment, online financing and online investment. Online payment means third-party payment institutions provide the on-line and off-line payment channels for users to do the business including online payment, fund clearing, or other business from users to the merchant. Online financing indicates the financing behavior completed through Internet intermediary institutions, which has three main forms: P2P, which is individuals borrow money from individuals, "small loan company + platform", which is the qualified small loan company provides loan to borrowers through e-commerce platform, the last one is crowdfunding mode, which is a

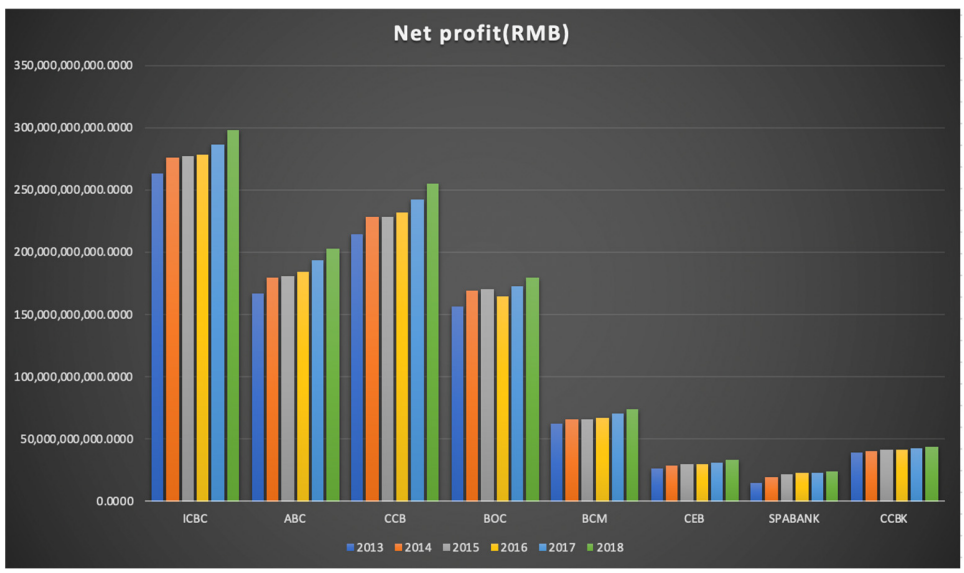
form of using the third party to provide financing platform, in which many network individual users gather small amount of fund to achieve financing purposes. Additionally, online investment is a new model of investment based on the Internet platform. One is to invest money on P2P and other financing platforms, the other is to purchase various Internet financial products (Dong, 2019)

## 2. Background

Before 2005, Internet Finance only involved in technology application in China. Then, with the occurrence of the third-party payment, Internet Finance began to take off in China. 2013 is the fastest growing year for Internet Finance industry. In June 2013, Yu'ebao, was jointly produced by Alipay and TianHong asset management. 50 million RMB monetary fund purchase was achieved in the first day. Likewise, Baidu financial management platform went online in June 2013. Just several hours later, more than 120,000 investors purchased its product "Baifa", with a selling more than 1 billion RMB (Peng, 2014). Although from the year of 2017 to 2018, due to the impact of macroeconomic downturn, liquidity shortage, and a series of regulatory policies for Internet Finance, Internet Finance has been hit to some extent, the trading volume of the top three products still reached 8.15 trillion RMB (Internet monetary fund), 1.79 trillion RMB (P2P Internet lending) and 219.6 trillion RMB (third-party payment), with an increase of 15%, - 36% and 48%, respectively. In just a few years, Internet Finance has rapidly seized the market share of commercial banks in settlement function, financing function and financial management, breaking traditional and stable business environment.

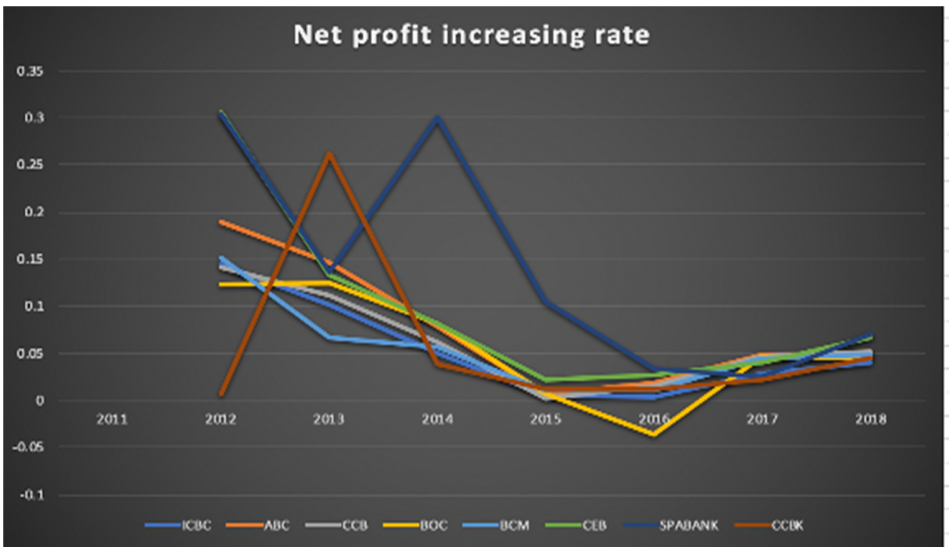
Looking back to performance of commercial banks in China, taking 5 state-owned banks and 3 joint-equity banks as examples, Figure 1 shows that the net profit growth of these banks in 2013-2018 have maintained a relatively stable level, the growth rates still show a trend of slowing down or even declining (Figure 2).

**Figure 1**. Net Profit




(Figure 1: The graph illustrates the growth of net profit of 5 state-owned banks & 3 joint-equity banks from 2013 to 2018. Data retrieved from Annual Report)

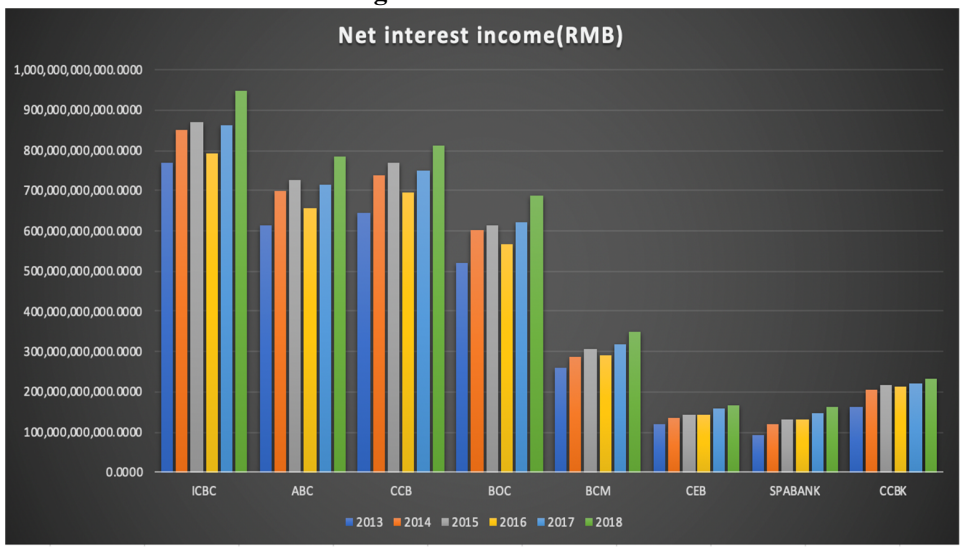
**Figure 2**. Net Profit Increasing Rates




(Figure 2: The graph illustrates the growth of net profit increasing rates of 5 state-owned banks & 3 joint-equity banks from 2011 to 2018. Data retrieved from Annual Report)

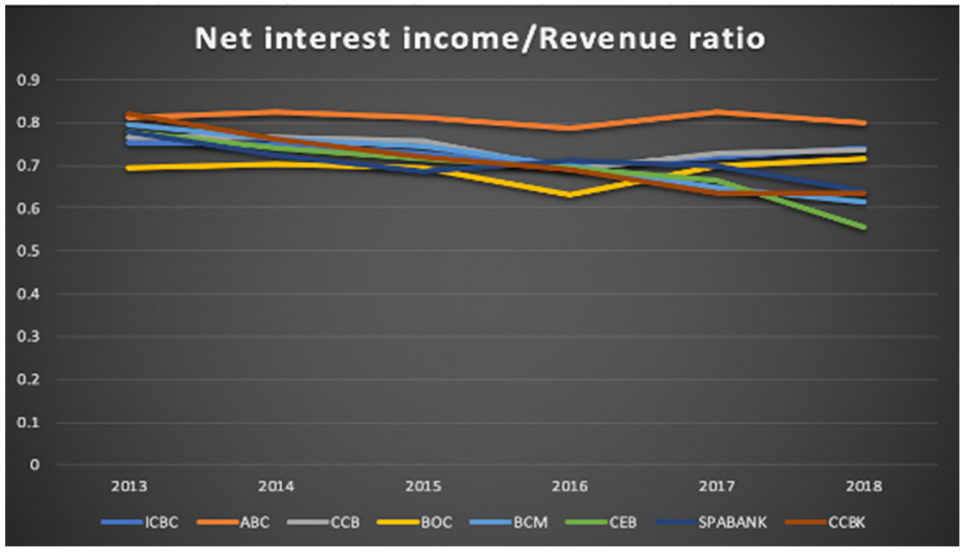
As the primary income, the net interest income increases with an upward trend every year (Figure 3). However, in Figure 4, generally speaking, the ratio of net interest income on revenue has a slight downward trend, especially for those joint equity banks.

**Figure 3**. Net Interest Income




(Figure 3: The graph illustrates the growth of net interest income of 5 state- owned banks & 3 joint-equity banks from 2013 to 2018. Data retrieved from Annual Report)

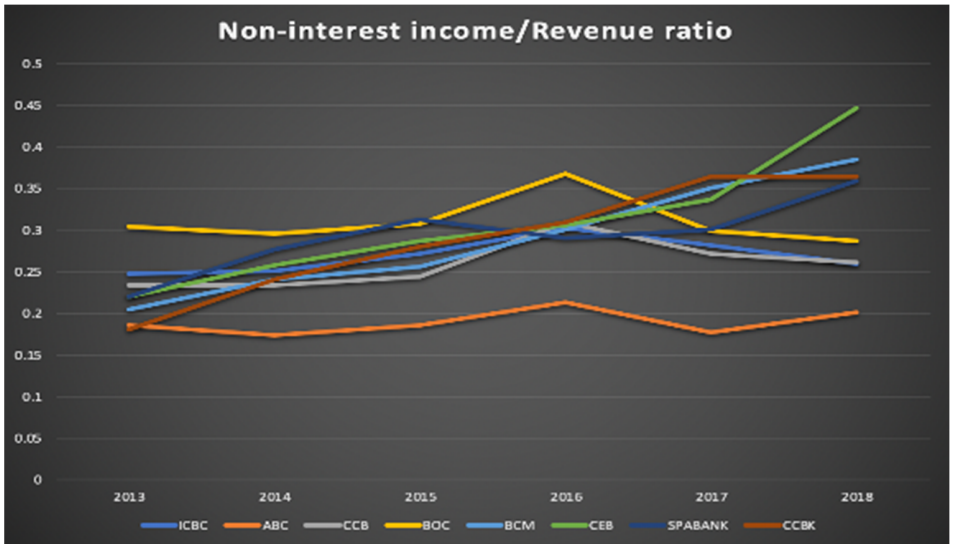
**Figure 4.** The Proportions of Net Interest Income on Revenue




(Figure 4: The graph illustrates the proportions of net interest income on revenue about 5 state- owned banks & 3 joint-equity banks from 2013 to 2018. Data retrieved from Annual Report)

Correspondingly, the overall ratio of non-interest income on revenue keeps rising, especially among those joint equity banks (Figure 5).

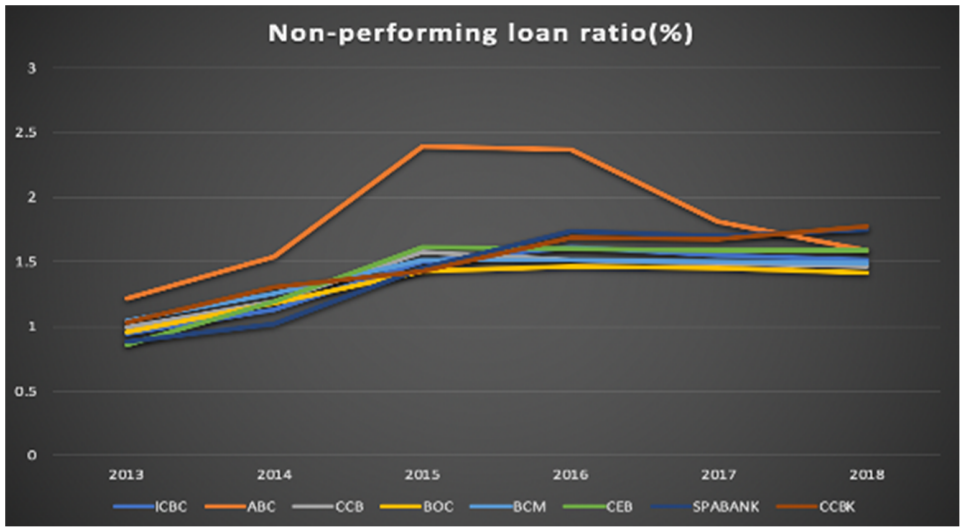
**Figure 5**. The Proportions of Non-interest Income on Revenue




(Figure 5: The graph illustrates the proportions of non-interest income on revenue of 5 state-owned banks & 3 joint-equity banks between 2013 & 2018. Data retrieved from Annual Report)

At the same time, coupled with the supply side structural reform, the non-performing loan rate also soared significantly. (Seen from Figure 6)

**Figure 6**. Non-performing Loan Ratios




(Figure 6: The graph illustrates the non-performing loan ratios of 5 state-owned banks & three joint-equity banks between 2013 & 2018. Data retrieved from Annual Report)

# II. Literature Review

The majority of scholars support the idea that Internet Finance's inhibited the development of commercial banks. Whinston et al. (2002) deems that E-finance makes the financial industry more competitive as it blurs the boundaries between different financial institutions. Therefore, traditional financial institutions have to find competitive strength. Specifically speaking, Berger and Fabian (2009) mainly studies the effects of electronic P2P (peer-to-peer) lending platform on credit rate by using 14,321 credit transactions between 2005-2009 in the United States. They deems that P2P financial intermediaries considerably change borrowers' credit condition via reducing information asymmetries, which gradually hurts the credit business of banks. Then, Fu (2012) identify that Internet Finance hurts the bank's payment & settlement business through the case of third-party payment. Moreover, through the analyzing of Yu'ebao, Qiu (2013) concludes that Yu'ebao monetary fund has jeopardized the market share of banks and also increased interest expense from banks.

Nonetheless, there are still some scholars think that Internet Finance has the ability to improve the business of banks. Ramsey (2014) puts forward the innovative concept and management efficiency of Internet Finance, which will accelerate the integration of banks & Internet. Based on the data of 16 listed banks in China between 2002 and 2013, with ROA as the dependent variable and the growth rate of Internet Finance as the main independent variable, Geng (2014) concludes that there is a time lag effect of the Internet Finance's influence on the whole profit of listed banks in China. The growth of Internet Financial industry is eventually conducive to banks.

Through the literature review, it's clear to see that most of the studies show that Internet Finance's jeopardized the development of traditional financial institutions. Primarily, it adopts relatively loose credit conditions, comparatively high investment interest rates and convenient settlement methods. However, most of the literatures are studying the reasons and effects through qualitative analysis. Not many researches did the empirical analysis by quantitative method. In addition, for those quantitative researches, they are limited to the analysis of the impact of Internet Finance on the bank's overall profit or non-interest income, lacking the analysis of net interest income, which is the major income of commercial banks in China. What's more, Pi and Zhao (2014) classify Internet Finance in China into 3 categories based on the popularity, which are third-party payment, online investment, and P2P Internet lending. So far, there is no study including all of these three factors.

Therefore, this thesis will firstly discuss the influence of Internet Finance (Internet monetary fund, P2P Internet lending and third-party payment) on different profits of commercial banks through cases and relevant data. Then, based on the financial data of 30 listed commercial banks in China between year 2013 and 2018, the ratio of net interest income to interest bearing assets and the ratio of non-interest income to total assets are selected as the measurement indicators of profit structure, Internet monetary fund, P2P Internet lending and third-party payment are the major independent variables, and other important factors of bank characteristics are selected to conduct the qualitative empirical research.

# III. Mechanism Analysis

Internet Finance involves in a broad range of fields and has various types. The three Internet Finance modes that produce primary effects on the profit structure of banks are as following: Internet monetary fund(IF), P2P Internet lending(P2P), and third-party payment(TPP).

## 1. Internet monetary fund

### 1-1. The development of Internet monetary fund

According to the definition of Internet monetary fund given by China Banking Regulatory Committee in March 2014, online investment products are the Internet monetary fund products represented by Yu'ebao, Tencent Licaitong, Xianjinbao, Huoqitong, and Baidu baifa launched by Internet enterprises with fund companies. They do not include monetary fund products sold on a commission basis through traditional channels like bank websites. In terms of its advantages, Internet monetary fund is not limited by place & time, simple & fast operation, low entry threshold, wide range of options and so on.

### 1-2. Influence mechanism analysis

#### 1-2-1. Net interest income

Internet monetary fund mainly affects the deposit field of traditional banks. As the

traditional offline financing not only has complex subscription procedure, but also a high minimum purchase amount. Internet enterprises and fund companies have cooperated to launch the popular Internet financing products. This kind of financial products have strong liquidity, generally there is no or very low purchase starting point, the purchase process is easy to operate, and the handling fee is also low, which attracts many investors. At the same time, some Internet fund sales platforms provide very affordable fund purchase rates. Take the Huaxia Growth Fund rate as an example, if the investor buy less than 10 million RMB, Tiantian Fund will reduce investor's investment with a 10% discount rate. For small and medium-sized investors, Tiantian Fund's subscription fee is far lower than the bank's subscription fee, as shown in Table 2, thereafter, it has taken a lot of deposit from commercial banks gradually.

**Table 2**. Huaxia Growth Fund Rate

| Subscription Amount | Normal Rate | Tiantian Rate |
|---|---|---|
| Less than 1 million RMB | 1.5% | 0.15% |
| 1 million RMB to 5 million RMB | 1.2% | 0.12% |
| 5 million RMB to 10 million RMB | 0.8% | 0.08% |
| More than 10 million RMB | 1000 RMB/per transaction | |

(Table 2: The table illustrates the comparison of the subscription rate of Huaxia Growth Fund in Banks and Tiantian Fund website. Data retrieved from Tiantian Fund website)

### 1-2-2. The intermediary business

In the traditional financial industry, banks have been monopolizing the fund sales market with their own credit system and huge customer scale, and charging high commission. With the improvements in third-party payment, investors begin to purchase Internet monetary fund through the third-party platform due to the habits. However, because the agency business occupies the intermediary business in a large amount, banks attach great importance to this business, constantly innovate their agency model, and sell fund through mobile app, online banking and other platforms. In addition, it also provides regular fund profit and information, gives advice to customers on market trends, product features, etc. (Zhang, 2016)

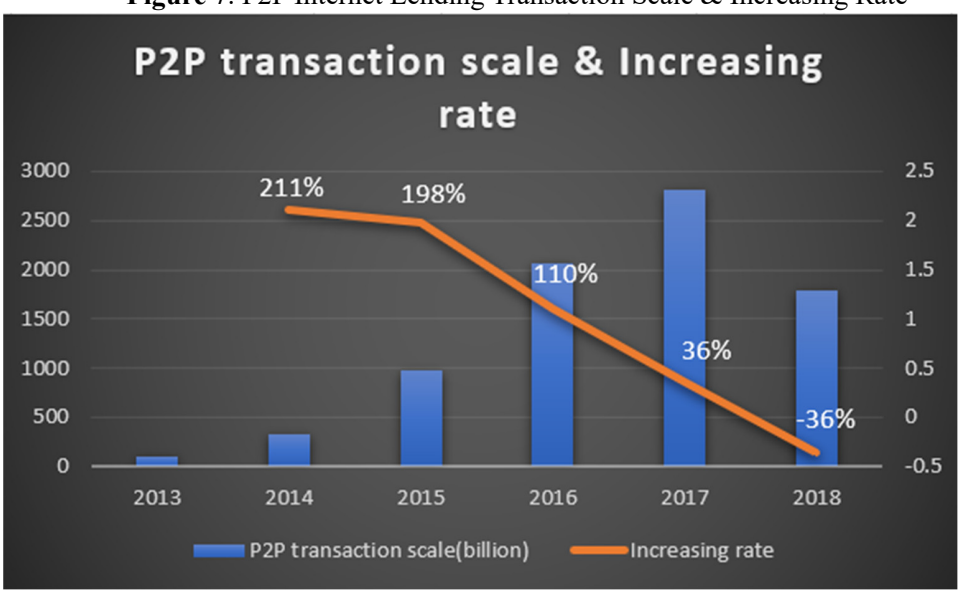
## 2. P2P Internet lending

### 2-1. The development of P2P Internet lending

P2P Internet lending can be traced back to the Internet lending in the UK. P2P means individual to individual. P2P Internet lending stands for the network platform provided by third-party institutions, which provides convenience for individuals to borrow money and charges certain intermediary fees. Compared with traditional commercial banks, its lending threshold is lower and the lending speed is faster, which can help lots of small or micro enterprises to solve their funding problems (Zhang, 2019).

From 2007, P2P began to appear in China. As of 2018, the turnover has reached 1794.8 billion RMB. From the Figure 7, the scale of P2P Internet lending market gradually increased in China between the year of 2013 and 2018. However, with the introduction of relevant regulatory documents, the number of P2P Internet lending operation platforms has gradually declined since 2015. As of 2018, only 1021 are still in operation, with a turnover of 1794.8 billion RMB.

**Figure 7**. P2P Internet Lending Transaction Scale & Increasing Rate




(Figure 7: The figure illustrates the P2P Internet lending transaction value from 2013 to 2018. Data retrieved from iResearch)

## 2-2. Influence mechanism analysis

### 2-2-1. Net interest income

P2P Internet lending mainly affects the loan business. The loan conditions of commercial banks are strict, therefore many individuals and micro and small enterprises which can't meet the conditions can't get loan from banks. Nevertheless, P2P Internet lending condition is low, the financing transaction parties can directly connect, and the loan amount and repayment term can be freely negotiated. Moreover, P2P Internet lending company approval process is more flexible and simple. Therefore, it has attracted some enterprises who can not meet the conditions to borrow.

Hence, it has become a popular financial management platform recently. In the current market downturn, some investors turn to invest in P2P, which to some extent affects the banks' deposit business.

**Table 3**. The Characteristics of P2P Wealth Management & Bank Wealth Management

| Characteristic | P2P wealth management | Bank wealth management |
|---|---|---|
| Threshold | 100-1000RMB | 50000RMB |
| Annual interest rate | 10% or higher | 3%-6% |
| Risk Level | High risk | Low risk |
| Client type | Risk seeker | Sound investor |

(Table 3: The table illustrates the characteristics of P2P wealth management & Bank wealth management**.** Data retrieved from P2PEYE.COM)

### 2-2-2. The intermediary business

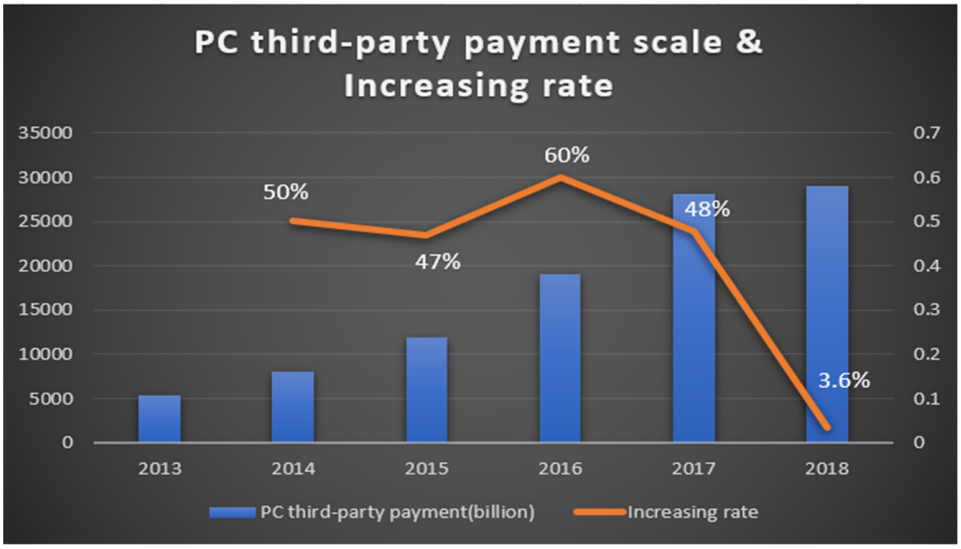
However, from the Table 3, P2P Internet lending and banks are different from each other in terms of investors, hence the influence on banks' intermediary field is limited.

## 3. Third-party payment

### 3-1. The development of third-party payment

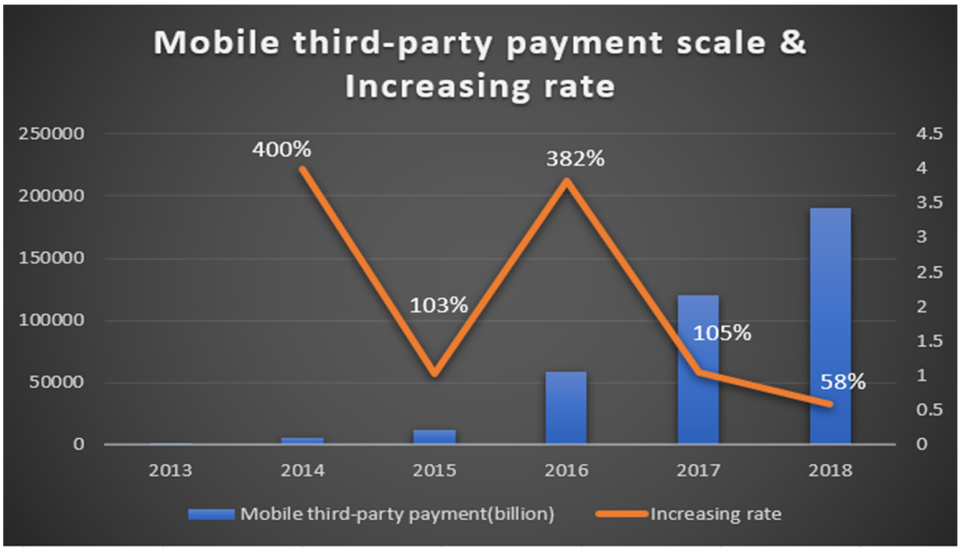
The People's Bank of China defines that third-party payment is a non-financial intermediary that provides money transfer service. Basically, the money transfer service includes PC third-party payment, mobile third-party payment, fixed-line telephone payment, prepaid card issuance & acceptance, bank card receipt and digital TV payment service. Among them, Internet Finance primarily relates to PC third-party payment and mobile third-party payment. Their representative platforms contain "Alipay", "WeChat payment", "Tenpay", "Lakala payment" and "99Bill". These kind of payment methods are not limited by the payment terminal, and have various and cheap payment and transfer alternatives. Based on iResearch, the scale of PC third-party payment has risen from 5,373 billion RMB in 2013 to 29,100 billion RMB in 2018. Additionally, mobile third-party payment reveals a leap forward growth. Since 2013, the number of transactions has increased by more than twice each year. By the end of 2018, it has reached 190,500 billion RMB, about 6.5 times of the PC third-party payment, as shown in Figure 8 and Figure 9.

**Figure 8**. PC Third-party Payment Scale & Increasing Rate




(Figure 8: The graph illustrates PC third-party payment scale & Increasing rate between 2013 and 2018. Data retrieved from iResearch)

**Figure 9**. Mobile Third-party Payment Scale & Increasing Rate




(Figure 9: The graph illustrates mobile third-party payment scale & Increasing rate between 2013 and 2018. Data retrieved from iResearch)

## 3-2. Influence mechanism analysis

### 3-2-1. Net interest income

Taking Alipay as an example, money will not be directly and immediately transferred to the seller after consumers spend money on Taobao. Instead, it will be staying in Alipay's account for around 7 days, which means Alipay would receive millions of customer provisions each day. And within this 7 days, Alipay can deposit those unpaid customer provisions into banks in the form of short-term fixed deposit or current deposit, so as to obtain huge interest income. Moreover, due to habits and convenient reasons, people will put some fund on the third-party payment account for daily small transaction. Taking Alipay's sedimentation deposit as an example, data shows that the average daily precipitation of Alipay has reached 10 billion in recent years (Dong, 2019). By 2018, the capital scale of Yu'ebao reached 1.9 trillion RMB, which exceeded the total current deposit of many banks, like China Merchants Bank, Bank of Communications & Everbright Bank. Hence, it increases interest expense, meanwhile, it diverts part of the deposit of banks, reducing the interest income eventually.

### 3-2-2. The intermediary business

The intermediary business of a commercial bank means the income obtained by handling the collection and payment settlement business for the client, completing the client's principal-agent business and providing various possible financial services. It mainly

includes: service fee and commission income, consulting business income, bank card fee income and handling transfer and settlement business, etc (Dong, 2019).

The third-party payment becomes very convenient in those fields. The two giants, Alipay and WeChat Pay, provide payment, settlement, cash withdrawal and other payment business, which is convenient, fast, and cheap. Taking customers' online consumption or payment as an example, the bank payment accepted by each e-commerce is different, and it can not cover all commercial banks, which requires customers to install U shield and mobile App of different banks, which is very complicated and inconvenient. However, if the customer bind the bank card with Alipay, they can directly use Alipay to pay, which significantly simplifies the payment process (Jin, 2017). Furthermore, Alipay supports interbank transfer within 2 hours to arrive, the actual situation generally only take 5 minutes. Also, users can pay water, electricity, gas, and mobile phone bill by Alipay or Wechat Pay. Eventually, they divert customers and seize the market share of the banking industry in those field.

Nevertheless, third-party payment still depends on commercial banks to a certain extent since the huge numbers of third-party payment users bind their bank cards on it, which means they still use bank cards for consumption payment. What's more, in Table 4 , third party payment is largely for small batch transfer. For instance, the Alipay mobile phone payment only provides 20,000 RMB transfer limit a day, and PC terminal also provides only 50,000 RMB limit. For large amount of payment system business, domestic & foreign currency payment system business are less involved. Hence, commercial banks and third-party payment are more cooperative in intermediary field.

**Table 4**. Comparison of the Transfer Fee of ICBC & Alipay through Different Terminal

| | **ICBC** | **Alipay** |
|---|---|---|
| Mobile phone transfer | No service charge for any banks | To Alipay account: No service charge<br>To bank account:: No service fee under 20000RMB per day, 0.1% charge if over 20000 RMB |
| PC transfer | Intra-bank transfer: No service charge<br>Inter-bank transfer:<br>(1) under 5000RMB: No service charge<br>(2) 5000RMB-10000RMB: 5 RMB/per transaction<br>(3) 10000RMB-50000RMB: 7.5RMB/per transaction<br>(4)over 50000RMB: 0.015% charge, maximum charge: 25RMB/per transaction | To Alipay account: 0.1% charge, maximum 50000RMB transfer |

(Table 4: The table illustrates the service charge of Industrial and Commercial Bank of China & Alipay via Mobile phone and PC. Data retrieved from ICBC and Alipay official website)

# IV. Methodology

## 1. Hypothesis

Based on the previous analysis, the following research hypotheses are proposed:

Hypothesis 1: Internet monetary fund, P2P internet lending, and third-party payment negatively and significantly influence the net interest income of commercial banks in China.

Hypothesis 2: The influences of Internet monetary fund and P2P internet lending on non-interest income of commercial banks in China are limited.

Hypothesis 3: Third-party payment and commercial banks are more cooperative in payment and settlement business in China.

Hypothesis 4: The influence extent of Internet monetary fund, P2P internet lending, and third-party payment on joint-equity banks and state-owned banks are different.

## 2. Data Selection

The data includes three categories. The first classification is the three main Internet Finance variables, covering the period from 2013 to 2018. This categorical data is obtained from iResearch. Then the bank-specific variables belong to the second category, which is collected from the Annual Report of 30 listed commercial banks in China between 2013 and 2018. The third one is macro factor variables, and those variables are obtained from Wind. The commercial banks include 30 listed banks operating in China within 2013 to 2018, of which 5 are state-owned banks, 25 are joint-equity banks.

## 2-1. Dependent Variables

This paper chose the ratio of Net Interest Income to Interest Bearing Assets (NIM) (HO & Saunders, 1981) and the ratio of Non-Interest Income to Total Assets (NIIR) (DeYoung & Rice, 2004) as the dependent variables, respectively. On the one hand, the Net Interest Income is still considered as the primary source of bank profit. The net interest margin level of commercial banks has been regarded. On the other hand, The importance of promoting intermediary business has been stressed recently. The increase of Non-Interest Income can accelerate the innovation of commercial banks. Meanwhile, it has small binding force on the use of fund, small financial exchange risk, and weak impact by the economic cycle, relatively. Therefore, it acts an unignorable role in the sustainability of banks' profits (Wang, 2017).

## 2-2. Explanatory variables

### 2-2-1. Determinants of Internet Finance

According to the Research Report of Internet Financial Index of Peking University and the previous analysis, this paper selected Third-party Payment(TPP), Internet monetary fund(IF), and Peer to Peer internet lending(P2P), as the three main independent variables.

### 2-2-2. Bank-specific variables

Besides TPP, IF and P2P, it's also necessary to find other determinants of NIM and NIIR.

**Assets**: Berger (1987) finds that the increasing size of banks can save cost. Zarruck (1989) concludes the net interest margin of bank has a positive relationship with the amount of capital in bank. However, some recent empirical studies show that opposite view. For example, Demirguc-Kunt et al. (2004) analyze 72 European countries banking industry, which suggests a negative correlation between asset size and NIM. As for NIIR, based on Pelton (1960) study in the 1508 American banks during 1988-2008, finding that the asset size positively contributed to NIIR, which are also proved by DeYoung and Hunter (2002).

**Operating cost ratio(OPC)**: It reflects the proportion of operating cost on total asset. Maudos & Guevara (2004) conclude that the net interest margin will be reduced by 43% as the average operating cost is reduced by 10% from the analysis of banking field in 4 countries during 1993-2000. Similarly, Han & Wang (2017) also prove that the operating cost possesses a positive correlation with NIM in Chinese banking sector. In the case of NIIR, Davis and Tuori (1998) conclude that less cost-effective like small banks with higher operating cost have a higher propensity to expand the revenue sources by expanding their intermediary business.

**Loan-deposit ratio(LD)**: The study from Li & Chen (2017) suggests that larger banks incline to have a high LD ratio on the purpose of pursuing more profit, which in turn

motivate them to enhance their intermediary business to diversify the shocks causing by high loan. From the aspect of NIM, Han & Wang (2017) discover that the smaller LD the bank has, the lower liquidity risk the bank faces. Meanwhile, the opportunity cost for banks to hold these more liquid asset will become larger, which would cause banks to set a higher interest margin to cover those opportunity cost. Therefore, the higher the LD is, the lower NIM is.

**Capital adequacy ratio(CAR)**: Angbazo (1997) uses Call report data from the Federal Reserve to study 286 banks of different scales from 1989 to 1993, summarizing that NIM positively correlated with CAR. Likewise, Saunders & Schumacher (2000) find capital adequacy ratio correlated with NIM positively. According to the analysis of Wang (2017), if commercial banks want to obtain larger output, they need to have sufficient capital. The greater the risk is, the higher the bank's profit level will be. The higher percentage of non-interest income is, the stronger its profitability will have. Therefore, CAR is positively correlated with NIIR as well.

**Non-performing loan ratio(NPL)**: NIM was found positively correlated with it in Money-center Bank, Super-regional Bank, Regional-bank, and Local bank (Angbazo, 1997). Li and Chen (2017) conclude that banks have the propensity to promote their non-interest income business to offset the high liquidity risk through the study of 16 commercial banks in China from the first quarter of 2013 to the second quarter of 2016.

### 2-2-3. Macroeconomic environment

**GDP growth rate(GGDP)**: With the continuous improvement of living standards, people tend to spend more money on investment and consumption, which reduces the source of savings in banks, thus reducing NIM, therefore Zhang (2007) concludes that with every unit of GDP growth, NIM will decrease by 0.0001. For NIIR, no correlation was found through the analysis of Abdelaziz et al. (2012)

**CPI**: Boyd et al. (2001) deem strong negative correlation between inflation and bank lending, which eventually damage NIM. Using the data of 94 Chinese banks between 2011 and 2015, Zhao & Liu (2018) find that CPI poses positively on NIIR as the business volume, service charge and commission of commercial banks, and the income level of investment business will continue to grow with the improvement of economic development level and the rise of inflation rate.

## 3. Data description

**Table 5**. Descriptive Statistics of All Banks

| **All banks** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Variable | Definition | Obs | Mean | Std.Dev | Min | Max |
| **Dependent Variables** | NIM(%) | Net interest income/Interest bearing assets | 174 | 2.2804 | 0.4836 | 1.32 | 3.93 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | NIIR(%) | Non-interest income/Total Assets | 174 | 20.9458 | 10.1913 | 3.5829 | 51.09 |
| **Independent Variables** | LNIF | The natural logarithm of Interent monetary fund | 174 | 10.4298 | 0.8123 | 8.9226 | 11.3083 |
| | LNP2P | The natural logarithm of peer to peer lending | 174 | 9.0379 | 1.1604 | 6.9641 | 10.2416 |
| | LNTPP | The natural logarithm of third-party payment | 174 | 12.9487 | 1.2761 | 11.0821 | 14.6021 |
| | LNASSETS | The natural logarithm of total assets | 174 | 9.4847 | 1.7667 | 6.4056 | 12.5317 |
| | LD(%) | Loan/Deposit | 174 | 71.3627 | 12.8023 | 38.9712 | 109.984 |
| | CAR(%) | Core capital/Risk weighted assets | 174 | 12.9193 | 1.4198 | 9.88 | 17.19 |
| | OPC(%) | Operating cost/total assets | 174 | 1.5352 | 0.3380 | 0.8224 | 2.6830 |
| | NPL(%) | Non-performing loan/total loan | 174 | 1.4005 | 0.4347 | 0.53 | 2.9 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | GGDP(%) | Growth of GDP | 174 | 7.1 | 0.3840 | 6.7 | 7.8 |
| | CPI | Consumer Price Index | 174 | 101.951 | 0.3830 | 101.4 | 102.6 |

(Table 5: The table illustrates the descriptive statistics of all variables**.** Data retrieved from Annual report of banks, iResearch and Wind)

Table 5 reveals the average proportion of NIIR is 20.9458%, in another words, the non-interest income makes up about 20.95% of the total assets of the bank. The minimum value 3.5829% is from Bank of Zhengzhou in 2013, and the maximum value 51.09% is from Minsheng Bank in 2018. The high value reveals that Minsheng Bank actively promotes the diversification of profit structure and accelerates business innovation in recent years. In addition, averagely speaking, net interest income accounts for 2.2804% of interest bearing assets. The minimum value is 1.32% from Everbright Bank in 2017, and the maximum value is 3.93% from Guiyang Bank in 2014. The three main independent variables are LNIF, LNP2P and LNTPP, with a mean of 10.4298, 9.0379 and 12.9487, respectively. The average GDP growth rate(GGDP) is 7.1%, which shows that China's economy is developing rapidly. The average level of CPI is 101.9505, with a maximum of 102.6 and a minimum of 101.4, indicating that China is experiencing relative moderate inflation.

**Table 6**. Descriptive Statistics by Bank Types

| **Types** | **State-owned banks (Obs.=30)** | | | | **Joint-equity banks (Obs.= 144)** | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | Mean | Std.Dev | Min | Max | Mean | Std.Dev | Min | Max |
| NIM(%) | 2.1854 | 0.3166 | 1.39 | 2.76 | 2.3002 | 0.5102 | 1.32 | 3.93 |
| NIIR(%) | 26.3611 | 5.4110 | 17.4648 | 38.4408 | 19.8176 | 10.5963 | 3.5829 | 51.09 |
| LNIF | 10.4298 | 0.8238 | 8.9226 | 11.3083 | 10.4298 | 0.8128 | 8.9226 | 11.3083 |
| LNP2P | 9.0379 | 1.1768 | 6.9641 | 10.2416 | 9.0379 | 1.1611 | 6.9641 | 10.2416 |
| LNTPP | 12.9487 | 1.2942 | 11.0821 | 14.6021 | 12.9487 | 1.2769 | 11.0821 | 14.6021 |
| LNASSETS | 11.9876 | 0.4223 | 10.9955 | 12.5317 | 8.9633 | 1.4669 | 6.4056 | 11.1192 |
| LD(%) | 75.1633 | 7.1430 | 61.1672 | 90.3976 | 70.5709 | 13.5747 | 38.9712 | 109.984 |
| CAR(%) | 14.1683 | 1.1422 | 11.86 | 17.19 | 12.6591 | 1.3337 | 9.88 | 16.6 |
| OPC(%) | 1.4701 | 0.1352 | 1.2495 | 1.8148 | 1.5488 | 0.3653 | 0.8224 | 2.683 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NPL(%) | 1.4543 | 0.3310 | 0.94 | 2.39 | 1.3893 | 0.4535 | 0.53 | 2.9 |
| GGDP(%) | 7.1 | 0.3895 | 6.7 | 7.8 | 7.1 | 0.3843 | 6.7 | 7.8 |
| CPI | 101.9505 | 0.3884 | 101.4 | 102.6 | 101.9505 | 0.3832 | 101.4 | 102.6 |

(Table 6: The table illustrates the descriptive statistics of all variables by banks**.** Data retrieved from Annual report of banks, iResearch and Wind)

Table 6 shows in general, the 5 state-owned banks have a better performance than joint-equity banks in China. However, the risk of state-owned banks ranks higher than join-equity banks when it comes to Non-performing loan (NPL).

## 4. Analytical Method

This thesis takes the natural logarithm of Internet monetary fund (LNIF), P2P internet lending(LNP2P), the third-party payment (LNTPP) as independent variables, takes net interest income/interest bearing assets (NIM), non-interest income/total assets (NIIR) as the key dependent variables, respectively. Micro-wise speaking, assets (LNASSETS), loan/deposit (LD), core capital/risk weighted assets (CAR), operating cost/total assets (OPC), non-performing loan/total loan (NPL), macro-wise speaking, the growth of GDP (GGDP), and CPI are chosen as control variables at the same time.

Based on the F test and the Hausman (1987) test. The test results tell that fixed effect model

is appropriate as P-value is less than 0.05. Panel data is used in this study as our data include time series observations (T) and a number of banks(I).

NIM=F(Internet montary fund / P2P internet lending / third-party payment, bank-specific variables, macroeconomic factors)

$NIMit= \alpha i + \beta 1 * LNIFt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

$NIMit= \alpha i + \beta 1 * LNP2Pt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

$NIMit= \alpha i + \beta 1 * LNTPPt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

NIIR=F(Internet monetary fund / P2P internet lending / third-party payment, bank-specific variables, macroeconomic factors).

$NIIRit= \alpha i + \beta 1 * LNIFt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

$NIIRit= \alpha i + \beta 1 * LNP2Pt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

$NIIRit= \alpha i + \beta 1 * LNTPPt + \beta 2 * LNASSETSit + \beta 3 * LDit + \beta 4 * CARit + \beta 5 * OPCit + \beta 6 * NPLit + \beta 7 * GGDPt + \beta 8 * CPIt + \varepsilon it$

where i= 1, 2, … N stands for different banks, t = 2013, 2014, … T stands for year. $\alpha i$ represents the individual differences of different banks, and $\varepsilon it$ represents the error term.

Among banking characteristics, LNASSETSit measures the size of banks. LDit reveals the

liquidity risk (Han & Wang, 2017). the capital adequacy and the asset quality & default risk are represented by CARit and NPLRit, respectively (Angbazo, 1997). OPCit reveals the operation efficiency.

Additionally, in order to investigate whether the Internet Monetary fund, P2P Internet lending and third-party payment affect differently across bank types, this paper also do the regressions separately according to the different bank types. With respect to the sample included, this 30 listed commercial banks can be separated into two groups, the 5 state-owned banks and 25 joint-equity banks.

# V. Results and Discussions

Firstly, this section shows the empirical results to explore the determinant factors of banks' NIM and NIIR, especially the effect of Internet monetary fund (IF), P2P Internet lending (P2P) and third-party payment(TPP) on NIM and NIIR. Then, the exploration of whether the effects on NIM and NIIR are different in different types of bank.

## 1. Results

### 1-1. NIM & NIIR

**Table 7.** NIM and IF & P2P & TPP

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIM** | **NIM** | **NIM** |
| LNIF | -0.176** | | |
| | (0.0840) | | |
| LNP2P | | -0.144** | |
| | | (0.0567) | |
| LNTPP | | | -0.116*** |
| | | | (0.0409) |
| LNASSETS | -0.624*** | -0.675*** | -0.547*** |
| | (0.132) | (0.119) | (0.136) |
| LD | 0.00299 | 0.000842 | 0.00374 |
| | (0.00271) | (0.00248) | (0.00268) |
| CAR | 0.00180 | -0.00852 | 0.00449 |

| | | | |
|---|---|---|---|
| | (0.0186) | (0.0181) | (0.0184) |
| OPC | 0.691*** | 0.594*** | 0.637*** |
| | (0.0867) | (0.0957) | (0.0884) |
| NPL | -0.365*** | -0.305*** | -0.341*** |
| | (0.0639) | (0.0668) | (0.0634) |
| GGDP | -0.219 | -0.297* | -0.203 |
| | (0.148) | (0.156) | (0.125) |
| CPI | -0.117** | -0.143** | -0.0157 |
| | (0.0524) | (0.0551) | (0.0501) |
| Constant | 22.71*** | 26.23*** | 11.19** |
| | (5.701) | (6.175) | (4.928) |
| Observations | 174 | 174 | 174 |
| R-squared | 0.788 | 0.791 | 0.794 |
| Number of Number | 29 | 29 | 29 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 7: The table illustrates correlation between NIM and each variable. Data retrieved from Annual report of banks, iResearch and Wind)

**Table 8.** NIIR and IF & P2P & TPP

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIIR** | **NIIR** | **NIIR** |
| LNIF | 2.951 | | |
| | (2.046) | | |
| LNP2P | | 1.101 | |

| | | | |
|---|---|---|---|
| | | (1.397) | |
| LNTPP | | | 1.710* |
| | | | (1.006) |
| LNASSETS | 9.131*** | 10.76*** | 8.275** |
| | (3.215) | (2.935) | (3.347) |
| LD | 0.0840 | 0.121** | 0.0776 |
| | (0.0660) | (0.0610) | (0.0658) |
| CAR | 0.511 | 0.665 | 0.489 |
| | (0.453) | (0.446) | (0.452) |
| OPC | 4.001* | 4.648* | 4.766** |
| | (2.112) | (2.361) | (2.174) |
| NPL | 4.112*** | 3.608** | 3.749** |
| | (1.566) | (1.647) | (1.558) |
| GGDP | 2.897 | 1.458 | 2.204 |
| | (3.602) | (3.847) | (3.075) |
| CPI | 3.492*** | 3.255** | 1.906 |
| | (1.275) | (1.359) | (1.232) |
| Constant | -497.5*** | -462.6*** | -314.1** |
| | (138.8) | (152.3) | (121.2) |
| Observations | 174 | 174 | 174 |
| R-squared | 0.599 | 0.595 | 0.601 |
| Number of Number | 29 | 29 | 29 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 8: The table illustrates correlation between NIIR and each variable. Data retrieved from Annual report of banks, iResearch and Wind)

## 1-2. NIM & NIIR in different bank groups

**Table 9.** NIM and IF & P2P & TPP : Differences in Bank Groups

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIM** | **NIM** | **NIM** |
| LNIF | -0.121 | | |
| | (0.133) | | |
| LNP2P | | -0.192* | |
| | | (0.1) | |
| LNTPP | | | -0.0849 |
| | | | (0.0599) |
| LNASSETS | 0.00539 | 0.0895 | 0.026 |
| | (0.172) | (0.167) | (0.168) |
| LD | -0.0193 | -0.0154 | -0.0188 |
| | (0.0122) | (0.0116) | (0.0118) |
| CAR | 0.110* | 0.0815 | 0.105* |
| | (0.0569) | (0.0545) | (0.0551) |
| OPC | 0.782*** | 0.639** | 0.717** |
| | (0.324) | (0.317) | (0.321) |
| NPL | -0.00356 | 0.0567 | -0.000739 |
| | (0.189) | (0178) | (0.183) |
| GGDP | 0.318 | 0.0924 | 0.272 |
| | (0.317) | (0.299) | (0.27) |
| CPI | -0.0775 | -0.147 | -0.00288 |
| | (0.109) | (0.111) | (0.108) |
| Constant | 7.771 | 16.14 | 0.214 |
| | (14.11) | (13.99) | (12.42) |
| Observations | 30 | 30 | 30 |
| R-squared | 0.795 | 0.814 | 0.804 |
| Number of Number | 5 | 5 | 5 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 9: The table illustrates correlation between NIM and each variable in state-owned banks in China. Data retrieved from Annual report of banks, iResearch, and Wind)

**Table 10.** NIM and IF & P2P & TPP in Joint-equity Banks

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIM** | **NIM** | **NIM** |
| LNIF | -0.311*** | | |
| | (0.0837) | | |
| LNP2P | | -0.187*** | |
| | | (0.0638) | |
| LNTPP | | | -0.172*** |
| | | | (0.0391) |
| LNASSETS | -0.227*** | -0.225*** | -0.217*** |
| | (0.0397) | (0.0404) | (0.0395) |
| LD | 0.00439* | 0.00135 | 0.00454* |
| | (0.00253) | (0.00248) | (0.00246) |
| CAR | -0.000460 | -0.0132 | 0.00327 |
| | (0.0197) | (0.0198) | (0.0194) |
| OPC | 0.755*** | 0.691*** | 0.680*** |
| | (0.0839) | (0.0948) | (0.0868) |
| NPL | -0.367*** | -0.297*** | -0.335*** |
| | (0.0680) | (0.0729) | (0.0670) |
| GGDP | -0.166 | -0.0654 | -0.128 |
| | (0.167) | (0.174) | (0.138) |
| CPI | -0.180*** | -0.200*** | -0.00943 |
| | (0.0558) | (0.0613) | (0.0575) |
| Constant | 26.15*** | 26.32*** | 7.403 |
| | (6.402) | (7.109) | (5.343) |
| Observations | 144 | 144 | 174 |
| R-squared | 0.790 | 0.777 | 0.798 |
| Number of Number | 24 | 24 | 24 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 10: The table illustrates correlation between NIM and each variable in joint-equity banks in China. Data retrieved from Annual report of banks, iResearch and Wind)

**Table 11.** NIIR and IF & P2P & TPP in State-owned Banks

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIIR** | **NIIR** | **NIIR** |
| LNIF | -5.495** | | |
| | (2.691) | | |
| LNP2P | | -2.774 | |
| | | (2.282) | |
| LNTPP | | | -2.732** |
| | | | (1.224) |
| LNASSETS | 12.56*** | 13.82*** | 13.24*** |
| | (3.472) | (3.803) | (3.428) |
| LD | 1.018*** | 1.094*** | 1.043*** |
| | (0.246) | (0.263) | (0.242) |
| CAR | -3.566*** | -4.166*** | -3.814*** |
| | (1.152) | (1.240) | (1.127) |
| OPC | 1.110 | 0.361 | -0.429 |
| | (6.549) | (7.206) | (6.566) |
| NPL | -4.622 | -3.126 | -4.265 |
| | (3.824) | (4.046) | (3.746) |
| GGDP | -16.32** | -12.43* | -14.77*** |
| | (6.424) | (6.799) | (5.520) |
| CPI | 0.819 | 0.626 | 3.566 |
| | (2.205) | (2.522) | (2.207) |
| Constant | -55.44 | -109.1 | -373.2 |
| | (285.6) | (318.6) | (254.0) |
| Observations | 30 | 30 | 30 |
| R-squared | 0.557 | 0.515 | 0.569 |
| Number of Number | 5 | 5 | 5 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 11: The table illustrates correlation between NIIR and each variable in state-owned banks in China. Data retrieved from Annual report of banks, iResearch and Wind)

**Table 12.** NIIR and IF & P2P & TPP in Joint-equity Banks

| | (1) | (2) | (3) |
|---|---|---|---|
| **VARIABLES** | **NIIR** | **NIIR** | **NIIR** |
| LNIF | 5.159*** | | |
| | (1.953) | | |
| LNP2P | | 1.573 | |
| | | (1.474) | |
| LNTPP | | | 2.558*** |
| | | | (0.915) |
| LNASSETS | 5.570*** | 5.554*** | 5.483*** |
| | (0.656) | (0.666) | (0.657) |
| LD | 0.0342 | 0.0719 | 0.0370 |
| | (0.0539) | (0.0534) | (0.0534) |
| CAR | 0.851* | 1.060** | 0.814* |
| | (0.451) | (0.453) | (0.451) |
| OPC | 3.740** | 3.705* | 4.546** |
| | (1.758) | (1.939) | (1.829) |
| NPL | 2.452 | 1.820 | 2.027 |
| | (1.524) | (1.620) | (1.524) |
| GGDP | 3.104 | -2.490 | 1.631 |
| | (3.945) | (4.038) | (3.296) |
| CPI | 4.219*** | 3.932*** | 1.550 |
| | (1.302) | (1.430) | (1.387) |
| Constant | -558.5*** | -454.1*** | -254.8** |
| | (149.0) | (165.0) | (128.2) |
| Observations | 144 | 144 | 144 |
| R-squared | 0.629 | 0.609 | 0.631 |
| Number of Number | 24 | 24 | 24 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

(Table 12: The table illustrates correlation between NIIR and each variable in joint-equity banks in China. Data retrieved from Annual report of banks, iResearch and Wind)

# 2. Discussions

## 2-1. NIM & NIIR

According to the results from Table 7, R-squared of the three models are 0.788, 0.791 and 0.794, respectively, indicating that the models have a goodness of fit.

In the first place, the growth of the explanatory variable IF negatively affect NIM, and passes the significance test with a confidence level of 5%, which reveals that IF negatively and significantly affect NIM. To be specific, NIM decreases by 0.176 % for every 1% increase of IF. Similarly, P2P presents the significantly (5%) negative influence on NIM. For every 1% increase in TPP, NIM drops by 0.144%. Moreover, TPP also significantly (1%) damage on the NIM through the decreasing by 0.116% with every increase of 1%.

The reason is that TPP and IF both raise the cost of deposit of commercial banks, they are diverting the current deposit. At the same time, TPP, relying on online shopping website, deposit a huge amount of customer provisions into the bank in current or fixed deposit, thus increasing interest expenditure. Likewise, P2P Internet lending reduces the bank's net interest income through competing with the bank's loan business.

Among banking factors, OPC contributes to NIM positively and significantly, which in line with the research results from Maudos & Guevara (2004). Moreover, the empirical study results present a negative and significant effect of Assets, NPL and CPI on NIM.

From Table 8, R-squared of the three models are 0.599, 0.595 and 0.601, respectively, demonstrating that the models have a goodness of fit as well.

Firstly, the growth of the explanatory variable IF positively affects NIIR, but has not passed

the significance test, which reveals that IF has a positive and but insignificant effect on NIIR. Detailly, NIIR increased by 2.951% for every 1% increase in IF. Similarly, the growth of the explanatory variable P2P contributes NIIR positively, but has not passed the significance test, which shows that TPP is positively but insignificantly contributed to NIIR. To be specific, NIIR increased by 1.101% with every 1% increase in P2P,. What's more, the independent variable TPP presents a positive influence on NIIR, and also has passed the significance test with 10%.

TPP has significantly and positively affect NIIR. The cooperative effect of TPP and commercial banks is mainly reflected in payment & settlement. Commercial banks are opening the settlement channels for TPP , while TPP expands intermediary business for banks, bringing more intermediary business for banks, which eventually promotes the non-interest income of commercial banks. What's more, as the liberalization of interest rate recently, increasing amount of Chinese commercial banks have begun to vigorously promote intermediary business, the impact of Internet monetary fund and P2P Internet lending on their non-interest income is limited.

For banking specific characteristics, Assets, OPC and NPL all exert significantly and positively effect on NIIR. This result show that the banks with larger assets have a higher propensity to realize economies of scale and then gain more NIIR (DeYoung & Hunter, 2002). The banks own high NPL have to diversify their business, for instance, expand the intermediary business, for the purpose of offsetting the bad debt risk, which in line with the study by (Li & Chen, 2017).

For the macro determinants, CPI presents the significantly and positively influence on NIIR,

which was proven by Zhao & Liu (2018). However, the growth of GDP does not show the significant effect.

## 2-2. NIM & NIIR in different bank groups

Based on the regression results of different banks, the three main variables have a weaker negative influence on NIM of state-owned banks than joint-equity banks as a whole. Moreover, they produce negatively on NIIR of state-owned banks, but a positively on NIIR of joint-equity banks.

The underlying reasons firstly, thanks to the large scale of assets, the wide range of clients and the support of government, the deposit and loan field of state-owned banks are more prominent than joint-equity banks, the shocked from Internet Finance is limited. But at the same time, since the limited impact and comprehensive management structure, it lacks the propensity to expand its non-interest income business, the shock to intermediary business is considerable.

Secondly, for joint-equity banks, the positive influence on their non-interest income is more comprehensive. As the corporate governance structure of joint-stock banks is relatively simple, and at the same time, they actively innovate and pay concentration on the development of their intermediary business, the better user experience and service have been attracting more and more young and middle aged-group, which are the main user groups in transaction and consumption (Xia & Chunsom, 2018), so that their non-interest income business is in the forefront of development in banking industry. Additionally, joint-

equity banks can actively integrate and innovate with Internet Finance, and rapidly improve non-interest income business through Internet Finance. According to Xiao & Deng, the growth of non-interest income has exceeded the growth of net interest income from 2008 to 2016. Among them, the non-interest income of state-owned banks increased by about two times, and that of joint-equity banks by six times. In terms of the intermediary business involved, joint-equity banks are also the most extensive one.

# VI. Conclusion and Implication

## 1. Conclusion

Based on the panel data of 30 listed commercial banks in China between 2013 and 2018, this thesis analyzes the influence of the three major models of Internet Finance on the net interest and non-interest income of banks.

The results reveal that: firstly, IF, P2P and TPP all negatively and significantly affect the NIM of commercial banks. Secondly, TPP acts a positive and significant role in NIIR of commercial banks, while IF and P2P Internet lending leave a positive but insignificant impact. The cooperative relationship between TPP and banks are more apparent. Commercial banks are opening the settlement channels for third-party payment, whereas third-party payment expands intermediary business for banks through network, bringing more intermediary business for banks, which eventually promotes the non-interest income of commercial banks. Furthermore, increasing number of banks have begun to vigorously develop their intermediary business as the interest rate liberalization, the impacts of IF and P2P Internet lending on their non-interest income are limited.

Thirdly, Internet Finance has a significant heterogeneous impact on the profitability of different banks. From the view about the negative influence on interest income of different commercial banks, IF, P2P Internet lending, and TPP contribute more on the joint-equity banks than the state-owned banks, which is mainly due to the support from the government to the state-owned banks. From the view of the impact on non-interest income of banks, IF, P2P Internet lending, and TPP leave a positive effect on joint-equity banks, but damage on

the non-interest income of state-owned banks. Joint-equity bank's increasing innovation and using the network to improve the intermediate service in the recent years.

## 2. Implication

There's not a simple competitive relationship between Internet Finance and traditional banks, instead, there's a great space for integration between them. (Liu, 2013)

First of all, commercial banks can learn from Internet Financial enterprises and develop Internet information technology to deeply dig customer groups, develop their own characteristic products and improve the overall operating efficiency.

Secondly, the government should actively encourage the communication and cooperation between them. Compared with commercial banks, Internet Financial enterprises have relatively high information technology capabilities, which can promote the absorption of technology spillover effects by commercial banks (Zhao & Liu, 2018). At the same time, banks can use their own advantages in network and credit to attract more customers for e-commerce (Shen & Zhao, 2017).

Last but not the least, the government and other regulatory agencies should regulate the development of Internet financial enterprises, incorporate them into standardized development, and pay attention to prevent all kinds of risks brought by Internet Finance. As for the overall risk level, regulators should pay close concentration on the changes of relevant risk indicators so as to avoid financial crisis (Zhao & Liu, 2018).

# VII. Limitations

Firstly, there may be a deviation between the current research conclusions and the actual impact results in the future as the fast development. This paper only expounds and verifies Internet Finance and listed banks from 2013 to 2018, but with the progress and change of Internet Finance and banks in the future, the accuracy of the research results of this thesis could be reduced.

Secondly, due to the limited development time and the different calculation methods of data from different institutions, the empirical analysis results will also be affected to some extent.

# References

Allen, J., & Mcandrews, J., & Strahan, P. (2002). E-finance: An Introduction. Journal of financial Services Research, 2002(22), 5-27

Financial stability analysis group of the people's Bank of China. "2014 China Financial Stability Report". Retrieved from http://www.financialnews.com.cn/jrts/xstj/201407/t20140707_58885.html

Jin, Y. H. (2017). Research on the influence of Internet Financial Development on traditional commercial banks. *Theory Monthly,* 2017(4), 168-182

Dong, Q. (2019). The influence of Internet Finance on commercial banks and Its Countermeasures. *China Economic & Trade Herald*, 2019(7), 43-44.

Peng, Y. (2014). "Study on the Effect of Internet Finance on Commercial Banks' Profits in China*"*. (Master's thesis, Xiamen University)

Lin, L. H., & Geng, X. J., & Whinston, A. (2002). A new perspective to finance and competition and challenges for financial institutions in the internet era. *BIS,* 2002(7), 13-25

Berger, S. C., & Fabian, G. (2009). Emergence of Financial Intermediaries in Electronic Markets: The Case of Online P2P Lending. *BuR-Business Research*, 2009, 2(1), 39-65

Fu, J. P. (2012). The influence of third party payment on the development of online banking. *Financial Theory & Practice*, 2012(10), 116-118

Qiu, X. (2013). Internet Based Fund: Challenges and Enlightenments to Commercial Banks- A Case Study of YueBao. *Journal of Shanghai Finance University,* 2013(4), 75-83

Geng, P. J. (2014). "Internet Financial research on the influence of the commercial banks in China". (Master's thesis, Henan University)

Zhang, H. Y. (2016). An analysis of the way of seeking innovation in the business of selling funds on behalf of commercial banks. *Financial Insights,* 2016(2), 105-106

Zhang, Z. W. (2019). "The influence of Internet Finance on the Business of China's Commercial Banks and its Countermeasures". (Master's thesis, Anhui University)

Ho S.Y., & Saunders A. (1981). The determinants of bank interest margins: theory and empirical evidence. *Journal of Financial and Quantitative Analysis,* 1981, 16(4), 581-600

DeYoung, R., Rice, T. N. (2004). Noninterest income and Financial Performance at U.S. Commercial Banks. *Financial Review,* 2004, 39(1), 101-127

Wang, X. Y. (2017). "Study on the effect of Internet finance on profitability of commercial banks". (Master's thesis, Beijing Jiaotong University)

Zarruck E. R. (1989). Bank margin with uncertain deposit level and risk aversion. *Banking and Finance*, 1989, 13(6), 797-810

Asli Demirguc-Kunt., & Luc Laeven., & Ross Levine. (2004). Regulations, Market Structure, Institutions, and the Cost of Financial Intermediation. *Journal of Money, Credit and Banking,* 2004, 36(3), 593-622

Pelton, W. J. (1960). The determinant of banks' non-interest income. *American Journal of Public Health and the Nations Health,* 1960, 50(1), 21

DeYoung, R., & Hunter, W.C. (2002). Deregulation, the Internet, and the Competitive Viability of Large Banks and Community Banks. *THE FUTURE OF BANKING,* 312-322

Maudos J., & Klein M.A. (2004). Factors explaining the interest margin in the banking sectors of the European union. *Banking and Finance*, 2004, 28(9), 2259-2281

Han, Z. G, & Wang, Y, J. (2017). Factors Affecting Commercial Bank Spreads Under Interest Rate Liberalization. *Journal of Capital University of Economics and Business,* 2017, 19(1), 18-24

Davis, E. P., & Tuori, K. (1998). The Changing Structure of Banks' Income - an Empirical Investigation 1. *International Affairs*

Li, S. J., &., & Chen, Y. F. (2017). The impact of third-party Internet payment on the net interest margin of commercial banks. *Journal of Shandong Technology and Business University*, 2017, 31(5), 94-100

Angbazo L. (1997). Commercial bank net interest margins, default risk, interest rate risk and off balance sheet banking. *Banking and Finance*, 1997, 21(1), 55-87

Saunders A., & Schumacher L. (2000). The determinants of bank interest rate margins: an international study. *Department of Finance Working Paper Series,* 2000, 19(6), 813-832

Zhang, L. H. (2007). An empirical study on the determinants of net interest margin of

commercial banks in China. *Shanghai Finance,* 2007(5), 21-25

Abdelaziz, H., Helmi, H., & Mouldi, D. (2012). Modelling Non-interest income at Tunisian Banks. *Asian Economic and Financial Review,* 2012, 2(1), 88-99

Boyd, J. H., Levine, R., & Smith, B.D. (2001). The impact of inflation on financial sector performance. *Journal of Monetray Economics,* 2001, 47(2), 221-248

Zhao, S. M., & Liu, X. T. (2018). Does Internet Finance Affect the Non-Interest Income of Commercial Banks? *Contemporary Finance & Economics,* 2018(2), 49-61

DeYoung, R., & Hunter, W.C. (2002). Deregulation, the Internet, and the Competitive Viability of Large Banks and Community Banks. *THE FUTURE OF BANKING,* 312-322

Xia, H., & Chunsom, N. (2018). Third-Party Payments Impact on Commercial Banks' Non-Interest Income: Evidence from China. *International Journal of Economics and Finance,* 2018, 10(8), 190-203

Liu, Z. B. (2013). Rethinking On the Second Wave of China's Economic Globalization Strategy. *Academic Monthly,* 2013, 45(1), 88-96

Shen, C., & Zhao, M. (2017). Research on the influence of Internet Finance on commercial banks' income - Based on the analysis of 101 commercial banks in China. *Modern Economic Research*, 2017(6), 32-55

# Appendix 1

Appendix 1. Correlation Matrix

| | NIM | LNIF | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIM** | 1.0000 | | | | | | | | |
| **LNIF** | -0.5119 | 1.0000 | | | | | | | |
| **LNASSETS** | -0.4528 | 0.1378 | 1.0000 | | | | | | |
| **LD** | -0.4395 | 0.2533 | 0.4529 | 1.0000 | | | | | |
| **CAR** | -0.0373 | 0.4176 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.3605 | 0.3605 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | -0.1557 | 0.4854 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | 0.4888 | -0.9674 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | 0.1922 | -0.6104 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIM | LNP2P | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIM** | 1.0000 | | | | | | | | |
| **LNP2P** | -0.5224 | 1.0000 | | | | | | | |
| **LNASSETS** | -0.4528 | 0.1348 | 1.0000 | | | | | | |
| **LD** | -0.4395 | 0.2091 | 0.4529 | 1.0000 | | | | | |
| **CAR** | -0.0373 | 0.3834 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.3605 | -0.0020 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | -0.1557 | 0.5091 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | 0.4888 | -0.9634 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | 0.1922 | -0.6563 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIM | LNTPP | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIM** | 1.0000 | | | | | | | | |
| **LNTPP** | -0.5587 | 1.0000 | | | | | | | |
| **LNASSETS** | -0.4528 | 0.1409 | 1.0000 | | | | | | |
| **LD** | -0.4395 | 0.2760 | 0.4529 | 1.0000 | | | | | |
| **CAR** | -0.0373 | 0.4033 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.3605 | -0.0494 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | -0.1557 | 0.4372 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | 0.4888 | -0.9160 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | 0.1922 | -0.3836 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIIR | LNIF | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIIR** | 1.0000 | | | | | | | | |
| **LNIF** | 0.4121 | 1.0000 | | | | | | | |
| **LNASSETS** | 0.7103 | 0.1378 | 1.0000 | | | | | | |
| **LD** | 0.5751 | 0.2533 | 0.4529 | 1.0000 | | | | | |
| **CAR** | 0.0245 | 0.4176 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.1126 | 0.3605 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | 0.1306 | 0.4854 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | -0.4026 | -0.9674 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | -0.1567 | -0.6104 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIIR | LNP2P | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIIR** | 1.0000 | | | | | | | | |
| **LNP2P** | 0.3887 | 1.0000 | | | | | | | |
| **LNASSETS** | 0.7103 | 0.1348 | 1.0000 | | | | | | |
| **LD** | 0.5751 | 0.2091 | 0.4529 | 1.0000 | | | | | |
| **CAR** | 0.0245 | 0.3834 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.1126 | -0.0020 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | 0.1306 | 0.5091 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | -0.4026 | -0.9634 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | -0.1567 | -0.6563 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

| | NIIR | LNTPP | LNASSETS | LD | CAR | OPC | NPL | GGDP | CPI |
|---|---|---|---|---|---|---|---|---|---|
| **NIIR** | 1.0000 | | | | | | | | |
| **LNTPP** | 0.4291 | 1.0000 | | | | | | | |
| **LNASSETS** | 0.7103 | 0.1409 | 1.0000 | | | | | | |
| **LD** | 0.5751 | 0.2760 | 0.4529 | 1.0000 | | | | | |
| **CAR** | 0.0245 | 0.4033 | -0.0136 | 0.0143 | 1.0000 | | | | |
| **OPC** | 0.1126 | -0.0494 | -0.0480 | 0.1821 | -0.0301 | 1.0000 | | | |
| **NPL** | 0.1306 | 0.4372 | -0.0330 | 0.3061 | 0.3004 | 0.4147 | 1.0000 | | |
| **GGDP** | -0.4026 | -0.9160 | -0.1349 | -0.2313 | -0.4006 | -0.0458 | -0.5089 | 1.0000 | |
| **CPI** | -0.1567 | -0.3836 | -0.0647 | -0.0521 | -0.2465 | -0.1242 | -0.3822 | 0.5915 | 1.0000 |

Appendix 2. Abbreviation

ICBC: INDUSTRIAL AND COMMERCIAL BANK

ABC: AGRICULTURAL BANK OF CHINA

CCB: CHINA CONSTRUCTION BANK

BOC: BANK OF CHINA

BCM: BANK OF COMMUNICATIONS

CEB: CHINA EVERBRIGHT BANK

SPABANK: PING AN BANK

CCBK: CHINA CITIC BANK

# 국문초록

# 인터넷 금융이 중국 상업은행의 수익성에 미치는 영향에 관한 연구

성명: Du Yushan

학과 및 전공: 국제학과 국제통상전공

서울대학교 국제대학관

중국의 금리 자유화로 인해 상업 은행의 이자 수입 이익은 더 이상 지속할 수 없게 될 것이 분명하며, 이에 상업 은행들은 심각한 이윤창출의 딜레마에 빠지게 될 것이다. 알리페이와 차이푸퉁을 대표로 하는 인터넷 금융 플랫폼은 수년 동안 상업 은행에 의해 지배되던 전통적인 금융 생태계를 변화시켰다.

우선, 본 연구에서는 중국의 인터넷금융과 상업 은행의 현황에 대해 분석을 수행하고, 3 대 인터넷금융 모델이 상업 은행의 수익성에 미치는 영향 메커니즘을 순이자이익과 비이자이익의 관점에 입각하여 살펴보도록 한다. 그다음증식자산에서의 순이자이익 비율과 총자산에서의 비이자이익 비율을 각각 종속변수로 설정하고, 인터넷 통화기금, P2P 인터넷 대차, 제 3 자 결제 규모 등을 3 대 독립변수로 설정하였다. 본 연구에서는 중국에서 상장한 30 개

상업 은행의 2013~2018 년 자료를 기반으로 경험적 타당성 분석을 수행하였다.

경험적 타당성 분석에서 인터넷 통화기금, , P2P 인터넷 대차, 제 3 자 결제는 은행의 순이자이익에 부정적이고 현저한 영향을 미치는 것으로 나타났다. 이 중 제 3 자 결제가 상업 은행의 비이자이익에 긍정적이고 현저한 역할을 미치는 반면, 인터넷 통화기금과 P2P 인터넷 대차는 긍정적이지만 미미한 영향을 미치는 것으로 나타났다. 은행 소유권에 입각하여 인터넷 통화기금, P2P 인터넷 대차, 제 3 자 결제는 이자수익 측면에 있어 지분제 상업은행 국유은행보다 지분제 상업은행에 더 많이 손해를 끼치고 있는 것으로 나타났다. 비이자면에서 인터넷 통화기금, P2P 인터넷 대차, 제 3 자 결제는 지분제 상업은행에 긍정적인 영향을 주지만, 국유 은행에 피해를 주는 것으로 나타났다. 마지막으로 본 연구에서는 3 대 인터넷 금융 모델이 서로 다른 수익원과 유형의 상업 은행에 미치는 영향에 대해 분석을 수행하였고 상업 은행들에서 인터넷 금융의 도전에 대처하기 위한 대응책과 제안을 제시하였다.

**주요어**: 인터넷 금융, E-금융, 상업 은행, 이윤, 인터넷 통화기금, P2P 인터넷 대차, 제 3 자 결제

**학번**: 2018-22022