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MASTER'S THESIS

**The development and impact of internet  
finance**

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## Declaration

1. I hereby declare that I have compiled this thesis using the listed literature and resources only.
2. I hereby declare that my thesis has not been used to gain any other academic title.
3. I fully agree to my work being used for study and scientific purposes.

In Prague on 24.12.2020

Jia Wang

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## **Abstract**

In recent years, the rapid development of Internet finance has seized the financial market with a variety of business modes, which has had a strong impact on traditional financial institutions. This thesis analyzes the characteristics and main modes of Internet finance to explore the impact and future development of Internet finance. Due to the variety of Internet financial modes, this thesis uses a representative model of third-party payment to study the impact on residents, governments, and commercial banks. The main models used are OLS, panel data models, and VAR models. In order to explore the future development of Internet finance, this thesis not only compares the development of Internet finance in the United States, Europe, and China, but also analyzes the differences in the development of various regions. In addition, the thesis uses SWOT analysis to analyze the current environment of Internet finance, and speculates on future development trends and development measures that can be taken.

Keywords: Internet finance, third-party payment, regional differences, future development

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## **Introduction**

With the continuous updating and upgrading of Internet technology and the increase in financial demand, Internet finance has also emerged. It can not only improve financial efficiency, but also cover many fields, becoming a shining star in the financial industry. While the emergence of Internet finance provides more financial products, it also impacts traditional financial institutions, forcing traditional financial institutions to make business adjustments, promoting changes in the financial market, changing people's lifestyles, and affecting government policies. However, the development of Internet finance is also accompanied by various risks. Once they occur, they will have serious consequences. Therefore, the future development of Internet finance has also become a concern of everyone.

### **1. Literature review**

#### **1.1 Research on Internet Finance**

##### **1.1.1 Research on the Definition of Internet Finance**

The term Internet finance was mentioned earlier by Koh et al. (1973). They mentioned that qualified Internet finance enterprises will have access to basic financial credit. Regarding the concept of Internet finance, Gong Xiaolin (2013) believed that Internet finance is a financial activity based on modern information technology and has functions such as payment, financing and transaction intermediary. Xie Ping and Zou Chuanwei (2012) believed that the development of Internet finance is not only different from the indirect financing mode of commercial banks in the past, but also different from the direct financing method of the capital market. Generally speaking, the Internet finance mode is essentially related to direct financing, but it is not direct financing, but a third type of financing. Similarly, Jiang Song (2018) defines Internet finance as a financial platform based on the Internet platform. It is a new financial business model in which traditional financial institutions and Internet companies use Internet technology, information and communication technologies to achieve financial, payment, investment and information intermediary services. Wu Xiaoqiu (2014) argued that internet finance mainly uses internet information technology, and has a financial

function chain and an independent living space for investment and financing. "Financial function chain" and "independent living space" are two indispensable elements of internet finance. With these results of previous scholars, in this thesis, we consider internet finance combines traditional financial industry and modern information technology. As an emerging field, internet finance uses internet information to realize functions such as financial transactions, payment, transfer and information intermediation.

### **1.1.2 Research on the Causes and Characteristics of Internet Finance**

Li Qianying et al. (2015) proposed four reasons that may cause the emergence of internet finance: firstly, the development of the internet technology provides the user base for internet finance; secondly, information technology provides technical support for internet finance; thirdly, internet finance can meet the investment needs of users; at last, internet finance provides positive meaning to society. Of course, the four points they raised are the main factors, but they are not the only factors. The emergence of internet finance is also related to the main features of internet finance itself. Cui Yakun et al. (2016) logically deduced the causes of internet finance through cost-benefit analysis and supply-demand analysis, and found that the root cause of internet finance: under the traditional financial model, the contradiction in the financial market is that the supply of financial products and services provided by financial institutions are far from meeting consumer demand. Wang Da (2014) started with the United States, the source of the rise of internet finance, and analyzed the structural evolution of the US financial market and financial system from the three periods of the development. He pointed out that the marketization of interest rates is the source that induced the development of internet finance in the United States, and the conclusion is also applicable to the current China. From the aspect of the origin of internet finance, by analyzing Wang Junyun's (2015) point of view, we can find that the purpose of internet finance is to use the prominent features of the internet to reduce the problems of information asymmetry, moral hazard and adverse selection found in traditional financial markets, then improve the efficiency of financial markets and improve the

financial market system. Moreover, Cai Jieli et al. (2017) attributed the emergence and development of internet finance to two aspects: demand aspect and supply aspect. These two factors are mainly related to consumer demand and the supply of technology. Through the research results of these scholars, we can find that the most important point in the emergence of the internet is consumer demand for financial services. The traditional financial system can no longer meet people's growing demand, so internet finance is needed to solve this problem. The increasingly developed internet technology has provided a guarantee for the emergence of Internet finance.

The rapid development of internet finance is mainly due to its outstanding characteristics. Li Qianying (2015) studied the advantages of internet finance, then she concluded that low cost fees, high efficiency and wide coverage are the main advantages. Through these advantages, internet finance has attracted the attention of consumers. Tao Yana (2013) argued that the main characteristics of internet finance are low cost, high efficiency, good customer experience, and risk specificity. After Zhang Yiqian (2015) compared internet finance with traditional financial modes, she found that the main advantages of internet finance are fast information dissemination and processing, the realization of online payments, and the rational allocation of resources. Through the research results of scholars and the information provided in the current financial market, we can find that internet finance has many characteristics, such as convenient and fast payment methods, high information transparency, low cost, rich user credit data, and the emergence of virtual currency.

### **1.1.3 Research on Modes of Internet Finance**

As we all know, internet finance modes such as P2P lending, third-party payment, and e-commerce have become the focus of public attention. However, many scholars have further divided internet finance based on these modes. Li Qianying (2015) divided the mode of internet finance into third parties Payment, P2P network lending, big data finance, crowdfunding financing, information finance, internet financial platform. Liu Zhongqi (2016) proposed a similar view to Li Qianying. He believes that the main internet financial development modes are third-party payment, P2P online loan

platforms, crowdfunding, and internet financial platforms. Tan Xin (2016) proposed that internet finance can be divided into internet sales, internet finance modes, cross-border virtual currencies, and internet finance companies. Zheng Yanfang (2014) analyzed the main development modes of internet finance: P2P lending mode, third-party payment mode, e-commerce mode, and online banking mode. This explains the reason for the rapid development of internet finance. But most people believe that the general modes of internet finance refers to third-party payment mode, P2P online loan mode, and crowdfunding mode. Even though internet finance can still be divided into many models, the three modes mentioned above are the most common and are developing faster. Therefore, this thesis mainly discusses internet finance from these three aspects. Among these three modes, in China, the most significant and rapid development is third-party payment, so in this thesis, I mainly discuss the development of internet finance from third-party payment mode. For P2P network lending , crowdfunding mode and other modes, this thesis only briefly introduces.

#### (1) Research on P2P Online Lending

P2P lending, as an important mode of internet finance, first originated in the United Kingdom and then developed into other countries. In 2005, the UK established Zopa, the first P2P lending company. In 2006, the United States established Prosper to handle P2P lending. Therefore, Slavin (2007) claimed that in the United Kingdom and the United States, P2P online lending will become an alternative to traditional lending methods and continue to develop. P2P online lending is an internet financial peer-to-peer lending platform where individuals provide a medium for lenders and borrowers through online platforms, borrowers issue loan targets on corresponding platforms, and investors invest on the platform. The main features of P2P online lending are undirected lending, large number of people involved, and a different operating mode compared to traditional financial institutions. When studying the behavioral characteristics of P2P online borrowing investors, many scholars mainly study their herding behavior. Eunkyong Lee et al. (2012) studied herding behavior in online P2P lending. They believe that P2P online lending is a direct activity between lenders and borrowers, it is

also separate from traditional financial institutions such as commercial banks and other financial intermediations. By using a network platform to provides information intermediation services. Moreover, they conducted empirical research on the daily data of the largest P2P platform in South Korea and found that investors will bid on projects that tend to be invested by more investors. Therefore, they believe that this kind of herding behavior has certain blindness and defects. However, on the contrary, Herzenstein et al. (2010) claimed that the herding behavior in the P2P lending industry has helped investors to shorten the auction process to a certain extent, thereby improving lending efficiency and the final lending rate.

## (2) Research on Crowdfunding

Crowdfunding is an important internet financial mode. Paul Belleflamme et al. (2015) raised that crowdfunding is an activity on the internet platform that publicly calls for financial resources. Crowdfunding can connect fundraisers to fund specific activities. Moreover, we can define crowdfunding as the act of raising funds to support a project. Internet crowdfunding has the characteristics of openness, global information, diversity of returns, and diversification of investors. However, crowdfunding comes with a series of risks. As Lu Yue (2017) mentioned, in the internet crowdfunding, investors' rights and interests may be damaged, and the funds received by crowdfunding may lack supervision. Not only that, the crowdfunding platform also has audit risks. As a result, crowdfunding is restricted in many ways and cannot be universally spread.

## (3) Research on Other Modes

There are relatively few studies on other financial modes, but they do not lack research value. For example, virtual currencies are generally divided into two types. One type is virtual currencies with issuance centers. Shin DH (2008) and Sun Baowen (2009) regarded virtual currencies as Internet operations that serve as general equivalents within a certain range. Although it has the functions of circulation and payment methods under certain circumstances, the special commodities released by the merchants are different from legal tender. There is also a decentralized virtual currency represented

by Bitcoin. Wu (2013) pointed out that decentralization makes Bitcoin do not require government guarantees and transactions are free. Nakamoto (2008) once wrote that Bitcoin advocates believe that it is a currency system that is decentralized, anonymous, proprietary, and non-inflationary.

#### (4) Research on Third-party Payment

For the research focus of this thesis on third-party payment. Carl Kaminski (2003) pointed out that third-party payment is a transaction between individuals, allowing consumers and merchants to use payment intermediaries to complete the transfer of funds and monetary payments. Through Ren Shuming (2013) and Li Ping (2016), we can define third-party payment as some institutions that have contracted with banks and have certain strength and reputation protection. They are independent of banks, websites and merchants, and are responsible for clear payment services. In general, third-party payment is a financial mode that emerges along with internet finance. It mainly refers to other payment services such as online payments and prepaid cards provided by non-financial institutions. Third-party payment has developed fast and sound along with internet finance. The United States is a country with a high degree of development of internet finance. It has many famous third-party payment institutions, for example, Paypal. Comparatively speaking, Du xiaoyu (2018) thought that China 's internet finance and third-party payment mode have developed relatively late, but due to the rapid development of China 's economy and huge consumer demand, China has rapidly developed third-party payment mode in just over a decade. From the report of iResearch (2018), the total scale of third-party payment transactions in China in 2013 was 7.62 trillion, but the total scale of third-party transactions in 2017 reached 133.62 trillion. In 2018, Tmall 's "Double 11" completed 100 billion yuan in transactions in just 1 hour and 47 minutes, which is 7 hours shorter than 2017. It indicates that third-party payment is still on the rise in China and it will grow faster and faster. Therefore, this thesis will mainly study the third-party payment mode in China.

At present, many scholars have studied third-party payment, but most of them focused on the following aspects: First, the reason why third-party payment exist. Su Huazhong

(2013) expounded the development process of third-party payment, and analyzed the political, technical and economic background of the development of third-party payment. The reasons for the rise of third-party payments are mainly explained in terms of cross-regional payment needs, restrictions on traditional payment methods, and internet development. Li Yulin et al. (2013) analyzed the efficiency of third party payment from the aspect of transaction cost efficiency ,which is based on transaction cost theory, and they pointed out that third party payment can effectively reduce transaction costs and save social resources. Second, the operation mode of third-party payment. Ni Kang (2015) used Alipay's successful operation model as an example to explain the profit model that an excellent third-party payment should have. Li Linli (2016) analyzed the current status of the current third-party payment operation model, and proposed related solutions to the problems. The third aspect is to focus on the risks and regulatory measures of third-party payments. Zheng Jianyou (2006) listed the potential risks and problems in the third-party payment market, and put forward his own suggestions for strengthening China's third-party payment supervision. Hou Chunjun (2009) analyzed the problems of unclear legal status, anti-money laundering, credit card cash, fraud, and network system security in third-party payments. He proposed that we should gradually improve laws and regulations by drawing on advanced regulatory modes and experiences from other countries system. Fourth, the impact of third-party payments on other economic dimensions. Cindy Claycomb (2005) predicted in research that third-party payments and e-commerce will have an impact on a country's industry. Tom. Prieto (2010) believed that third-party payments also have a great impact on taxation, but this effect has both a positive promotion and a negative hindrance.

## **1.2 Research on Empirical Analysis of Third-party Payment**

### **1.2.1 Research on the impact of third-party payment on residents**

The impact of third-party payments on other economic aspects is an important aspect of the impact on consumption. Ellen Christianse (1999) founded through research that

the third-party institutions introduced by the e-commerce shopping platform will make customers more assured of the shopping environment and trust the shopping platforms, thereby promoting consumption and playing a positive role in the e-commerce platform. Zhang Chuanyong (2015) pointed out that third-party payment has successfully resolved the contradiction in the temporal and spatial separation between buyers and sellers, funds and logistics. With the rapid development of internet information technology and the popularity of mobile phones and computers, third-party payments have penetrated into residents' lives. Third-party payments can be used not only for online transfers and daily payments, but also for online shopping. But for the time being, few scholars have directly studied the impact of third-party payments on Chinese residents' consumption. Cui Haiyan (2016) studied the impact of internet finance on Chinese residents' consumption, but internet finance includes not only third-party payments, but also P2P and crowdfunding mode, so it cannot directly represent the impact of third-party payments on household consumption. Xu Zhao (2014) took WeChat payment as the research object and found that its innovative financial payment methods, financial management and marketing models have made consumption methods more convenient and promoted consumer consumption. But the full text is explained in a theoretical way, lacking the support of model results. Li Wei (2018) used time series data to empirically analyze the impact of third-party payment transaction scales and internet development indexes on household consumption. The consumer price index was used as an explanatory variable, and third-party payment transaction scales and internet financial development indexes were used as explanatory variables. However, as one of the important internet financial modes, third-party payment has a certain impact on the internet financial development index. It is likely that the model has multiple collinearity problems due to the correlation between variables. Lu Jianli (2018), when studying the impact of internet finance on consumption, set out a time series model starting from online shopping. When variables were adopted, the scale of third-party payments was used to represent internet finance, and the online shopping market transaction value was used to represent household consumption. However, the time span selected in the thesis is 2004-2017, with a total of 14 variables, which lacks

certain representativeness. Therefore, this thesis will use quarterly data from the first quarter of 2013 to the first quarter of 2019. While increasing the number of variables, according to economic theories, household consumption is a function of income, so the per capita disposable income variable was introduced when the model was established.

### **1.2.2 Research on the impact of third-party payment on commercial banks**

Gong Xiaolin (2013) explained the impact of internet finance on traditional banks. In the short term, the internet financial mode will not shake the traditional banks' profit methods and business modes. However, in the long run, if banks want to achieve long-term development, we must focus on expanding the profit modes of internet finance. Many scholars have studied the relationship between third-party payment and traditional banking business. Fan Jinya (2017) pointed out that although third-party payments have impacted some of the business of commercial banks, commercial banks also restrict the development of third-party payments with their own credit and capital advantages. Therefore, from the perspective of game theory, It seems that the two should seek cooperation. From another perspective, we know that third-party payment institutions do not have their own payment settlement systems, so they have to choose to cooperate with commercial banks. Some scholars also suggested that the development of commercial banks' intermediary business has not been significantly affected. Instead, it has achieved innovation in financial products and improved service modes in the competition with third-party payments, which has increased intermediary business income. From the perspective of interest rates, Dai Guoqiang et al. (2014) claimed that internet finance is an innovation in interest rates, which will greatly promote the marketization of interest rates and reduce the overall financing cost of society. Eisemann (1976) proposed that non-interest income is hardly affected by interest rates and economic cycles. Compared with net interest income, non-interest income has less volatility and is more stable. Therefore, the increase of non-interest income can reduce commercial banks' fluctuations in operating income. Although there are very few literature that have researched the impact of internet finance on the intermediary business of commercial banks, their researches either use only theoretical

analysis methods or use the proportion of fees and commission income as a measure. If we analyze in depth, we can find that the above research has limitations: internet finance will not only affect the bank's intermediate business, but also affect some investment business, exchange business, wealth management business and related derivatives market business. Therefore, it will be more accurate to explore the impact of internet finance on non-interest business. Secondly, the fee and commission income is only part of the bank's intermediate business income or non-interest business income. It is not comprehensive to use this indicator as a proxy variable to conduct research. The last point is that the number of banks studied in the past is relatively small and cannot accurately reflect the actual situation. Therefore, this thesis mainly studies the impact of third-party payments on the bank's non-interest income. In order to solve the problem of lack of data, this thesis adopts a 14-year time series and uses data from 15 banks in China, then establish a panel regression model for analysis. Moreover, through the analysis of the existing works of literature, we can find that the development of the internet financial has become a new trend, and it will develop more and more rapidly in the future. The development of internet finance has become the inevitable development of the financial industry, which has a certain impact on the traditional financial industry. The traditional financial industry cannot face it negatively. It should adjust its strategies, integrate technologies, and integrate its core business to effectively improve its service levels. Only in this way can it develop healthily and continuously.

### **1.2.3 Research on the impact of third-party payment on monetary policy**

Since the development of third-party payment, many scholars have studied the relationship between third-party payment and monetary policy. Among them, the International Settlement Organization BIS, which studied earlier, has published a series of research reports, suggesting that the emergence of third-party payments will have an impact on the government's monetary policy. Anon and Bandera (2004) wrote in a research report that even if the third-party payment innovates the payment and settlement method, it will not cause major institutional innovation. The emergence of third-party payment has accelerated the speed of financial transactions and improved

the efficiency of the use of liquidity resources, but it cannot to a large extent affect the process by which the central bank raises interest rates and thus affects actual economic variables through monetary policy. Professor Otmaixing realized that the emergence of third-party payments will have an impact and impact on the monetary policy of the central bank. The third-party payment mode is largely to electronicize physical currency. People no longer need cash, but instead use electronic currency for payment and settlement. Arnone and Bandiera (2004) also found through research that electronic money has gradually become an important form of currency, which may affect the effectiveness of monetary policy in the future, and people's extensive use of electronic money may affect the central bank's currency reserve demand. Abednego and Aprilsah (2010) studied the relationship between electronic money, money supply and currency circulation in the Indonesian market, and conducted research using the cash balance method. Finally, they concluded that electronic money will change people's money demand, thus speeding up the circulation of money. Xie Ping (2013) pointed out that due to its low transaction costs, mobile payment reduces people's daily demand for money, which in turn reduces the cash leakage rate, and ultimately has a positive impact on the broad money multiplier; Yang Yanfan (2014) found through research that third-party payment institutions as the main force of electronic money issuance will further magnify the effect of China's currency multiplier. However, some scholars believe that the impact of third-party payments on China's currency multiplier is uncertain. Ye Xiang (2011) explained that the currency multiplier is determined by the government's regulatory requirements, financial institutions' assets and liabilities, and payment behavior preferences. It is not possible to study only third-party payments. Fang Xing (2017) used the relevant data from 2014 to 2015 to study the relationship between the effectiveness of third-party payments and monetary policy using the TVP-VAR model. The final results show that from different levels of analysis, the effects of third-party payments on monetary policy are different. It is very likely that these research results are inconsistent: Some scholars regarded third-party offline payment, third-party internet payment, and third-party mobile payment as the same payment method, and did not specifically distinguish various payment methods. Not only that, many scholars

chose time periods before 2015, and many third-party payment platforms were established relatively late. For example, Alipay was established in 2004. The result is that the model results are not representative. At present, there are many empirical kinds of literature on the study of money supply. Although the specific objectives of the research are different and the specific methods of empirical analysis are different, the basic principles are similar. The empirical methods used in most literature are based on the vector autoregressive (VAR) model or cointegration and vector error correction (VEC) model proposed by Granger (1987), Johansen (1992). Although these pieces of literature did not consider the impact of internet finance when using these methods for empirical analysis, the data processing methods are similar, so this thesis intends to use these methods to build a VAR model of the impact of third-party payments on the money supply. The effect of third-party payments on the money supply is analyzed through the model results.

### **1.3 Research on Different Countries and The Future of Internet Finance**

It is obvious that the globalization of internet finance is not limited to China, but the degree and development of each country is different. Ding Chun et al. (2016) analyzed the reasons for the development of internet finance according to the specific conditions of Europe, the United States and China. The reasons for the inconsistent development in each region are mainly related to macroeconomic development, the degree of financial market development, and regulatory policies. Cao Jing (2009) analyzed the development of third-party payments in the United States, Europe, Asia, Australia, New Zealand and other regions. They found that the rapid and sound development of third-party payments in developed countries is mainly because developed countries have good infrastructure construction, mature credit systems, sound regulatory systems, and the guidance of laws and regulations. As a result, they proposed that China should learn the advanced experience of the developed countries to develop third-party payments in China. Zheng Hao (2017) explained the differences between third-party payments in China and other countries by comparing the differences between Alipay and Paypal.

Zhang Hongwei (2013) pointed out that at the beginning of the development of internet finance, the United States, Australia and the European Union have started to pay attention to the supervision of third-party payment services. Therefore, they have both similarities and differences in the supervision of third-party payments.

Internet finance continues to develop. Tao Yana (2013) pointed out four future development trends of internet finance: horizontal integration and vertical specialization; third-party payment, especially mobile payment, will gradually replace traditional payment services; P2P online lending will gradually replace some traditional loans business; crowdfunding will replace some of the traditional securities business. In a globalized economic situation, we cannot avoid the development of internet finance. Instead, we should focus more on developing internet finance in a better direction. As Cai Jieli (2017) mentioned, the global economic situation is both an opportunity and a challenge for internet finance. They believed that if internet finance wants to seize the opportunity, it should follow the development trend and solve the existing problems: network security, legal loopholes, and price control. Xin Yu (2014) proposed that the opportunities of internet finance are mainly its cost advantages and its ability to acquire customers. The challenge is the resistance, entry conditions and risks of itself. Chi Chunjing (2019) claimed that although the development of internet finance has increased capital flows, promoted the development of investment markets, and stimulated consumption, the government will continue to support the development of internet finance, but at the same time, the problem of investment fraud caused by internet finance It also needs to be resolved in a timely manner. Zheng Janyou (2006) claimed that if the current problems in the development of internet finance in China are to be solved, it is necessary to change the traditional marketing concepts and modes, correctly understand the internet finance modes, and meanwhile make reasonable use of the characteristics of internet finance. At the same time, he pointed out that if we want to solve the problem of internet finance supervision, financial institutions must strengthen the construction of credit systems, and the government must improve laws and regulations to protect the rights and interests of internet finance consumers.

## **2. Internet finance**

### **2.1 Characteristics of Internet Finance**

Internet finance is an emerging financial mode, which integrates Internet technologies, mobile communication technologies and other information technologies into the financial market, so as to realize the financing of funds. The traditional financial industry is mainly responsible for the circulation of funds, payment and other financial services, while the Internet industry is mainly responsible for the processing of information, communication and other functions. The combination of the two, Internet finance, has both functions, is a new field.

As a new field, Internet finance has its own characteristics:

#### **(1) High information transparency and autonomy**

The search engine, mobile payment, big data, cloud computing and other technologies used in the Internet finance are developing rapidly, so the information asymmetry in the financial market is constantly reduced. All financial participants can use these techniques to match information based on their own trading information to find the right trading object. The traditional loan financing and stock securities business can be operated through the Internet, and the autonomous ability of participants is improved, thus reducing the cost of financial transactions, speeding up the transaction process and reducing the asymmetry of market information.

#### **(2) Wide coverage**

Under the traditional financial mode, it is difficult for Banks to obtain very accurate information of both sides of the transaction due to the limitations of technology, manpower and other factors, so there are many risks in the transaction. To avoid excessive trading risk, traders and Banks may avoid such business. However, under the development of Internet finance, financial participants can directly match the information they need on the Internet, and Internet finance breaks geographical and

time constraints, covers a part of the blind spot in the financial business then improves the efficiency of resource allocation.

### (3) High efficiency and low cost

Through the internet platforms, both parties to the transaction can complete the entire process of information identification, pricing, matching and transaction, reducing certain transaction costs and intermediary costs, and also reducing some monopoly profits. (Lu Caiping, 2017) From the actual situation, Internet finance is mainly processed quickly through computers, which saves customers' time for queuing for business and speeds up business processing. With the rapid development of Internet finance, many financial institutions have reduced the number of business outlets, and there is no need to recruit many ordinary employees, which saves the operating costs of financial institutions.

### (4) Unique risk characteristics

The emergence of Internet finance is relatively late and the development period is relatively short. Therefore, while developing rapidly, many disadvantages also appear. An important reason for these defects is that the relevant laws and regulations are not sound. Every country has laws related to the Internet finance market, but they are relatively few, and the introduction of laws lags behind the development of Internet finance, so there is a risk of lack of supervision in the Internet finance market. Not only that, because the Internet financial market uses a lot of Internet technologies, it is vulnerable to computer viruses and other threats, which may eventually lead to the leakage of trading information and other serious consequences.

## **2.2 Modes of Internet finance**

With the rapid development of Internet finance, many modes have been formed. According to the financial demands of users, there are mainly the following 15 modes.

Table 2-1 Main Modes of Internet Finance

Payment and settlement	Financing	Finance and investment	Risk management	Information intermediary	Virtual currency
Internet banking				Internet financial portal	Online virtual currency
Internet payment	P2P lending		Internet insurance		
	Crowdfunding				
	Internet asset trading				
	Online micro-loans	Internet money fund	Online inquiry		
	Internet consumer finance	E-commerce fiancne sales			
Internet securities					
				Game currency	

*Source:China Big Data Industrial Observation*

However, due to the late emergence of Internet finance, the rapidly developing and popular modes are mainly P2P online lending, crowdfunding and third-party payment.

### **2.2.1 P2P online lending**

P2P online lending refers to Peer to Peer online lending, which mainly refers to the transactions directly conducted by financial market participants through P2P online lending platforms(zhang ruofan,2016). P2P online lending platforms are mainly provided to small and medium-sized enterprises and individuals who need financing but have difficulty in obtaining loans from traditional financial institutions. P2P online lending platforms also provide information to both borrowers and investors. Borrowers can announce their financing demands through the platform and find investors willing to lend money. In the whole transaction process, P2P online lending platforms only provide intermediary services such as collecting information, auditing information and disclosing information, so as to earn service fees.

There are many operating modes of P2P online lending, mainly including simple intermediary mode represented by Prosper in the United States, compound intermediary mode represented by Zopa in the United Kingdom, and zero-return mode represented by Kiva(He wenjing,2019). In China, the main modes are pure online mode, online and offline combination mode (OTO mode) and so on.

The rapid development of P2P online lending is mainly due to its own pattern characteristics. First, it is easy to operate. Both parties can complete the transaction

through the Internet platform; The second is openness, where you can learn about both lenders and borrowers. Moreover, P2P mode is generally a one-to-many transaction mode, and capital can realize risk diversification. P2P online lending avoids the intervention of traditional financial institutions, so compared with traditional commercial Banks, the total transaction cost is very low except for certain intermediate fees.

### 2.2.2 Crowdfunding

Crowdfunding is a mode of raising funds directly to the public on the basis of the Internet. To be specific, it is a financing mode that conducts publicity and promotion through network channels, concentrates the scattered funds of the public, and provides funds for the for-profit or non-profit activities of small enterprises or individuals (Lv yue, 2017). Crowdfunding is mainly composed of project sponsors, Internet crowdfunding platforms and funders interested in the project.

In Internet crowdfunding, it is usually free or paid in the form of return on investment with products, services, debt, equity, etc. According to the different return methods and international experience, crowdfunding can be mainly divided into four types: public welfare crowdfunding, product and service crowdfunding, debt crowdfunding and equity crowdfunding. The mode of Internet crowdfunding originated in the United States. The development of Internet crowdfunding in China is relatively late, and the main forms of Internet crowdfunding are also divided into four types.

Table 2-2 Types of Internet Crowdfunding in China

TYPE	PLATFORM
Lending-based crowdfunding	ppdai.com ; renrendai.com
Equity-based crowdfunding	angelcrunch ; dajiatou.com
Reward-based crowdfunding	dreamore.com ; zhongchou.cn
Donate-based crowdfunding	TREVOLTA ; Crowdt/1t

By the end of June 2018, there were 854 crowdfunding platforms in China, among which 251 were still in normal operation. The accumulative actual investment of successful crowdfunding projects reached 72.554 billion yuan(Huang zhenzhen, 2018). The attention and encouragement of Internet crowdfunding mode in various countries is determined by the characteristics of the crowdfunding mode: low threshold, creativity, diversity and ordinary groups. The use of Internet crowd-funding mode for financing is not affected by external factors such as age, occupation, etc. And the only decision criterion is the project. As long as a project has extraordinary ideas or creativity, whether it is technology, music or other types of projects, it can be funded through Internet crowdfunding platforms.

### **2.2.3 Third-party payment**

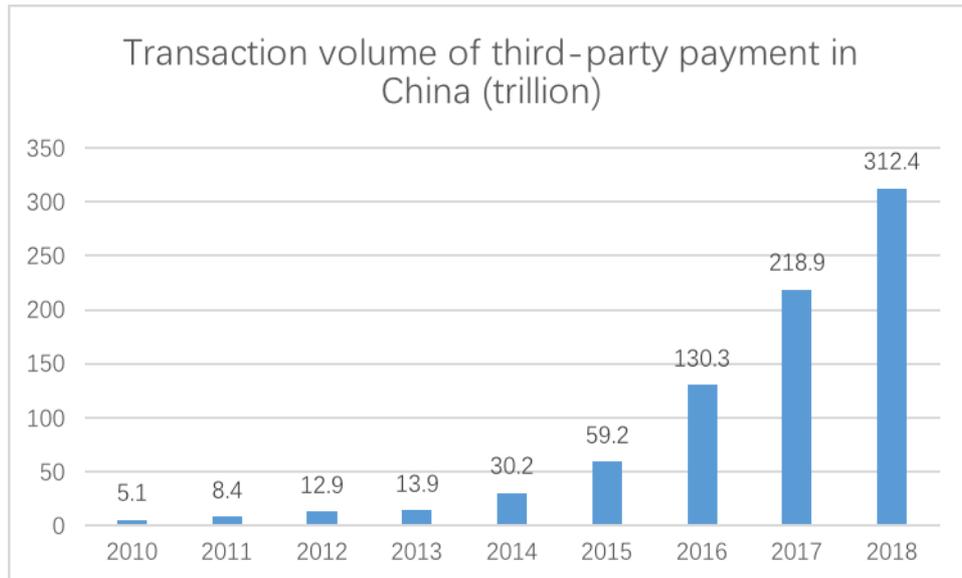
As one of the fastest and most widely developed Internet finance modes, third-party payment mainly refers to some third-party payment institutions with certain financial strength and reputation, which exist between buyers and sellers as an intermediary trading platform after signing contracts with major banks(Cal Kaminski,2003). Major trading process is: after the buyer choose goods, using a third-party account for payment, the third-party payment institution will tell the seller that the buyer have already paid, and the seller can deliver the goods. After the buyer has received and checked the goods, he can inform the third-party payment institution that he can pay the seller. Finally, the third-party payment institution transfers the payment to the seller's account.

I believe that third-party payment is more familiar to people than other Internet financial modes. The emergence of third-party payment has successfully reduced people's demand for wallets. Mobile phones have become our latest wallet. We can completely solve all payment problems through online payment. No matter where we go, as long as it is not where we can only pay in cash, we can always make electronic wallet payments via mobile phones or computers. At present, third-party payment is developing rapidly in various countries, especially in China, where there are a variety of third-party payment platforms, such as alipay, tenpay, netease, kuaiqian and so on. If you go shopping or travel in China, what do you see most? My answer is: QR code,

WeChat payment QR code and Alipay payment QR code. Wherever you need to pay, you will see these two QR codes. Why are people so inclined to third-party payment? I think the most important thing is that it simplifies transaction operations and makes payment faster. The third-party payment platforms adopt the method of cooperating with many banks to conduct online transactions through mobile phones and computers. For merchants and consumers, there is no need to install too much apps, the operation is simple, and the transaction can be completed in a very short time. Of course, third-party payment platforms can also record the transactions of both parties in detail to prevent possible disputes in subsequent transactions (Ji Guoxin, Wang Qirui, Mo Fanyu, 2020).

With third-party payment, we don't have to worry about whether our cash will be stolen, or whether we forget to bring our wallet, merchants do not have to worry about not having enough change for consumers. Just a few clicks on the phone screen or mouse to complete online payment, you can solve most of the needs of clothing, food, housing and transportation in life. It innovates people's way of life. You can buy the latest clothes without going out shopping, you can receive fragrant food without going out, you can get in a taxi by paying with your mobile phone, and there is no need to wait for mutual transfers, because third-party payment platforms provide instantaneous service, which not only save time, but also get the same services. And with the emergence of third-party payment platforms, some customs in people's lives have begun to change. For example, it is a traditional Chinese New Year custom for relatives and friends to send blessings by giving red envelopes to each other. However, with the emergence of third-party payment platforms, this custom began to change. Issuing electronic red envelopes and red-envelope war led by several large Internet companies such as Tencent and Alibaba Group have become new types of activity for people to express their blessings and increase the entertainment of life. Behind countless electronic red envelopes is the surge in the number of third-party payment users, which has promoted the development of third-party payment.

Figure 2-1 Transaction Volume of Third-party Payment in China



*Source: data.iresearch.com.cn*

From Figure 2-1, we can find that the total amount of third-party payment transactions in China developed slowly before 2014 and has been developing rapidly since 2014. I think one reason for the rapid development of third-party payment is the development of Internet information and communication technologies and the popularization of electronic products such as computers and mobile phones. Therefore, compared with the traditional payment mode, the third-party payment has obvious advantages. It can integrate a variety of bank card payment methods into one interface, and the platform is responsible for the connection between transactions and banks, making online payment more convenient and fast. It also reduces transaction costs to some extent, because buyers and sellers do not need to worry about fees caused by different Banks. Moreover, the third-party payment platform itself is attached to the large portal websites and relies on the credit of the Banks it cooperates with. Therefore, the third-party payment platform can break through the credit problems in online transactions and promote the rapid development of e-commerce.

#### **2.2.4 Other modes**

The above-mentioned three modes are currently relatively popular and large-scale Internet finance modes, but other modes are also undergoing rapid development and are increasingly being valued by people. For example, virtual currency. Virtual currency

is the most representative application of blockchain technology. Virtual currency is different from the digital currency of the central bank. The digital currency of the central bank has the function of legal currency, but the virtual currency is a unit of account issued and used by private institutions. It is a digital form that can reflect value, including encrypted currency, Internet points and other currencies backed by assets. (Wang Xin, Ren Zhe, 2016). As of 2018, there are more than 1,800 virtual currencies in circulation worldwide, with a market size of more than 300 billion U.S. dollars. (Foley et al., 2019)

At present, virtual currencies can be roughly divided into three categories: The first category is virtual currencies that have no exchange function, which can generally be used in online games and can only be used in a closed virtual environment. The second type is virtual currency that can be exchanged one-way, usually used in a virtual environment, but compared to the first category, the second one of virtual currency can buy some physical goods and services. The third category is two-way exchange of virtual currencies, which can be purchased and sold through legal means, including cryptocurrencies represented by Bitcoin(Sun lihang,2018).

An important feature of cryptocurrency is decentralization. Decentralization means that there is no central party like a central bank to intervene in the management and issuance of cryptocurrencies, allowing participants to execute transactions themselves. Although the transaction is publicly recorded, people cannot track the user's real identity, but can only know the user's virtual address, which has better privacy(Chaum,1983). And without the participation of intermediary agencies, the payer directly contacts the payee, reducing the intermediate cost and reducing the cost.

Many other types of Internet finance modes also have their own unique characteristics and advantages, involving a variety of financial services. Each mode is advancing with the advancement of Internet technology, expanding the influence of Internet finance.

### 3. The Impact of Internet Finance Represented By Third-party Payment -- Taking China as An Example

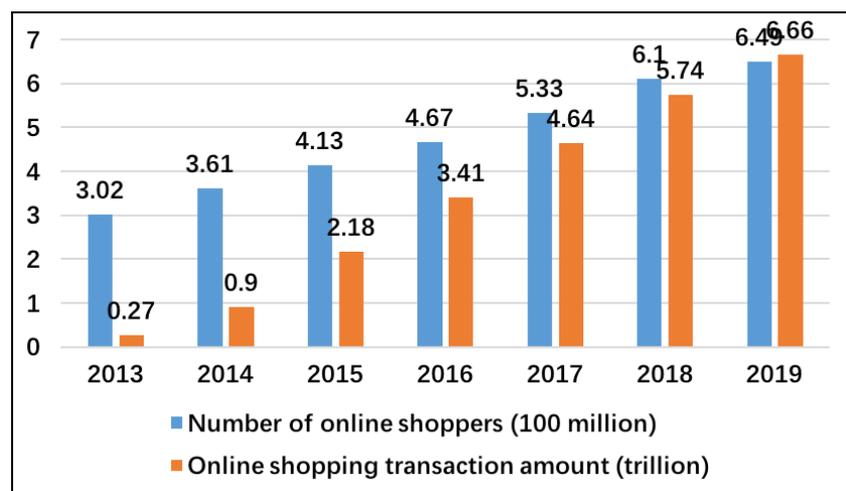
In view of the most rapid and prominent development of third-party payment mode in China, this thesis mainly studies the impact of Internet finance represented by third-party payment on China from three perspectives: residents, government policies and banks.

#### 3.1 The Impact of Third-party Payment on Residents' Life

With the continuous development of Internet finance and the continuous increase of online shopping platforms, the consumption patterns of residents have become more diversified. The most important changes are:

(1) Resident consumption shifted from offline consumption to online consumption

Figure 3-1 Number of Online Shoppers and Transaction Volume from 2013 to 2019

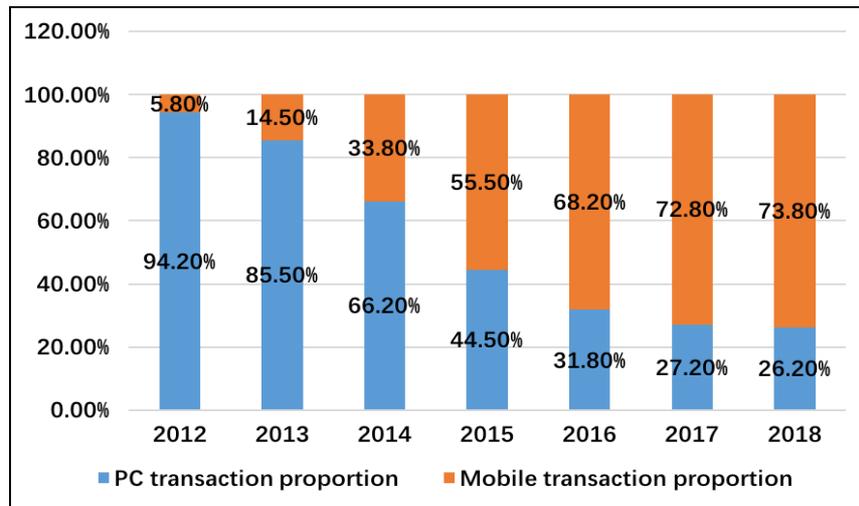


Source: [www.chyxx.com](http://www.chyxx.com)

From Figure 3-1, we can find that the number of online shoppers continues to increase, and the growth rate of online shopping volume is even faster than that of the number of people. The volume in 2019 has increased by 6.39 trillion compared to 2013. For example, in the Tmall Double Eleven event in 2020, the daily volume on November 11 reached 498.2 billion, which reflects the huge potential of China's online shopping market(Sina Finance,2020).

(2) Mobile consumption exceeds PC consumption

Figure 3-2 2012-2018 Online Shopping Payment Modes



Source: <http://www.chinairr.org/report/R09/R0904/201908/19-309828.html>

As shown in Figure 3-2, we can find that in 2016, China Mobile's online shopping accounted for 68.2% of the overall online shopping transaction scale, an increase of 22.8 percentage points from last year. The mobile terminal has surpassed the PC terminal to become the more dominant consumption scenario in the online shopping market; at the same time, in 2016, the growth rate of mobile users of TOP10 enterprises in China's online shopping market far exceeded that of PC users. The growth rate of App users was 27.1%, and that of PC users was only 9.6%. This also explains why companies will focus more on the development of mobile services.

The changes in residents' consumption patterns are closely related to third-party payment. In order to further study the strength of the relationship between third-party payment and residents' consumption, the thesis conducts an empirical test.

### 3.1.1 Sample and Model Selection

By analyzing the changes in household consumption, we can find that payment modes are an important factor. At present, online shopping is an important part of residents' consumption, and mobile online shopping is developing faster, so the mobile online shopping transaction volume is used as the explained variable (Y). The data used in this thesis is from the first quarter of 2013 to 2019 Mobile payment online shopping

transactions in the first quarter. Third-party mobile payment transaction volume (X1) is used as an explanatory variable. At the same time, we must not forget that there is another important factor affecting residents' consumption: residents' income. According to the "life cycle approach" theory put forward by Modigliani (1954), consumers always choose to optimize their income in consumption expenditures under the conditions of budget constraints, to maximize their utility. Therefore, consumers will make the best choice between current consumption and future consumption. Both current income and future expected income will affect the current consumption of residents, so we use per capita disposable income as the explanatory variable X2. Data comes from iResearch, National Bureau of Statistics of China, and Analysys data.

Due to the small number of variables and the use of time series data, this thesis uses the OLS model for analysis. The OLS model can intuitively show the linear relationship between the explanatory variable and the explained variable, and the final regression analysis result obtained after a series of tests can reflect a more specific relationship between the variables, and the coefficients can also be used to observe the relationship between the variables. The positive or negative relationship between them can determine whether third-party payment can really promote residents' consumption.

### **3.1.2 Data Processing and Inspection**

For the accuracy of the model, this thesis first performed log transformation on the data. The logarithmic change does not change the nature and correlation of the data, and to a certain extent compresses the scale of the variables. Secondly, this thesis first conducts a unit root test on the data to avoid spurious regression. The so-called pseudo-regression refers to the existence of large correlation coefficients between variables. If the data is directly used for regression, the results will be largely biased, and the established regression model may also have no economic significance. The unit root test is a test of the stationarity of a time series. Only a stable time series can be used for quantitative analysis, otherwise a pseudo-regression phenomenon will occur. Unit root test includes ADF test, PP test, NP test, etc. This thesis adopts ADF test.

Table 3-1 ADF test

	t-statistic	5% level	10% level	Prob	Result
Y	-0.068888	-1.959071	-1.607456	0.6476	non-stationary
X1	1.761378	-1.956406	-1.608495	0.9775	non-stationary
X2	3.532188	-1.959071	-1.607456	0.9995	non-stationary
D <sup>2</sup> (Y)	-6.846535	-1.959071	-1.607456	0.0000	stationary
D <sup>2</sup> (X1)	-7.248210	-1.957204	-1.608175	0.0000	stationary
D <sup>2</sup> (X2)	-2.227276	-1.960171	-1.607051	0.0284	stationary

Note: D<sup>2</sup>(Y), D<sup>2</sup>(X1), D<sup>2</sup>(X2) in the table are the second-order differences of variables Y, X1, X2.

From the final results, if you test the stationarity of the zero-order sequence of the variable, the P value obtained is 0.6476, 0.9775, and 0.9995 all over 0.5, indicating that the zero-order data of the time series Y, X1, and X2 are all non-stationary, but after the second-order difference, it successfully passed the stationarity test.

After passing the stationarity test, we perform a cointegration test on the model. Cointegration test is used to analyze the long-term equilibrium relationship between variables. In the process of cointegration analysis of variables, if the explanatory variable and the explained variable are cointegrated, we can be sure that the variables will not produce pseudo-regression results, and there is a long-term and stable relationship between variables. The co-integration test method used in this thesis is the EG two-step method. First obtain the OLS regression results according to the variables, and then perform the unit root test on the obtained residuals. If the unit root test is passed, the variables are cointegrated and have a long-term equilibrium relationship. The OLS regression equation is:

$$LN(Y) = -0.497929 + 0.725838LN(X1) + 0.105769LN(X2) + \varepsilon$$

After performing a unit root test for the residuals, we can find that the P value is 0.0055, which is less than the P value at the 5% significance level, so the regression results are valid.

Table 3-2 Unit Root Test For Residuals

	t-Statistic	1% level	5% level	10% level	Prob	Conclusion
$\varepsilon$	-2.944685	-2.692358	-1.960171	-1.607051	0.0055	stationary

### 3.1.3 Conclusion

Through the OLS regression model, we can find that there is an obvious positive correlation between mobile online shopping volume, third-party mobile payment volume and per capita disposable income. When the third-party mobile payment transaction volume increases by 1%, the mobile online shopping transaction volume will increase by 0.725838%. When the per capita disposable income of residents increases by 1%, the mobile online shopping transaction volume will increase by 0.105769%. Therefore, we can be sure that the development of third-party payment can promote the increase of residents' consumption. In order to better stimulate consumption in the future, the government should continue to promote the rapid and healthy development of Internet finance, including third-party payments, while ensuring that residents' income continues to increase. The government should further strengthen security and convenience, make Internet finance a continuous driving force for consumption, and ensure sustainable economic growth.

### 3.2 The Impact of Third-party Payment on Government Policies

With the rapid development of Internet finance, the e-commerce market has gradually emerged, and the prosperity and development of the e-commerce market is inseparable from the support of third-party payment. Third-party payment helps consumers simplify payment modes through simple and convenient payment features. The currency in third-party payment is what we call electronic money, which is a substitute for cash, which will change traditional payment modes (Berentsen, 1998), and this substitution will weaken the central bank's position as the settlement center of the overall financial system (Berk, 2002). Electronic money will speed up the circulation of money, change the money multiplier, and weaken the central bank's ability to supply money (Sullivan, 2002). We can see that the impact of third-party payment on

government policies refers to monetary policy. This thesis mainly analyzes the relationship between third-party payment and money supply.

To study the relationship between third-party payment and money supply, first, we can use relevant monetary theories to analyze third-party payment. Fisher (1911) studied the relationship between currency and economic activity, and proposed the Fisher equation:  $M=PT/V$  based on the theory of cash transaction theory. The emergence of third-party payment has changed people's payment modes, and people have gradually preferred to use electronic money instead of cash. In this case, the transaction speed will increase and the cycle of commodity transactions will be shortened. Therefore, the currency circulation speed will also increase. According to Fisher's equation, we can find that when the commodity transaction volume remains constant, the acceleration of currency circulation will reduce the supply for money. Keynes's (1936) money demand theory pointed out that people hold money because of the "liquidity preference" theory, and most people are willing to maintain a part of their wealth in the form of money. And Keynes said that money demand is divided into three categories: transactional demand, speculative demand and preventive demand. The electronic currency used in third-party payment has a certain substitute effect for the currency in circulation, reducing people's transactional demand for money (Wang Liang, 2013). With the rapid development of Internet finance, people can find more and more financial products, and financial investment has become more convenient. Therefore, to a certain extent, people's reduced transaction demand will be transformed into investment demand.

Theoretically speaking, money supply refers to the money stock of a country to serve the social and economic operations in a certain period. The main determinants are the money multiplier and base currency, and the money multiplier theory is an important theoretical basis for monetary policy. The main factors affecting the money multiplier are: cash ratio, time deposit ratio, excess reserve ratio, required deposit reserve ratio and required time deposit reserve ratio. Through the use of electronic money, third-party payment reduces people's demand for cash and affects the cash ratio. Secondly, the circulation of electronic money is very high. Commercial banks can quickly raise

funds when funds are short of funds, and can appropriately reduce the withdrawal of excess reserves, which will also affect the money multiplier and ultimately affect the money supply. In order to analyze the impact of third-party payment on the money supply more specifically, this thesis conducts an empirical analysis on third-party payment and money multiplier.

### 3.2.1 Sample and Model Selection

At present, there are not many empirical researches on the relationship between third-party payment and money multiplier. A few scholars have used the OLS model to analyze. In comparison, the VAR model depends on the quantitative relationship of variables, which can be analyzed by impulse response. In this way, the relationship between variables can be reflected more clearly, so this thesis mainly adopts the VAR model.

In order to better study the relationship between third-party payment and money supply, this thesis uses the monetary multiplier that affects the money supply as the explained variable, and uses the narrow money multiplier(K1) and the broad money multiplier(K2). This thesis refers to the research of Yang Yifan (2014), Bai Ruitao (2016) and other scholars, measures the electronicization of third-party payment by the ratio of third-party payment transaction volume to the broad money supply(EM). Take EM as the explained variable. In order to avoid the mutual influence between variables, this thesis establishes the VAR model between third-party payment and narrow currency multiplier, third-party payment and broad currency multiplier. Due to the short development time of Internet finance and the insufficient data period, this thesis uses quarterly data from 2013 to 2018 for analysis. Data sources: China National Bureau of Statistics, iResearch Consulting Database, China Economic Network Statistics Database.

Table 3-3 Variables selection

Variables	Data processing
narrow money multiplier K1	narrow money supply / base money

broad money multiplier K2

broad money supply / base money

electronicization of third-party payment EM

third-party payment transaction volume / M2

### 3.2.2 Model Inspection

#### (1) Stationarity test

First, the stability of the variables must be tested before the model analysis. If the variables are non-stationary, it will affect the correctness of the regression analysis. It can be seen from the Table 3-4 that the original series of the three variables K1, K2 and EM are all non-stationary. After the first-order difference of the variables is tested, we can find that at the 10% significance level, the series of the three variables are all stationary series. Thus, the conditions for constructing the VAR model are satisfied, and the cointegration test can be performed.

Table 3-4 Stationarity Test

	ADF statistic	P-value	1% level	5% level	10% level	Result
K1	-1.869913	0.6356	-4.440739	-3.632896	-3.254671	non-stationary
DK1	-2.556989	0.0132	-2.674290	-1.957204	-1.608175	stationary
K2	-2.124460	0.5062	-4.416345	-3.622033	-3.248592	non-stationary
DK2	-3.831428	0.0362	-4.498307	-3.658446	-3.268973	stationary
EM	-1.916278	0.6137	-4.416345	-3.622033	-3.248592	non-stationary
DEM	-3.021242	0.0484	-3.769597	-3.004861	-2.642242	stationary

#### (2) Cointegration test

The purpose of cointegration test is to judge whether there is a long-term equilibrium relationship between variables. This thesis mainly uses the Johanson cointegration test.

Table 3-5 Cointegration Test of K1 and EM

Hypothesized No.of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.618797	20.05773	15.49471	0.0096
At most 1	0.037732	0.769254	3.841466	0.3804

Table 3-6 Cointegration Test of K1 and EM

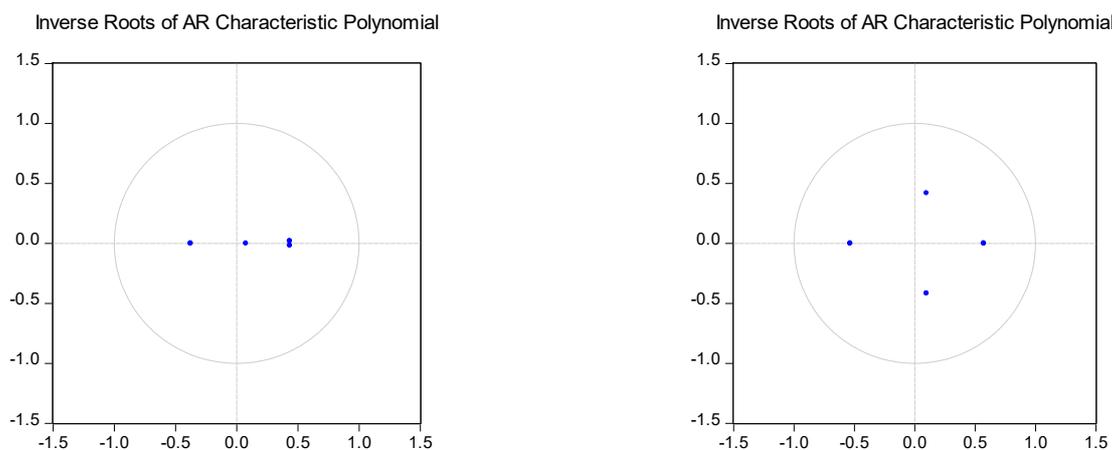
Hypothesized No.of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.858088	37.34804	15.49471	0.0000
At most 1	0.013054	0.249660	3.841466	0.6173

Through the results of the cointegration test, we can find that when testing the cointegration relationship between K1 and EM, the P value of no cointegration relationship is 0.0096, and the P value of at most one cointegration relationship is 0.3804. At the 5% significance level, we should reject the null hypothesis that "there is no cointegration relationship between variables" and accept the null hypothesis that "there is at most one cointegration relationship between variables". Similarly, K2 and EM also have one cointegration relationship. This also shows that there is a long-term equilibrium relationship between K1 and EM, and between K2 and EM.

## (2) Model stability test

Before constructing the model, we first select the lag order of the model. According to the AIC and SC standards, the lag order of the model we choose is both 2, so that we can check the stability of the model. Only a stable VAR model will not change for a long time due to shocks. Therefore, we choose AR root test to examine the stability of the model.

Figure 3-3 AR root test



It can be obtained from the figure that all the points are in the unit circle, and most of them are far away from the unit circle. This shows that the reciprocals of all roots of

the model are all within the unit circle, that is, the reciprocals of roots are all less than 1. According to the results, this model is stable.

### 3.2.3 Regression Analysis

After passing the test, we can construct the VAR model:

Table 3-7 VAR regression model of K1 and EM

	DEM	DK1
DEM(-1)	0.192469 (0.25552) [ 0.75324]	-0.441990 (0.59788) [-0.73926]
DEM(-2)	0.123618 (0.25013) [ 0.49421]	0.200828 (0.58527) [ 0.34313]
DK1(-1)	0.080176 (0.11427) [ 0.70165]	0.379683 (0.26737) [ 1.42006]
DK1(-2)	0.078415 (0.11719) [ 0.66912]	0.083125 (0.27421) [ 0.30315]
C	0.042429 (0.02253) [ 1.88289]	0.053059 (0.05273) [ 1.00632]

Table 3-8 VAR regression model of K2 and EM

	DK2	DEM
DK2(-1)	-0.067777 (0.25881) [-0.26188]	-0.004334 (0.02975) [-0.14571]
DK2(-2)	-0.052224 (0.25881)	0.043757 (0.02975)

		[-0.20178]	[ 1.47108]
DEM(-1)		-1.682756	0.304685
		(2.06988)	(0.23789)
		[-0.81297]	[ 1.28077]
DEM(-2)		1.121957	0.137068
		(2.07006)	(0.23791)
		[ 0.54199]	[ 0.57613]
C		0.279743	0.035304
		(0.20722)	(0.02382)
		[ 1.35000]	[ 1.48242]

We can get the regression equations:

$$DK1 = -0.44199 * DEM_{t-1} + 0.20083 * DEM_{t-2} + 0.37968 * DK1_{t-1} + 0.08313 * DK1_{t-2} + 0.05306$$

$$DK2 = -1.68276 * DEM_{t-1} + 1.121957 * DEM_{t-2} - 0.06778 * DK2_{t-1} - 0.052224 * DK2_{t-2} + 0.27974$$

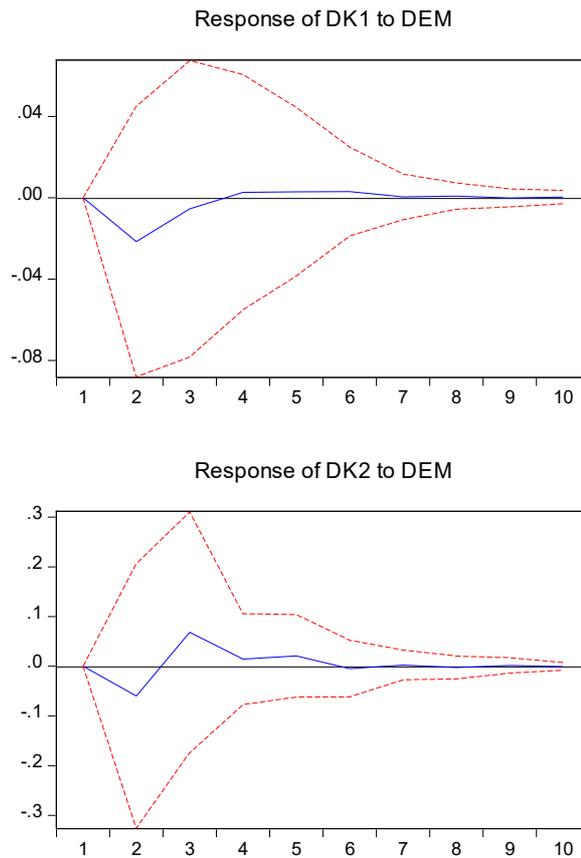
We can find that when one period is lagging, EM has a negative influence on K1 and K2, but if two-periods lags, EM has a positive influence on K1 and K2. Since there are only two-period lags in the regression equation, in order to more clearly analyze the long-term dynamic relationship between variables, this thesis uses impulse response to illustrate.

### 3.2.4 Impulse Response

We give EM a impulse and then observe the responses of K1 and K2:

Figure 3-4 Impulse Response of K1,K2 to EM

Response to Cholesky One S.D. (d.f. adjusted) Innovations ?2 S.E.



The horizontal axis in the Figure 3-4 is the number of lag periods, a total of 10 periods; the vertical axis represents the response value of the money multiplier to third-party payment electronicization; the solid line represents the value of the impulse response function, which represents the response of the money multiplier to shocks, and the dotted line indicates the deviation from plus or minus two standard deviations. From the response of K1 to EM, we can see that there was a downward trend in the first period and a negative impact; but from the second period, the curve showed an upward trend, the impact was positive, reaching the maximum in the fourth period, and then it decayed slowly in the 6th period and was close to zero. At the same time, we can find that the response function value of K1 to EM was above 0 or close to 0 after 3.5 periods, indicating that the positive shock of third-party payment electronicization will have a positive impact on the narrow money multiplier after 3.5 periods. The impulse response diagram shows that the electronicization of third-party payment has a greater impact on the narrow money multiplier in the short-term, which is mainly reflected in the impact of third-party payment on cash and demand deposits in circulation. The later curve

tends to be flat and close to zero, indicating that ,from a long-term perspective, the impact of third-party payment on the narrow money multiplier is relatively low, and the impact on the narrow money supply is relatively small. The response of K2 to EM showed a downward trend in the first period, and the response value began to rise in the second period and reached the maximum in the third period, and then began to decay and was close to zero. The positive shock of third-party payment electronicization will have a positive impact on the broad money multiplier after 2.5 periods. It means third-party payment will have a greater impact on the broad money multiplier in the short term.

By comparison, the response speed of K2 to EM is faster than the response speed of K1 to EM, and the response value of K2 reaches its peak in the third period, which precedes K1. The reason for this phenomenon may be that third-party payment not only has an impact on cash and demand deposits, but also affects time deposits and savings deposits. Third-party payment have reduced people's demand for cash. With the development of Internet finance, more and more new financial management, investment products, and new financial modes have emerged. People may invest the currency they hold into other business areas of Internet finance through a third-party payment medium, and some of these currencies may return to the bank in the form of custodial deposits and agreement deposits.

### **3.2.5 Conclusion**

In the short term, the impact of third-party payment on the narrow money multiplier and broad money multiplier is relatively strong, mainly from the substitution impact of electronic money on cash and demand deposits. In the long run, third-party payment has an expansion effect on both the narrow money multiplier and the broad money multiplier. Under the premise that the base currency remains unchanged, the money supply will be increased, but the strength of this influence is limited because the development period of third-party payment is relatively short and overall industry scale and development level is limited. Not only that, Internet finance, including third-party payment, has strengthened the market endogenousness of the money supply, resulting

in a decrease in the controllability of money supply. Not only that, Internet finance, including third-party payments, has strengthened the market endogenousness of the money supply through the return of money, resulting in a decrease in the controllability of the money supply. The development of electronic money has extended the concept of traditional money, leading to the gradual breaking of the boundary between M0, M1, and M2, increasing the difficulty of the central bank's monetary level division, and reducing the measurability of money supply. Therefore, in the future, relevant departments should pay close attention to the possible risks of third-party payment to monetary policy, encourage monetary policy research in the field of money circulation and money supply, strengthen monitoring, conduct macro-control in accordance with market demand, and ensure monetary policy effectiveness.

### **3.3 The Impact of Third-party Payment on Commercial Banks**

Internet finance has gradually penetrated into various industries with its unique information technology, and the first to be affected is the traditional financial industry, especially traditional financial institutions such as commercial banks. On the positive side, Internet finance and commercial banks have their own advantages and disadvantages. Therefore, the two can cooperate or compete, ultimately promoting the level of innovation in the financial industry. (Raza and Hanif, 2013) And Internet finance provides new financial modes for commercial banks, and financial services and products can be upgraded accordingly, which improves the operating efficiency of commercial banks. However, the emergence of Internet finance has increased the degree of interest rate marketization, and has adversely affected the income and risk levels of industrial banks. (Dai Guoqiang and Fang Pengfei, 2014)

For a long time, commercial banks in China have mainly used interest income as their main source of income. However, in recent years, with the continuous development of Internet finance and the increase in interest rate marketization, the level of interest income of commercial banks has shown a downward trend, and commercial banks have paid more attention increasing their own non-interest income. Relative to net interest

income, non-interest income is less volatile and more stable. Therefore, the increase in non-interest income can reduce the volatility of commercial bank operating income (Eisemann, 1976). There is no definite definition of non-interest income of commercial banks. It includes interest income from interest margins obtained by commercial banks through providing deposit and loan services for other financial institutions and the central bank, and interest income from investment bonds of commercial banks. It also includes income that cannot be classified as interest income from the main business of commercial banks. The main categories are: net income from fees and commissions, net investment income, net income from changes in fair value, and other business income.

From the perspective of third-party payment, as an important part of Internet finance, it has a positive and negative impact on the non-interest income of commercial banks. In terms of positive impact, the comprehensiveness and convenience of third-party payment have continuously forced commercial banks to reform and improve their competitiveness. The development of Internet finance has forced commercial banks to use information technology to carry out financial innovation, which has improved the operational efficiency of banks (Srivastava, 2014) and increased non-interest income. Secondly, when using third-party payment, most transactions need to be bound to bank cards. As the number of third-party payment users increases, the number of cards issued by commercial banks also increases. However, in terms of negative effects, the various services provided by third-party payment have the same business nature as commercial banks, and there is a competitive relationship between the two. Some products provided by third-party payment institutions have higher yields than banks, reducing commercial banks' non-interest income. Not only that, different commercial banks have different online banking systems. Under different circumstances, consumers may need to switch to different banking systems. However, third-party payment avoids this restriction, thus attracting more users.

Through analysis, we can find that third-party payment has both a promoting effect and a hindering effect on the non-interest income of commercial banks. We are not sure

whether the promoting effect is greater than the hindering effect. This is the content that this thesis wants to explore in the model.

### **3.3.1 Sample and model selection**

This thesis mainly uses the data of commercial banks for 14 years from 2005 to 2018 as the research sample. The data comes from the annual reports of commercial banks and the Wind database. This thesis mainly selects 15 commercial banks as the research objects: Industrial and Commercial Bank of China, China Everbright Bank, Huaxia Bank, China Construction Bank, Bank of Communications, Nanjing Bank, Agricultural Bank of China, Shanghai Pudong Development Bank, Bank of China, China CITIC Bank, Ping An Bank, Minsheng Bank, China Merchants Bank, Industrial Bank, Bank of Beijing.

In terms of model selection, previous scholars have also conducted relevant empirical tests. Some scholars used panel data regression analysis to conclude that third-party payment has caused a certain impact on commercial banks' intermediary business, but there are also some opportunities (Li Feixiang, 2019). Some scholars also used the OLS model to analyze and found that Internet finance has a positive impact on the profitability of commercial banks (Chen Qianqian, 2019). But in comparison, when studying the relationship between Internet finance (including third-party payment) and commercial banks, most scholars used panel data regression analysis. Therefore, this thesis also chooses this model, using panel data including cross-sectional data and time series data to establish a multiple regression model for panel data.

Since this thesis mainly studies the relationship between third-party payment and non-interest income of commercial banks, we select the non-interest income of commercial banks as the explained variable (NNI) and the third-party payment transaction volume as the explanatory variable (TP). For the completeness of the model, the thesis also selects several control variables. Although the control variable can affect the explained variable, it is not the core explanatory variable to be studied in this thesis. Reasonable selection of control variables can more accurately analyze the impact of core explanatory variables (TP) on the explained variables. Therefore, taking into account

the size of the bank and the ability of operation and management, thesis has selected several representative bank indicators as control variables: ROE, ROA, cost-to-income ratio (CIR), and capital adequacy ratio (CAR) . These indicators can reflect the operating capabilities of commercial banks to a certain extent. For example, ROE reflects the level of return on net assets. Commercial banks with larger ROEs indicate stronger operating capabilities. Since the gap between the maximum and minimum non-interest income of commercial banks is very large, and compared with other bank indicators, the value is large, if logarithmic processing is not performed, the data may be unstable and affect the construction of the model. Logarithmic processing will not change the relationship between variables. So thesis takes lnNNI as the explained variable. In the same way, the third-party payment transaction volume is also logarithmized as the core explanatory variable lnTP.

### 3.3.2 Model Inspection

Before performing panel data regression, in order to avoid the appearance of pseudo-regression, we need to perform unit root test on the data to ensure the stability of the data. The unit root test can be divided into two types: the first test assumes that the cross-section individuals in the panel model have the same unit root, and the test methods include LLC test, Breitung test, and Hadri test; the second test assumes that the cross-section individuals in the panel model have different unit roots, and the test methods include IPS test, ADF test, and PP test. In order to analyze the reliability, thesis selects four methods, LLC, IPS, ADF, and PP.

Table 3-9 Unit Root Test

	LLC (Prob)	IPS (Prob)	ADF (Prob)	PP (Prob)
NNI	0.0001	0.0065	0.0097	0.0042
TP	0.0000	0.0000	0.0002	0.0002
ROA	0.0000	0.0000	0.0000	0.0000
ROE	0.0000	0.0000	0.0000	0.0000
CIR	0.0000	0.0000	0.0000	0.0000

CAR	0.0000	0.0000	0.0000	0.0000
-----	--------	--------	--------	--------

According to the test results, in the zero order sequence, the significance value (P value) corresponding to each variable is less than the P value at the 1% level, indicating that the unit root test passed at the 99% confidence level. The variables have stationarity. At the same time, in order to ensure that the model has economic significance, we also need to perform a cointegration test to verify whether there is a long-term equilibrium relationship between the explained variable and the explanatory variable. Cointegration test can use Fisher test, Pedroni test (Pedroni, 1999) and Kao test (Kao, 1999). Thesis mainly uses Kao test:

Table 3-10 Cointegration test-results of KAO test

	t-Statistic	Prob.
ADF	-4.936203	0.0000
Residual variance	0.020190	
HAC variance	0.019104	

From the above results, we can get that the P value is less than 0.01, so we can think that the result is significant, and there is a long-term cointegration relationship between variables.

### 3.3.3 Regression analysis

In order to choose the correct regression model, we should first perform an F test to determine whether the model has individual effects. The null hypothesis of the F test: the intercept and the coefficient are the same for different individuals and cross-sectional data. If the result of the F test accepts the null hypothesis, it means that there is no significant gap between different individual data and different cross-sections, and the model does not have individual effects. We can use a mixed effects model.

However, if the result of the F test shows rejection of the null hypothesis, then there is an individual effect in the model, but whether it is a random effect or a fixed effect, we need to do Hausman test. The null hypothesis of Hausmann test is that this individual

effect should be a random effect. If the test result rejects the null hypothesis, then we should choose a fixed effects model.

(1) F test (Null hypothesis: select mixed effect model)

Table 3-11 F Test

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	89.475701	(14,189)	0.0000
Cross-section Chi-square	424.646902	14	0.0000

Through the F test, we can clearly find that the P value is less than 0.1, reject the null hypothesis, and do not choose the mixed effects model. Therefore, we can perform Hausmann test.

(2) Hausmann test (Null hypothesis: select random effects model)

Table 3-12 Hausmann Test

Correlated Random Effects – Hausman Test			
	Chi-Sq.		
Test Summary	Statistic	Chi-Sq. d.f.	Prob.
Cross-section Random	0.000000	5	0.0000

Through Hausmann test, we get P value < 0.01, reject the null hypothesis, and choose fixed effects model.

(3) Regression results

Table 3-12 Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.640998	0.174026	-3.683339	0.0003
lnTP	0.544161	0.023834	22.83087	0.0000
ROA	0.781811	0.096139	8.132086	0.0000
ROE	0.020488	0.004720	4.340892	0.0000
CIR	-0.001529	0.002057	-0.743376	0.4582
CAR	-0.032085	0.008934	-3.591100	0.0004

By establishing a regression model, we can get the regression equation:

$$\ln NII_{it} = -0.640998 + 0.544161 \ln TP_{it} + 0.781811 ROA_{it} + 0.020488 ROE_{it} - 0.0011529 CIR_{it} \\ - 0.032085 CRA_{it}$$

From the above equation, we can find that there is a positive correlation between our core explanatory variable TP and the explained variable NNI. For every 1% increase in third-party payment transactions, the non-interest income of commercial banks will also increase by 0.544%. Therefore, it can be explained that although third-party payment has both a positive and a negative impact on the non-interest income of commercial banks, overall, the positive impact is greater than the negative impact. Although the products of third-party payment platforms compete with the financial products of commercial banks, commercial banks have a large scale of development and a long development period. They can use Internet financial technology to position the market, comprehensively consider the situation of financial products, and strengthen risk prevention and increase revenue. Moreover, compared with third-party payment platforms, commercial banks have comparative advantages in terms of reputation, scale, and number of customers. At the same time, due to the emergence of third-party payment platforms, commercial banks have promoted the construction of online banking, launched some new financial products, and increased non-interest income. At present, if we use a third-party payment platform, commercial banks will still be involved in most cases, such as binding a bank card of a commercial bank, or inter-bank transfer. Although these are all carried out on third-party payment platforms, they have also increased the non-interest income of commercial banks.

### **3.3.4 Conclusion**

Through regression analysis, I believe that when dealing with Internet finance, commercial banks should pay more attention to learning from the development advantages of Internet finance, transforming development advantages into their own advantages, and combining their own specific conditions to promote relevant business innovation. Secondly, commercial banks should continue to increase investment in information technology construction, maintain and upgrade online banking platforms, and expand their business scope. When it comes to Internet finance, commercial banks can't just treat it as a competitor. Although the two have a competitive relationship, they

can also cooperate. For example, third-party payment platforms have more customer information. By cooperating with third-party payment platforms, commercial banks can learn more accurately about customer risk tolerance and income levels, so as to provide services that better meet customer needs, increase non-interest income and overall benefits, then ultimately realize the development.

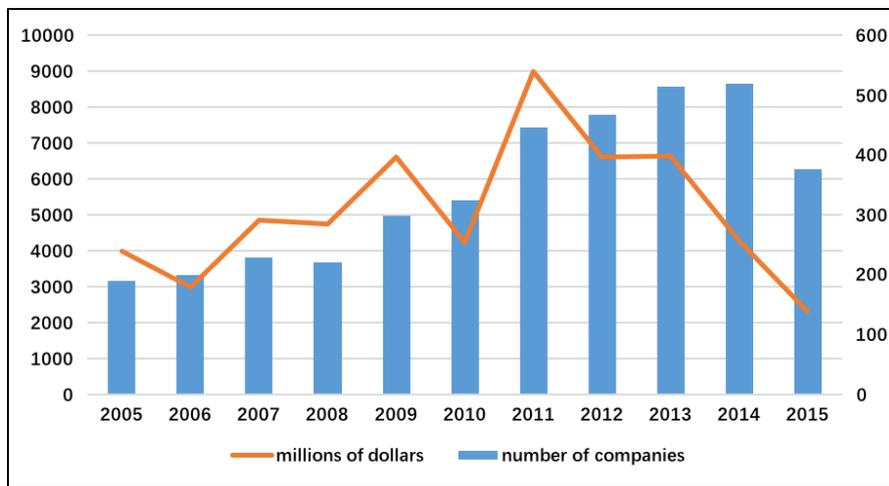
#### **4. The current status of Internet finance in United States, Europe and China**

##### **4.1 Development status of Internet finance in United States**

In United States, most people know about the term "Fintech" instead of Internet finance. Strictly speaking, Fintech includes a wider range than Internet finance, because fintech not only includes Internet finance, but also integrates other technologies into finance. It is a financial service that uses electronic communications and computers to facilitate finance and the market. (F Allen, J Mcandrews and P Strahan, 2002) To a certain extent, the development of Fintech also reflects the development of Internet finance. Compared with other countries, the development of Internet finance in United States is relatively early, such as Paypal, which was established in 1998, and Schwab, which began to provide online financial services in the 1990s. Here, we have to mention Paypal. At present, Paypal is the world's largest online payment company. Paypal's business supports more than 20 currency transactions in 190 countries and regions around the world, and provides a variety of products and services, such as Paypal digital wallets, cross-border e-commerce services, etc. The development of Paypal fully embodies the continuous progress of third-party payment and provides experience for the establishment and development of other third-party payment platforms. In the 1990s, the application of Internet industry in United States developed rapidly, and Internet finance was generated and developed rapidly in this wave of development. The number of Internet finance companies in United States also continues to rise every year during a certain period of time. Figure 4-1 shows the number of new Fintech companies and the amount of financing in the United States from 2005 to 2015. We can find that in the first 10 years, the number of new fintech companies in United States showed an upward trend, but by 2015 there was a significant decline. And the amount of financing

continued to decline after reaching the peak in 2011. According to survey data of CB insights, in 2014, the financing amount of Internet finance companies in US reached 9.887 billion US dollars, accounting for 82.09% of the total financing amount of global Internet finance companies. But by 2017, the US financing amount was only \$ 11.6 billion, accounting for 22%. From this data, we can also analyze that, to a certain extent, the development of the Internet financial market in United States has also entered a mature stage.

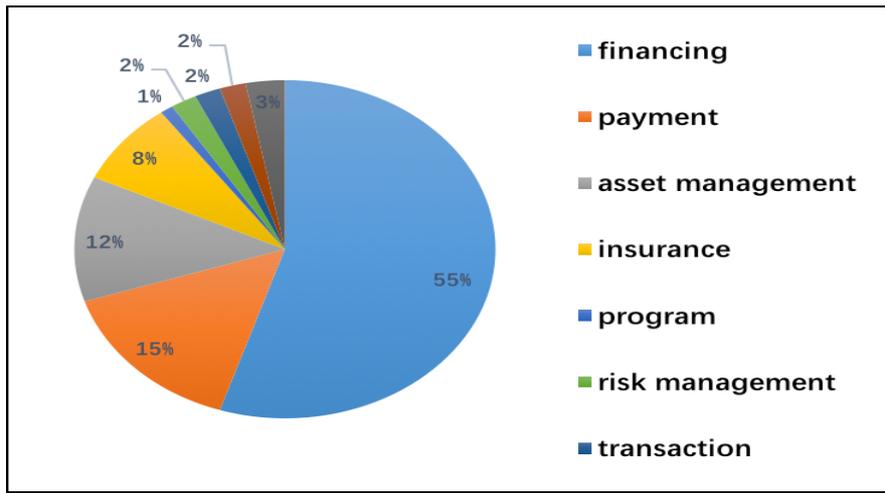
Figure 4-1 2005-2015 Number of New Fintech Companies and Financing Amount in US



Source: Crunchbase

In United States, Internet finance originally referred to internet financing methods such as online banking and internet insurance, but with the development of the society, Internet finance has formed a financial system including transfer payment, financing loans, asset management and online insurance(GOMBER P and Kauffman R J,2018). Figure 4-2 shows the current main business of fintech companies in the US in 2015. From the figure, we can find that financing and payment are the main services provided by American Internet finance companies.

Figure 4-2 Main Business of Fintech Companies in 2015



Source: Crunchbase

Although the Internet finance market in United States has entered a mature stage, there are still some factors that restrict the in-depth development of Internet finance:

(1) To a certain extent, the double-layer supervision mechanism in the United States has restricted the horizontal expansion of Internet financial institutions. An important reason why Internet finance become popular among people is its convenience. Consumers can use the Internet to transact online financial services across time and regions. However, the double-layer financial supervision mechanism is relatively cumbersome, which is not conducive to the development of Internet financial platforms across regions.

(2) Some laws and regulations restrict the use of data by Internet finance companies. Because the government and the public are very concerned about the use of big data and models by internet finance companies, they believe that the sources of big data and the credit models used by internet finance companies may bring many hidden risks, violations of laws and regulations, and so on. Therefore, an intangible restriction has been formed on Internet financial companies. However, big data is an indispensable part of the development of Internet finance. The larger and more complex data, the more complex models need to be used. However, people worry that the inclusion of gender and ethnicity in the credit model that may cause discrimination, which will violate the principle of fairness. Therefore, it has hindered the development of Internet finance.

## **4.2 Development status of Internet finance in Europe**

The economy in Europe is relatively developed, and Internet finance development, like United States, started earlier. Technological, scientific and intelligent Internet finance has a greater impact on the traditional European financial industry, especially the banking industry. To a certain extent, Internet finance has changed the internal structure of banks, expanded the business scope of banks, and promoted the innovation of financial modes. With the further impact of the Internet and mobile phones on people's lives, European banks have reduced their outlets and strengthened the construction of e-banking. Some scholars believe that in a short period of time, the bank's outlets will not disappear, but the scale will become smaller and smaller, because more customers may be inclined to handle related financial services through electronic banking(Hewen,2016). Not only that, there are also retail banks in the European market. Such banks may not have branches, and all business is conducted through the Internet or telephone channels, which can enable banks to develop new businesses on a low-cost basis. For example, ING DIBA,which is a representative company.

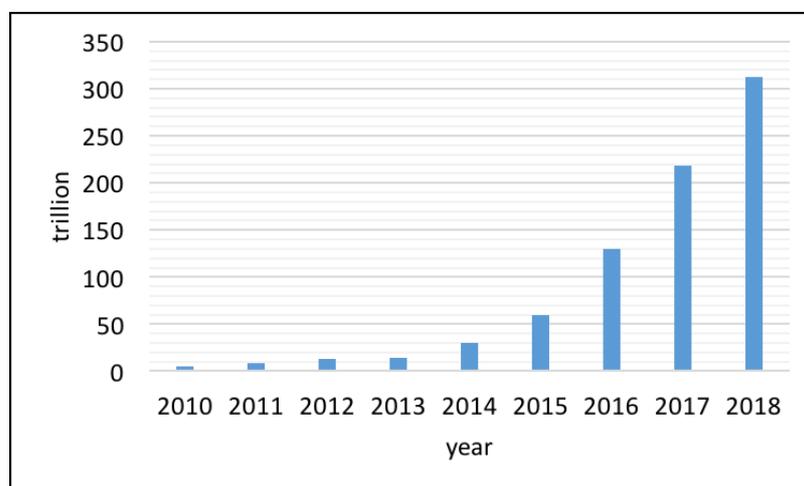
However, there is a problem with the development of Internet finance in Europe: the market scale is small. In the second half of 2016, Cambridge University and a number of authoritative institutions released a research report on the development of European Internet finance called "Maintaining Growth Momentum". The report collated data from 367 platforms in 32 countries in Europe. The report pointed out that in 2015, the total economic volume of many European countries has exceeded 16 trillion euros, but the total market volume of Internet finance is only 5.431 billion euros. Not only that, but the difference between many European countries is also relatively large: UK's Internet finance market volume is 4.412 billion euros, accounting for 81% of the entire Europe. It can be said that the UK is a central area of European Internet finance. Some other countries, such as France, have a market scale of 319 million euros, Germany has 249 million euros, and the Netherlands has 111 million euros(Liu lei and Liu xiaoting,2018). In a developed region with developed economy and mature legal supervision, Internet finance, which represents the future financial development direction, has not developed on a large scale. The possible reason is that the domestic

regulatory policies of European countries and European regulatory policies have not reached a balance point. The financial platform needs to be further adjusted to adapt to changes in European regulatory policies on the basis of adjusting to changes in domestic regulatory policies, so there is also a great risk of policy changes.

### 4.3 Development status of Internet finance in China

Internet finance in China is in rapid development, as shown in Figure 4-3. Before 2014, the development of internet finance in China was relatively slow and the market scale was small. But after 2014, it climbed dramatically. The reason of the phenomenon is that Internet finance has the potential for scale development in China.

Figure 4-3 Third-party Payment Transaction Volume in China



Source: [www.chyxx.com](http://www.chyxx.com)

By the end of 2016, 70% of households in China had computers and 95% of individuals had smartphones (Ding chun, 2016). The popularity of mobile Internet and the rapid development of China's economy have increased residents' enthusiasm for consumption. Traditional business models are difficult to meet people's shopping needs, so e-commerce and Internet finance, especially third-party payment, are rapidly emerging. Among them, the market share of third-party payment platforms represented by Alipay, WeChat, etc. is extremely large. Third-party payment has become an indispensable part of the lives of Chinese residents, gradually replacing traditional payment methods. At present, there are more and more third-party payment platforms with payment licenses issued by the government. Some independent third-party payment platforms are mainly for merchants, governments and enterprises with settlement needs. Their direct

customers are enterprises, and they indirectly attract consumers through enterprises, in comparison, payment platforms such as Alipay relies more on e-commerce websites and directly face consumers. Independent third-party payment platforms, on the one hand, they can more actively respond to the personalized requirements of different companies and industries, and offer personalized payment solutions for large customers; on the other hand, they do not have a sound credit evaluation system, products and services are easy to be copied and lose the key to victory (Li Feng, 2016). From the perspective of Internet finance as a whole, in recent years, the Chinese government has continuously increased investment in domestic ICT development, digital infrastructure construction and promoted the development of electronic communications while also adding a number of new laws and regulations. Not only that, the government promotes the construction of e-banking in the form of financial subsidies. Therefore, in China, the development of Internet finance has many favorable conditions and is in rapid development.

However, compared with United States and Europe, China's Internet finance development is relatively late, and the development is not mature enough. There are still many problems to be solved:

#### (1) Lack of innovation

Some of the Internet finance modes that are developing fast in China can now be found in the United States or European countries. Many Chinese Internet finance companies just copy the modes of some foreign companies and then make some changes on this basis to form themselves, rather than carrying out its own unique innovation. Furthermore, many domestic Internet finance companies also imitate each other, making it difficult for many Internet finance companies to occupy an advantageous position in the competition.

#### (2) Imperfect social credit system

In order to reduce information asymmetry, transaction risks, and mitigate moral hazard, a sound social credit system is indispensable. The number of small and medium-sized enterprises in China is huge, but there is no perfect social credit system. If commercial banks want to lend funds, they may need to understand the credit level of enterprises

themselves, which reduces the willingness of commercial banks to lend money to small and medium-sized enterprises, so enterprises cannot obtain financing or loans from commercial banks. The emergence of Internet finance has greatly challenged China's credit system(Wang lingqing,2017), because although Internet finance has alleviated the difficulty of loans for small and medium-sized enterprises to a certain extent, it involves a lot of credit issues. Internet finance reduces the transaction costs of financial services, but also makes credit risk management more complicated. The imperfect credit system makes Internet financial platforms and investors bear greater risks.

### (3) Uneven regional development

From the perspective of China as a whole, the development of Internet finance is fast and large in scale, but from the perspective of various provinces in China, the regional differences are large(Ding chun,2016). The development of Internet finance in the southeast coast and the southwest Yangtze River basin is rapid. While the development of the northwest region is slow, which is basically consistent with China's overall economic development trend.

### (4) Imperfect laws and regulations

When encountering problems in the operation process of Internet financial companies and platforms, due to the lack of unified and complete laws and regulations, mutual refusal will appear in the actual processing process because people cannot be judged right or wrong. Moreover, due to the lack of laws and regulations, Internet fraud and illegal fund raising have appeared in the Internet financial market, which has seriously damaged the interests of Internet financial companies and investors.

## **5. Differences in The Development of Internet Finance in Different Countries**

### **5.1 Different Development Stages**

The emergence and development of Internet Finance in United States can be divided into three stages: The first stage (1990s): booming period (Li sizhuo, 2018). In the second half of the 20th century, the United States experienced at least three waves of financial disintermediation(Li sizhuo, 2018), which seriously affected the traditional financial field. At the same time, Internet technology began to be industrialized in the

1990s, accelerating the speed of innovation and transformation of financial institutions. E-trade, insweb, SFNB, paypal and other Internet financial companies were established. The second stage(21st century-2005): a period of steady development (Li sizhuo, 2018). Large commercial banks have increased the investment and layout of network facilities, and there is not much innovation in Internet finance(Wang da, 2014). The third stage(after 2005): integrated development period (Li sizhuo, 2018). During this period, Internet Finance continued to innovate, resulting in a new financial model, not limited to the networking and informatization of traditional finance, platforms such as Prosper, KickStarter and so on began to be established.

Compared with United States, the development of Internet Finance in Europe is relatively slow. According to the types of banking business, the development of Internet finance can be divided into three stages: Firstly, technical stage of financing and loan business(Liu lei, 2018). In this stage, there are platforms such as mbank, Zopa and crowdcube. They use Internet technology to transform traditional financial business into online business, improve business processing speed, reduce transaction costs, and meet the financing needs of the people. The second stage was scientific stage of asset management business(Liu lei,2018). Banks began to establish the online banking system, using the online platform to provide all kinds of financial services, customers can use the online platform for investment management. The third stage was intelligent stage of intermediate business(Liu lei,2018). In this stage, the third-party payment, online credit rating and other intermediary businesses continue to be informationized. Germany's Essentia Analytics rating company has developed a set of online credit rating cloud computing software to provide low-cost credit rating services for start-ups lacking market information and credit records.

China's Internet development can be divided into four stages:First stage(before 2005): initial stage(Zhou yingheng, Gong shiguang, 2016). Internet finance is mainly reflected in the provision of internet technology services for financial institutions. Banks also began to establish their own online banking, e-commerce and third-party payment platforms began to appear. The second stage(2005-2012): embryonic stage(Zhou yingheng, Gong shiguang, 2016). Internet finance gradually goes from technology field

to business field, and new Internet Finance modes began to appear. The third stage(2013-2015): high speed development stage(Zhou yingheng, Gong shiguang, 2016). As the threshold of the Internet financial market is lower than the traditional financial market, a large number of enterprises enter the Internet financial market, the development of the third-party payment is gradually mature, the P2P online loan platform has an explosive growth, and the crowdfunding platform is applied to different fields. At the same time, financial institutions such as securities companies have also begun to speed up the construction of Internet finance. The Internet financial market in China is showing a high-speed development trend. The last stage(after 2015): development, risk and supervision coexist(Zhou yingheng, Gong shiguang, 2016). After 2015, Internet finance continues to develop rapidly and becomes the focus of the government. With the development of Internet finance, the accompanying risks also appear. In order to promote the healthy development of Internet finance, the government began to formulate relevant rules to regulate the Internet financial market.

## **5.2 Different Economic Environment**

From the perspective of macro-economic development level, financial services in economically developed regions are bound to be developed. In Europe, there are financial centers such as London, Paris, Zurich, Luxemburg, and most European countries are in the range of financial centers(Ding chun,2016). Although United States has not as many financial centers as Europe, there are also some financial centers in the central and western regions that support the development of local economy. However, Chinese mainland has only two international financial centers, Beijing and Shanghai. There is no corresponding financial center in the central and western regions, which restricts the economic development of the central and western regions. In this case, even though China's GDP growth rate is faster than that of some European developed countries, the development of financial services lags behind the economic development speed, resulting in a gap in financial services, providing opportunities for the development of Internet finance.

## **5.3 Different Supervision Policies for Internet Finance**

United States adopts a prudent and loose attitude towards Internet finance(Nian

meng,2015). It has established a strict and perfect legal system to ensure the healthy development of the financial industry. In order to adapt to the development of Internet finance, it has made specific provisions for the emerging Internet financial modes. The regulation of Internet Finance in the United States is relatively loose, allowing Internet financial institutions to develop freely within the scope permitted by the traditional regulatory system. For the asset credit rating of Internet financial institutions, the United States has a unified rating system. In Europe, the supervision of Internet finance is relatively strict. The independent supervision of Internet finance has been implemented, and a clear legal framework has been established to ensure the healthy development of Internet finance(Liu lei,2018). However, due to the different regulatory policies of European countries, the transnational development of Internet finance is limited to some extent.China's supervision of Internet finance, as mentioned above in China's Internet development status, has problems such as lack of laws and regulations, imperfect policies and so on, which restricts the upgrading and transformation of Internet finance industry(Wang lingqing,2017). Moreover, the modes of supervision of China's Internet finance lags far behind the practice of Internet finance innovation, and cannot further promote the reform of Internet finance. In order to regulate the products and services of the Internet financial market, sometimes the administrative regulations of the financial regulators is too strict and their risk tolerance is low, which restrains the development of the Internet finance enterprises. Moreover, compared with Europe and the United States, China's methods and means of supervision are relatively backward, and there is no authoritative system. Although the Chinese government is constantly improving, at present, there is still a certain gap between China and the United States , Europe in terms of Internet finance supervision.

## **6. SWOT Analysis of Internet finance**

The SWOT analysis method can comprehensively consider the internal environment and external environment of a company's development, and fully consider various influencing factors, so as to choose the best business strategy (Tang taozhi, 2002). We can have a more comprehensive understanding of the Internet finance environment

through SWOT analysis, so as to predict its future development trend.(Take China as an example)

### **6.1 Strengths**

There are four main advantages of Internet finance: advanced information technology, diversification of models, policy support, and a large customer base. Internet finance uses advanced information technology, and this information technology is constantly being developed and updated. Therefore, Internet finance has a huge database that can continuously digitize information. Financial participants can access various financial products through this database and obtain the financial services they want. Secondly, Internet finance has a variety of models. These models simplify people's financial services, solve some problems that traditional financial institutions cannot solve, innovate financial products, and attract more people to join the Internet financial platform. At the same time, government policy support is constantly promoting the development of Internet finance. For example, in China, the development of Internet finance was mentioned more than once in the government work report. In 2014, Shanghai issued the "Several Opinions on Promoting the Healthy Development of Shanghai's Internet Financial Industry", and the Guiyang Government issued "Several Policies and Measures to Support the Development of Guiyang's Internet Financial Industry". All regions are very concerned about the development of Internet finance. They not only use laws and regulations to lead the healthy development of Internet finance, but also provide preferential policies to promote the innovation of Internet finance. Finally, we must not forget that Internet finance also has a large customer base. Internet finance successfully connects the Internet, finance, and mobile communications. The users of social networks are all potential service targets of Internet finance. Therefore, with the increase in the number of social media users, the customer base of Internet finance is also increasing.

### **6.2 Weaknesses**

The main disadvantages of Internet finance are that the ability to control risks needs to be strengthened, the credit system is imperfect, and the degree of financial product innovation is not high. Investors pay too much attention to the profits of Internet finance,

and under the situation of imperfect supervision, there are “bankruptcy, bad debts” and other situations in the Internet finance industry. Fraud cases also occur frequently, which seriously affects investors’ confidence. This shows that the risk control capabilities of the Internet finance industry still need to be improved. Secondly, most of the data in the Internet financial credit investigation system is obtained by the evaluation of third-party rating agencies or the accumulation of transaction data. The authenticity of transaction data and the business level of the rating agency will affect the credit investigation system. Compared with traditional financial institutions, Internet finance still has a certain gap in product design. Many Internet financial products have only been upgraded on the original traditional financial products and lack innovation.

### **6.3 Opportunities**

The difficulties faced by small low-profit enterprises in financial services are opportunities for Internet finance. Chinese economist Lang Xianping pointed out that small low-profit enterprises are a general term for individual industrial and commercial households, micro and small enterprises. (Lang Xianping, 2011) As an important part of the economic system, these enterprises have increased employment opportunities, increased people's income levels, and played an important role in social development. However, small low-profit enterprises have also encountered financing obstacles in their own development. The main dilemma is the high financing cost and single financing channels. Whether it is bank loans or private loans, in order to reduce credit risk, borrowers will lend to these enterprises at high interest rates, resulting in relatively high financing costs. Not only that, the financing of small low-profit enterprises is mainly through the accumulation of internal funds and bank loans, and there is basically no equity financing. As a result, the scale of these enterprises is difficult to expand, the amount of funds is limited, and the possibility of companies wanting to go public is also very low. When small low-profit enterprises join the Internet finance industry, they will be able to reach more financial participants, and financial services will not be restricted by time or region, thereby improving the efficiency and business volume of the enterprise, and promoting enterprise

development. Therefore, Internet finance is very popular among small low-profit enterprises, providing opportunities for the future development of Internet finance.

#### **6.4 Threats**

Fierce competition and various risks are threats to the development of Internet finance. This risk includes the risk of laws and regulations, the risk of crime, and the risk of information leakage. Imperfect laws and regulations cannot provide strong protection when financial participants encounter risks or mistakes, and the rights and interests of consumers cannot be protected. For example, loopholes in the supervision system also give criminal organizations the opportunity to commit crimes. Some criminal organizations use online banking, virtual currency, third-party payment and other means to quickly launder money, which has caused difficulty in supervision and seriously affected the healthy development of Internet finance. Not only that, the Internet financial platform must also be able to withstand hacker attacks. Every financial participant and financial institution attaches great importance to customer information. Internet financial platforms must take protective measures while collecting financial information. There have been many large-scale information leakage incidents in China before. If a security breach occurs, it will cause important information leakage accidents and cause serious consequences. Also, the rapid development of Internet finance has also caused companies to increase product yields in order to seize market share, resulting in intensified competition among industries and posing challenges to the future development of Internet finance.

### **7. The Future Development Trend of Internet Finance**

#### **7.1 Trend of Convergence and Symbiosis**

When an industry or a technology develops to a certain stage, it will surpass its original scope and touch some new fields to meet more needs. The rapid development of Internet finance has brought us a fact: Internet technology and finance do not only have a competitive relationship with each other. The introduction of Internet technology into the financial industry can not only upgrade the business of the traditional financial industry, but also simplify the service steps. In turn, the special needs of financial industry also continuously promote the update of Internet technology. In fact, in order

to improve their competitiveness, banks and other traditional financial institutions are constantly launching various online businesses to adapt to the challenges of Internet finance, so as to maintain their market share(Zhang yifan,2020). If traditional financial institutions cannot change their development mode in time, then we can think that in a short period of time, Internet finance will still be a hot topic. Although Internet finance and other financial institutions such as traditional banks are gradually merging in business, there are still certain differences in customer resources, so they may not be able to replace the traditional financial industry in a short time, but they will still have a strong impact on the traditional model. In this case, Internet finance and traditional finance are integrated with each other and develop together.

### **7.2 Trend of Comprehensive Development**

At present, the main business areas involved in Internet finance include banking, securities, insurance, etc., but these are not all businesses of Internet finance. The expansion of virtual channels, the use of big data, and the construction of network platforms are all expanding the business field of Internet finance(Zuo meiyun,2017). Internet finance can obtain more customer resources while reducing costs, also design products that meet user needs based on analysis of existing data, and finally penetrate other industries. In 2011, China Union Pay, Konka Group and Oriental Media Group jointly announced the launch of the first smart TV with Union Pay payment function in Shanghai. Users can operate the smart TV through the remote control to complete online payment such as TV shopping and utility expenses. The appearance of this smart TV reflects the integration of the home appliance industry, the media industry and the financial industry. Therefore, the future business areas of Internet finance may be very extensive and provide consumers with more comprehensive services.

### **7.3 Trend of Dewatering**

Compared with physical traditional financial institutions, Internet finance is obviously different in that Internet finance does not use physical methods, but uses virtualization technology to dewater some physical products and services(Gao yang,2014), Therefore, some related physical stores can be cancelled, thereby saving costs and improving economic benefits. Just like the publishing industry, the main value of books

is to convey the thoughts, opinions, knowledge and other information contained in books. Physical books are only a carrier. The emergence of Internet technology will not affect readers' access to book knowledge after these books are digitized. On the contrary, e-books save the printing costs, binding costs, and transportation costs. People can read books through the Internet anytime and anywhere, instead of carrying heavy physical books with them. From the perspective of currency evolution, it is also a process of dewatering, first from metal currency (gold, silver, etc.) to paper currency, from paper currency to bank card, and from bank card to mobile wallet. Dewatering does not deny the value of all entities, but removes many insignificant components. The physical space of the entity is always limited, but the capacity of the virtual space is unlimited. Therefore, Internet finance has great potential for development.

## **8. Suggestions for the steady development of Internet finance**

### **8.1 Further improve the supervision of Internet finance**

Although the development of Internet finance is different in each country, it is necessary for each country to improve the regulatory policies of Internet finance. From my point of view, first of all, we should be more clear about the regulatory goals of Internet finance in the new era. In general, better regulatory policies can protect the rights and interests of financial consumers, encourage and protect financial innovation, provide a good market environment for the Internet financial market, and improve financial efficiency. Secondly, based on the characteristics of Internet finance itself, we can improve the relevant legal system and Internet finance standards, and formulate special policies and regulations.

### **8.2 Improving financial risk prevention and control capabilities**

Internet finance is conducted through various online platforms, and it is likely to encounter risks such as information leakage and improper operation. Therefore, the Internet financial market needs to improve risk control capabilities. Participants need to enhance their ability to identify risks and take risk prevention measures in advance to be able to calmly respond to crises. Financial participants also need to analyze major risks such as operational risks and legal risks in detail, find out the reasons for the risks, and fundamentally improve risk control capabilities. From the government's

perspective, the government should improve the information security of Internet finance and formulate information security standards. At the same time, the government can raise everyone's awareness of financial risk prevention through the social media.

### **8.3 Increasing policy support and publicity to improve innovation capabilities**

Internet finance has outstanding advantages such as low cost, high efficiency, and convenience. It has great development potential in the future. However, due to some control measures inhibiting its development, there are not many innovative models. If the government can introduce more incentive measures and increase publicity for Internet finance, more scientific and technological talents, financial practitioners, and financial consumers will join the Internet finance market, promote market innovation and upgrade, and thus promote the development of Internet Finance.

### **8.4 Catering to market demand and expanding the market**

Compared with traditional commercial banks, Internet finance can learn about market information quickly and in detail, and has closer contact with consumers. Therefore, in the future development, Internet finance should continue to cater to market needs and take financial consumers as the center, find a correct development path. Looking at China's Internet financial market, we can find that the home appliance industry, the clothing and department store industry, and the gift industry are the main areas. If the Internet finance platform allows other industries to join the Internet finance market by cooperating with other industries, then to a certain extent, Internet finance will broaden the market.

## **9. Conclusion**

Internet finance based on modern information technology has become a new type of financial industry that we cannot ignore. It not only has low transaction costs, but also has no time and geographical restrictions, and it satisfies the needs of various financial participants to a greater extent. It has important influence on the government, traditional financial institutions, and individuals. For example, the rapid development of third-party payment in Internet finance has successfully transformed people's payment methods and simplified people's lives. Especially in the past year, due to the impact of COVID-19, economies around the world have been severely affected. Most of the time,

people can only stay at home. At this time, the existence of Internet financial platforms has solved most of people's demands. But there is no doubt that things always have two sides. While Internet finance brings benefits to the economy and society, it also comes with corresponding risks. Therefore, the healthy development of Internet finance in the future also depends on whether laws, regulations and regulatory policies are perfect, whether the platform's risk management and control capabilities have improved. Although Internet finance is an industry that develops on a global scale, there are still regional differences. Therefore, for the better development of Internet finance in the future, countries can learn from the excellent experience of other countries and apply appropriate development strategies to their own development. In general, although the current Internet finance still has many problems to be solved, it is an important part of the financial industry, and we should still look forward to its future.

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## Data used in this thesis

### Data used in OLS model

	mobile online shopping transaction volume	Third-party mobile payment transaction volume	per capita disposable income
2013Q1	365	3367	5006
2013Q2	472	4448	9049
2013Q3	621	5872	13557
2013Q4	1159	7751	18311
2014Q1	1373	13404	5562
2014Q2	1681	16353	10025
2014Q3	2336	20533	14986
2014Q4	3227	26898	20167
2015Q1	3567	28292	6087
2015Q2	4290	34746	10931
2015Q3	5243	43914	16367
2015Q4	7653	56674	21966
2016Q1	7477	59703	6619
2016Q2	8771	75037	11886
2016Q3	9619	90419	17735
2016Q4	10443	128146	23821
2017Q1	10376	188091	7184
2017Q2	12794	230408	12932
2017Q3	13985	294959	19342
2017Q4	14301	377275	25974
2018Q1	15124	403645	7815
2018Q2	15986	393078	14063
2018Q3	16758	438357	21035
2018Q4	17342	472446	28228
2019Q1	18210	476986	8493

### Data used in VAR model

	Third-party payment transaction volume	Narrow money supply(M1)	Broad money supply(M2)	Base money (B)
2013Q1	33954	918230	3026588	253650
2013Q2	38004	931353	3129125	257776
2013Q3	42565	937013	3190848	263138
2013Q4	51064	981622	3256024	271023
2014Q1	62631	959209	3415969	274741

2014Q2	72026	993810	3560694	279899
2014Q3	82831	990591	3593800	285299
2014Q4	98581	1012788	3636217	294093
2015Q1	104410	1019759	3775423	295753
2015Q2	121916	1035557	3921512	288780
2015Q3	143679	1080333	4069943	279677
2015Q4	174909	1164378	4127255	276377
2016Q1	185240	1216772	4287136	283377
2016Q2	208583	1281399	4397397	289071
2016Q3	226889	1351818	4518902	290707
2016Q4	272432	1427409	4599984	308980
2017Q1	325964	1437824	4758468	302387
2017Q2	359217	1496798	4828975	303772
2017Q3	421679	1546462	4929815	306044
2017Q4	496634	1605332	5000216	321871
2018Q1	512420	1583823	5189744	321350
2018Q2	508785	1595669	5250926	318471
2018Q3	549446	1613523	5366532	317918
2018Q4	583886	1635313	5435481	330957

Data used in pannel model

id	t	NNI	TP	ROA	ROE	CIR	CAR
1	2005	143.8500	13000	0.6569	13.3000	37.7000	9.8900
1	2006	157.7100	15500	0.7065	15.1600	36.0000	14.0500
1	2007	296.9200	21700	1.0126	16.1500	34.4800	13.0900
1	2008	467.2100	31400	1.2054	19.3900	29.5400	13.0600
1	2009	636.3300	36700	1.2009	20.1400	32.8700	12.3600
1	2010	770.7200	51000	1.3154	22.7900	30.6100	12.2700
1	2011	1,124.5000	84000	1.4408	23.4400	29.3800	13.1700
1	2012	1,191.1700	129000	1.4458	23.0200	28.5600	13.6600
1	2013	1,463.0200	139000	1.4425	21.9200	28.0300	13.1200
1	2014	1,653.7000	302000	1.3979	19.9600	26.7500	14.5300
1	2015	1,897.8000	592000	1.2972	17.1000	25.4900	15.2200
1	2016	2,040.4500	1303000	1.2044	15.2400	25.9100	14.6100
1	2017	2,044.2400	2189000	1.1447	14.3500	24.4600	15.1400
1	2018	2,012.7100	3124000	1.1108	13.7900	23.9100	15.3900
2	2005	11.0700	13000	0.4928	16.6100	39.3000	-1.4700
2	2006	8.1600	15500	0.4767	17.8400	39.4000	-0.3900
2	2007	22.7200	21700	0.7548	18.5500	31.8100	7.1900
2	2008	23.6400	31400	0.9197	25.2600	33.6100	9.1000

2	2009	46.5700	36700	0.7459	19.4300	39.3000	10.3900
2	2010	51.0800	51000	0.9542	20.9900	35.4400	11.0200
2	2011	66.3200	84000	1.1242	20.4400	31.9500	10.5700
2	2012	96.5300	129000	1.1773	22.5400	29.9700	10.9900
2	2013	144.4400	139000	1.1398	21.4800	31.5800	10.5700
2	2014	202.7200	302000	1.1230	17.3600	29.8200	11.2100
2	2015	267.0000	592000	1.0018	15.5000	26.9100	11.8700
2	2016	287.4900	1303000	0.8455	13.8000	28.7700	10.8000
2	2017	309.0000	2189000	0.7797	12.7500	31.9200	13.4900
2	2018	492.0100	3124000	0.7985	11.5500	28.7900	13.0100
3	2005	6.1200	13000	0.3876	12.8300	0.0000	8.2300
3	2006	26.7500	15500	0.3638	13.2600	42.7400	8.2800
3	2007	30.1400	21700	0.4051	17.1200	40.3900	8.2700
3	2008	41.2000	31400	0.4639	18.2300	41.4100	11.4000
3	2009	13.2200	36700	0.4769	13.0400	44.8800	10.2000
3	2010	17.1900	51000	0.6353	18.2500	43.4100	10.5800
3	2011	32.5100	84000	0.8073	17.4400	41.8900	11.6800
3	2012	44.1200	129000	0.9364	18.5000	39.9500	10.8500
3	2013	63.1700	139000	0.9813	19.3000	38.9300	9.8800
3	2014	86.4400	302000	1.0228	19.3100	37.5700	11.0300
3	2015	127.6100	592000	0.9789	17.1800	35.0100	10.8500
3	2016	150.3600	1303000	0.9028	15.7500	34.5000	11.3600
3	2017	190.6600	2189000	0.8194	13.5400	32.9600	12.3700
3	2018	206.8900	3124000	0.8088	12.6700	32.5800	13.1900
4	2005	106.3000	13000	1.1087	21.7500	39.3000	13.5900
4	2006	97.0300	15500	0.9232	15.0000	38.0000	12.1100
4	2007	266.8400	21700	1.1479	19.5000	35.9200	12.5800
4	2008	425.8700	31400	1.3091	20.6800	30.7100	12.1600
4	2009	552.9900	36700	1.2438	20.8700	32.9000	11.7000
4	2010	719.8900	51000	1.3217	22.6100	31.4700	12.6800
4	2011	925.1800	84000	1.4675	22.5100	29.7900	13.6800
4	2012	1,075.4400	129000	1.4748	21.9800	29.5700	14.3200
4	2013	1,190.6400	139000	1.4666	21.2300	29.6500	13.3400
4	2014	1,330.7200	302000	1.4218	19.7400	28.8500	14.8700
4	2015	1,474.4500	592000	1.3044	17.2700	26.9800	15.3900
4	2016	1,872.9100	1303000	1.1822	15.4400	27.4900	14.9400
4	2017	1,692.0300	2189000	1.1308	14.8000	26.9500	15.5000
4	2018	1,726.1300	3124000	1.1274	14.0400	26.4200	17.1900
5	2005	108.4300	13000	0.7421	15.0000	36.7800	11.2000
5	2006	133.0400	15500	0.8076	14.0000	36.0600	10.8300
5	2007	85.8000	21700	1.0807	17.1700	40.2600	14.4400
5	2008	110.2400	31400	1.1928	20.8600	39.3800	13.4700

5	2009	143.7300	36700	1.0092	19.2600	38.8700	12.0000
5	2010	192.3900	51000	1.0790	20.0800	31.1175	12.3600
5	2011	243.5500	84000	1.1869	20.4900	30.1300	12.4400
5	2012	272.1100	129000	1.1831	18.4300	29.7100	14.0700
5	2013	337.7700	139000	1.1120	15.4900	29.3500	12.0800
5	2014	426.2500	302000	1.0800	14.8700	30.2900	14.0400
5	2015	496.5600	592000	0.9957	13.4600	30.3600	13.4900
5	2016	582.5800	1303000	0.8696	12.2200	31.6000	14.0200
5	2017	686.4500	2189000	0.8106	11.4000	31.8500	14.0000
5	2018	817.4600	3124000	0.7988	11.1700	31.5000	14.3700
6	2005	1.0200	13000	0.8454	19.4800	37.6900	13.0900
6	2006	1.5700	15500	1.1160	25.3100	35.1500	11.7100
6	2007	-0.31	21700	1.3571	15.9500	30.2500	30.6700
6	2008	6.2800	31400	1.7154	13.7100	25.3900	24.1200
6	2009	5.7000	36700	1.2698	13.2300	31.2900	13.9000
6	2010	6.8400	51000	1.2496	17.2100	30.4600	14.6300
6	2011	9.5100	84000	1.2857	15.8700	30.9700	14.9600
6	2012	14.1900	129000	1.2930	17.3500	29.8600	14.9800
6	2013	13.8200	139000	1.1649	17.5600	31.0300	12.9000
6	2014	25.5700	302000	1.1232	19.0000	27.9100	12.0000
6	2015	40.0200	592000	1.0254	17.5900	24.1000	13.1100
6	2016	53.9100	1303000	0.8932	16.2500	24.8000	13.7100
6	2017	47.4800	2189000	0.8853	16.9400	29.2000	12.9300
6	2018	58.3900	3124000	0.9384	16.9600	28.6100	12.9900
7	2005	334.4400	13000	0.0238	1.3100	66.1500	7.6800
7	2006	433.7600	15500	0.1148	6.9100	50.4400	8.2200
7	2007	217.7200	21700	0.8223	13.4000	33.5200	8.7900
7	2008	173.4400	31400	0.8353	17.7200	44.7100	9.4100
7	2009	406.3500	36700	0.8178	20.5300	43.1100	10.0700
7	2010	482.6600	51000	0.9876	22.4900	38.5900	11.5900
7	2011	705.3200	84000	1.1079	20.4600	35.8900	11.9400
7	2012	800.8500	129000	1.1647	20.7400	36.7600	12.6100
7	2013	864.2300	139000	1.1955	20.8900	36.3000	11.8600
7	2014	909.6700	302000	1.1757	19.5700	34.5600	12.8200
7	2015	1,000.2800	592000	1.0708	16.7900	33.2800	13.4000
7	2016	1,079.1200	1303000	0.9853	15.1400	34.5900	13.0400
7	2017	951.1100	2189000	0.9508	14.5700	32.9600	13.7400
7	2018	1,208.2800	3124000	0.9282	13.6600	31.2700	15.1200
8	2005	23.8300	13000	0.4972	17.2100	0.0000	8.0400
8	2006	11.4400	15500	0.5310	19.3700	40.3523	9.2700
8	2007	16.9600	21700	0.6855	20.1000	38.6200	9.1500
8	2008	30.2600	31400	1.1253	36.7100	36.6900	9.0600

8	2009	32.8600	36700	0.9014	25.8600	35.9900	10.3400
8	2010	46.5200	51000	1.0057	23.2700	33.0600	12.0200
8	2011	63.4100	84000	1.1220	20.0700	28.7900	12.7000
8	2012	95.9000	129000	1.1770	20.9500	28.7100	12.4500
8	2013	148.3800	139000	1.2072	21.5300	25.8300	10.9700
8	2014	249.9800	302000	1.2026	21.0200	23.1200	11.3300
8	2015	335.4100	592000	1.1038	18.8200	21.8600	12.2900
8	2016	526.7200	1303000	0.9848	16.3500	23.1600	11.6500
8	2017	617.0700	2189000	0.9171	14.4500	24.3400	12.0200
8	2018	596.9800	3124000	0.9096	13.1400	25.1200	13.6700
9	2005	156.2300	13000	0.7233	12.6000	39.3000	10.4200
9	2006	169.2100	15500	0.9367	13.1100	38.9600	13.5900
9	2007	279.2400	21700	1.0956	13.8500	38.0700	13.3400
9	2008	653.5200	31400	1.0049	14.2600	33.5500	13.4300
9	2009	733.1700	36700	1.0867	16.4800	37.1500	11.1400
9	2010	828.5500	51000	1.1419	18.8700	34.1600	12.5800
9	2011	1,001.0200	84000	1.1693	18.2700	33.0700	12.9700
9	2012	1,091.2700	129000	1.1892	18.1000	31.8100	13.6300
9	2013	1,239.2300	139000	1.2332	18.0400	30.6100	12.4600
9	2014	1,352.2900	302000	1.2168	17.2800	28.5700	13.8700
9	2015	1,456.7100	592000	1.1190	14.5300	28.3000	14.0600
9	2016	1,775.8200	1303000	1.0528	12.5800	28.0800	14.2800
9	2017	1,448.8900	2189000	0.9835	12.2400	28.3400	14.1900
9	2018	1,444.0100	3124000	0.9448	12.0600	28.0900	14.9700
10	2005	8.8000	13000	0.5787	0.0000	44.3500	8.1100
10	2006	13.5700	15500	0.5724	13.1800	44.2000	9.4100
10	2007	16.6800	21700	0.9650	12.7000	34.8900	15.2700
10	2008	40.6400	31400	1.2114	14.8400	32.9772	14.3200
10	2009	48.1700	36700	0.9828	12.7100	39.9500	10.1400
10	2010	76.3000	51000	1.1295	19.2400	33.8200	11.3100
10	2011	118.4200	84000	1.2727	21.0700	29.8600	12.2700
10	2012	139.4900	129000	1.0963	16.7000	31.5100	13.4400
10	2013	188.7000	139000	1.2033	18.4800	31.4100	11.2400
10	2014	299.7500	302000	1.0657	16.8400	30.3200	12.3300
10	2015	407.0100	592000	0.9014	14.5500	27.8500	11.8700
10	2016	476.4300	1303000	0.7561	12.5800	27.5600	11.9800
10	2017	570.6300	2189000	0.7387	11.6700	29.9200	11.6500
10	2018	600.8200	3124000	0.7727	11.3900	30.5700	12.4700
11	2005	13.8300	13000	0.1458	7.1600	0.0000	3.7000
11	2006	6.5300	15500	0.5396	22.8300	45.5596	3.7100
11	2007	12.0200	21700	0.8644	33.4100	38.9300	5.7700
11	2008	19.1500	31400	0.1485	4.3200	35.9900	8.5800

11	2009	21.3100	36700	0.9472	26.5900	41.7600	8.8800
11	2010	21.9300	51000	0.9554	23.2200	40.8400	10.1900
11	2011	43.5300	84000	1.0465	20.3200	39.9900	11.5100
11	2012	67.1300	129000	0.9433	16.7800	39.4100	11.3700
11	2013	115.0100	139000	0.8708	16.5700	40.7700	9.9000
11	2014	203.6100	302000	0.9711	16.3500	36.3300	10.8600
11	2015	300.6400	592000	0.9317	14.9400	31.3100	10.9400
11	2016	313.0400	1303000	0.8277	13.1800	25.9700	11.5300
11	2017	317.7700	2189000	0.7478	11.6200	29.8900	11.2000
11	2018	419.7100	3124000	0.7445	11.4900	30.3200	11.5000
12	2005	29.4200	13000	0.5331	19.1800	0.0000	8.2600
12	2006	10.0800	15500	0.6092	22.3500	47.7360	8.1200
12	2007	27.0000	21700	0.7820	18.2300	46.2600	10.7300
12	2008	46.3700	31400	0.7996	15.2300	42.5500	9.2200
12	2009	98.2000	36700	0.9762	20.1900	42.1700	10.8300
12	2010	88.9500	51000	1.0884	18.2900	39.4800	10.4400
12	2011	175.4700	84000	1.4036	23.9500	35.6100	10.8600
12	2012	259.5800	129000	1.4081	25.2400	34.0100	10.7500
12	2013	328.5300	139000	1.3445	23.2300	32.7500	10.6900
12	2014	433.3300	302000	1.2585	20.4100	33.2700	10.6900
12	2015	601.5700	592000	1.1018	16.9800	31.2200	11.4900
12	2016	602.2700	1303000	0.9365	15.1300	30.9800	11.7300
12	2017	577.2900	2189000	0.8632	14.0300	31.7200	11.8500
12	2018	800.8900	3124000	0.8461	12.9400	30.0700	11.7500
13	2005	20.7600	13000	0.5663	17.5100	0.0000	9.0600
13	2006	35.7500	15500	0.8519	18.4900	37.9440	11.4000
13	2007	70.5600	21700	1.3582	24.7600	35.0500	10.6700
13	2008	84.2300	31400	1.4534	27.4100	36.7800	11.3400
13	2009	110.8200	36700	1.0020	21.1800	44.8600	10.4500
13	2010	143.0100	51000	1.1529	21.7500	39.9000	11.4700
13	2011	198.5000	84000	1.3902	24.1700	36.1900	11.5300
13	2012	249.9300	129000	1.4597	24.7800	35.9800	12.1400
13	2013	336.9100	139000	1.3938	23.1200	34.3600	11.1400
13	2014	538.6300	302000	1.2814	19.2800	30.5400	12.3800
13	2015	647.4200	592000	1.1368	17.0900	27.6700	12.5700
13	2016	744.3000	1303000	1.0927	16.2700	28.0100	13.3300
13	2017	760.4500	2189000	1.1542	16.5400	30.2300	15.4800
13	2018	881.7100	3124000	1.2392	16.5700	31.0200	15.6800
14	2005	4.3100	13000	0.6048	22.2500	39.9300	8.2000
14	2006	3.9700	15500	0.6951	25.8700	38.5500	8.7100
14	2007	12.0900	21700	1.1689	25.3400	36.5300	11.7300
14	2008	35.2300	31400	1.2162	26.0600	34.9000	11.2400

14	2009	44.7700	36700	1.1289	24.5400	36.6900	10.7500
14	2010	54.2400	51000	1.1641	24.6400	32.9100	11.2200
14	2011	91.3600	84000	1.2022	24.6700	31.9500	11.0400
14	2012	154.2600	129000	1.2342	26.6500	26.7300	12.0600
14	2013	234.4200	139000	1.1983	22.3900	26.7100	10.8300
14	2014	293.3800	302000	1.1759	21.2100	23.7800	11.2900
14	2015	345.1400	592000	1.0438	18.8900	21.5900	11.1900
14	2016	447.4100	1303000	0.9544	17.2800	23.3900	12.0200
14	2017	515.2400	2189000	0.9236	15.3500	27.6300	12.1900
14	2018	626.3000	3124000	0.9330	14.2700	26.8900	12.2000
15	2005	1.3200	13000	0.7732	34.0000	31.0900	12.0600
15	2006	3.3700	15500	0.8460	24.0000	27.9700	12.7800
15	2007	4.3100	21700	1.0677	23.0000	25.0300	20.1100
15	2008	12.1600	31400	1.4046	18.0000	23.4000	19.6600
15	2009	9.4000	36700	1.1852	16.0000	26.2700	14.3500
15	2010	11.5600	51000	1.0746	17.0000	30.3000	12.6200
15	2011	19.5600	84000	1.0589	19.3000	26.3500	12.0600
15	2012	31.9400	129000	1.1254	18.3000	25.7800	12.9000
15	2013	43.8000	139000	1.0962	18.0500	25.5100	10.9400
15	2014	55.9300	302000	1.0937	17.9800	24.6500	11.0800
15	2015	82.9600	592000	1.0022	16.2600	24.9900	12.2700
15	2016	99.3100	1303000	0.9049	14.9200	25.8100	12.2000
15	2017	109.7700	2189000	0.8494	13.7700	26.8500	12.4100
15	2018	99.3500	3124000	0.8215	11.6500	25.1900	12.0700

1: Industrial and Commercial Bank of China Limited ; 2: China Everbright Bank; 3: Huaxia Bank; 4: China Construction Bank; 5: Bank of Communications; 6: Bank Of Nanjing Co.,Ltd; 7: Agricultural Bank of China Limited; 8: Shanghai Pudong Development Bank Co., Ltd; 9: Bank of China; 10: China CITIC Bank; 11: Ping an bank CO.,LTD; 12: China Minsheng Bank Corp., Ltd; 13: China Merchants Bank; 14: Industrial Bank; 15:Bank of Beijing