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Srovnání spotřebitelských úvěrů a P2P úvěrování v Číně
Comparison of Consumer Loans and P2P Lending in China

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The declaration

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1 Introduction

In recent years, China's economy has developed well, which has promoted the arrival of the era of financial technology. The advancement and innovation of financial technology has brought huge impacts and challenges to China's banking industry. Consumer credit is the main source of income for commercial banks, but it is also the hardest hit. Internet finance provides customers with convenient business channels and rapid business processing efficiency. With its technical advantages, it can accurately analyze and predict customers' risk preferences and potential financial needs, thereby providing appropriate financial products and services. P2P lending is an integral part of Internet finance. P2P lending is booming in China. The number of operating platforms and the rapid growth of its participants in the past three years have also negatively affected the bank's loan business. Judging from the current development, there is a competitive relationship between P2P loans and commercial bank loans. Studying the long-term stability of this relationship is conducive to the stability and sound development of China's financial market.

The goal of this article is to make a comprehensive comparison of bank consumer loans and P2P lending in China. And it will select several different banks and P2P lending platforms in China as examples for detailed comparison. Based on the multi-criteria decision analysis method, we find the best choice for customers to make loans. There are many large banks in China, and P2P lending is also developing rapidly in China, so it is necessary for consumers to make more favorable choices.

This thesis is divided into five chapters. The first one is an introduction to the paper. The second one is an introduction to the characteristics of China's banking industry. The third chapter is the characteristics of financial technology and banking products. Chapter 4 will use a multi-criteria analysis method to compare bank consumer loans and P2P lending in China. The last chapter is the conclusion of the paper.

In chapter 2, the characteristics of the banking industry. First, the history of banking. Understand the functions of banks and their role in economic development. Next, learn about China's banking system, including the introduction of the six major commercial

Banks and their current development in China. Finally, the characteristics of the banking industry are summarized.

Chapter 3 is about the characteristics of retail banking products based on Fintech. In this chapter, we first introduce the meaning and application of Fintech. Second, introduce some bank products. This section will focus on consumer loans. Third, analyze the cooperation between Fintech and banking industry. This paper analyzes the influence of Fintech on China's commercial banks and the development and changes brought by Fintech to China's banking industry. The fourth part analyzes the data changes of China's current account in the past 20 years. Next, analyze the current situation of mobile payment in China and understand its impact on the economy through charts. Finally, it summarizes the development of banking industry in the era of Fintech. It also provides some suggestions and ideas for the further development of banking and Fintech.

In chapter 4, we first introduce the meaning and method of multi-criteria decision making. Next, the multi-criteria decision analysis method and its application analytic hierarchy process are used to analyze the loans provided by different banks and P2P lending platforms. And to provide customers with the best choice. Based on the calculation results, this chapter will compare bank consumer loans and P2P lending, analyze their differences and advantages and disadvantages, and provide ideas for their common development in the future.

The last chapter will state the conclusion of the thesis, and make a comprehensive evaluation and summary of the thesis theme.

2 Characteristics of Banking Industry

This chapter will introduce the structure and characteristics of China's banking industry from the perspective of the history, development and functions of banks, and understand the situation of China's six major commercial banks through examples, analyze the characteristics of banks and non-bank financial institutions in the banking industry, so as to understand the industry characteristics and development status of China's banking industry.

Banking, in China, refers to the People's Bank of China, regulatory bodies, self-regulatory organizations, as well as financial institutions, non-bank financial institutions and policy banks that absorb public deposits, such as commercial banks, urban credit cooperatives, and rural credit cooperatives established within the territory of the People's Republic of China.

The bank is the main body of the modern financial industry and the hub of the national economy.

2.1 The History of Banking

The emergence of Chinese banking can be traced back to the Tang dynasty, more than 1,000 years ago, when some institutions concurrently operated money. Subsequently, the Song dynasty, the Ming dynasty, the Qing dynasty appeared in charge of money institutions. These institutions are not yet real banks, but they have some of the characteristics of a bank.

The emergence of modern banks was in the middle ages in Europe, in the then center of the world Italy first produced. The Bank of Venice, established in Italy in 1171, is the earliest modern bank. The Bank of Genoa, established in 1407, was an early depository bank. Since then, a number of banks have been established, mainly engaged in deposit, loan business, most of the usury nature.

The Bank of England, founded in England in 1694, was the world's first capitalist joint-stock bank. From the end of 18th century to the beginning of 19th century, with the establishment of capitalist relations of production and the continuous development of

capitalist commodity economy, capitalist banks were generally established. Capitalist bank is a special capitalist enterprise. Its main function is to operate monetary capital, issue credit circulation instruments, and act as credit intermediary and payment intermediary between capitalists.

Established by the British in Guangzhou in 1845, Liru Bank (also known as "Oriental Bank") was the earliest bank in China. The Bank of Commerce of China, founded in 1897, was the first bank of its kind in China.

In the period of imperialism, the banking monopoly was formed with the continuous concentration of capital. The bank's monopoly capital and the industrial monopoly capital are merged into the financial capital. The bank has evolved from a simple intermediary into a universal monopolist, which not only controls the nerve center of the national economy, but also can expand through capital export and transnational banks.

The asset scale and after-tax profit of Chinese banking industry have been increasing significantly year by year. In 2011, the profit of Chinese banking industry accounted for nearly one third of the total profit of global banking industry. The scale of China's banking industry is developing rapidly, but under the background of accelerating interest rate liberalization, intensifying internal and external competition and declining profit growth, banks and financial institutions must make corresponding strategic adjustments in business structure, resource allocation and regional layout.

In succession since the outbreak of the financial crisis, the China Banking Regulatory Commission issued "About China's Banking Sector to Implement New Regulatory Standards Guidelines", "The Measures for The Administration of The Commercial Bank Leverage" and "The Commercial Bank Capital Management Method". On June 8, 2012, the CBRC officially issued "The Official Draft of The Capital Management Measures for Commercial Banks (trial)", which will be implemented from January 1, 2013.

There are also further discussions on liquidity management and counter-cyclical capital management of commercial banks. In terms of direction, these regulatory principles positively reflect the trend of new international regulatory standards. From the perspective of strength, both the setting of regulatory standards, the definition of

regulatory indicators and the requirements on implementation time are significantly higher than those of international standards.

Implement dynamic supervision of loan loss provisions. In line with the progress of the international reform of the provision system, the CBRC issued the guidance on the implementation of new regulatory standards for China's banking industry in 2011, which stated that the loan provision ratio should not be less than 2.5% and the provision coverage rate should not be less than 150%.

With the increasing competition in the banking industry, the banking financial institutions pay more and more attention to the tracking research of the industry development environment and market demand, especially the in-depth research on the development environment of the banking business and the trend change of customer demand.

2.2 The Role of Bank in Economic Development

Main Roles of Banks are:

- The bank is the fund allocation institution of China's economic construction and the link to ensure the smooth progress of reproduction,
- Banks can grasp and reflect the information of social and economic activities, and provide the necessary basis for enterprises and countries to make correct economic decisions,
- The bank shall supervise and manage the production and operation activities of various departments and enterprises in the national economy, optimize the industrial structure and improve economic benefits.

The bank is the fund allocation institution of China's economic construction and the link to ensure the smooth progress of reproduction.

By absorbing deposits and issuing loans, banks pool the idle funds of the society and lend them to the production departments that need funds in the form of loans to raise and allocate funds for economic construction.

Through capital activities, banks become the link between the national economy. Under the condition of commodity economy, various sectors and enterprises of national economy are an interdependent organic whole. All economic activities between them are realized through the relationship between goods and money. As the national center of credit, settlement, cash and foreign exchange receipts and payments, the bank concentrates most of the currency receipts and payments in various sectors and enterprises of the national economy. By conducting credit and settlement services, banks are like a link linking production, distribution, exchange and consumption. Linking industry, agriculture and other sectors of industry. The effect is like the circulation of the human blood. Without the activity of banks, the national economy would grind to a halt.

Banks can grasp and reflect the information of social and economic activities, and provide the necessary basis for enterprises and countries to make correct economic decisions.

The bank is the nerve center of national economy and the aggregate of social and economic information. Economic research and decision-making departments can grasp the social and economic trends comprehensively from the information of the changes in the amount of deposits and loans, the speed of the turnover of credit funds, and so on. Based on this, it analyzes the new situation and new problems in the economy, so as to provide the necessary basis for the leader's decision. With the computerization of the bank, the sensitivity and accuracy of the nerve center and information center of the bank have been enhanced. Large banks in developed countries generally have research departments that specialize in the regulation, statistics and forecasting of economic information. And high salaries to hire specialized personnel to study the work of the department, from the organization to strengthen the bank's economic information work.

It can be seen that modern banks, as an important subsystem of national economic management information system, have an irreplaceable position and role.

The bank shall supervise and manage the production and operation activities of various departments and enterprises in the national economy, optimize the industrial structure and improve economic benefits.

The bank can know the operation of each enterprise by the amount of deposits, loans and transfer and settlement. Thus urges each enterprise to carry out the national financial policy correctly, plays the supervisory management role. In addition, banks use credit, interest rate, foreign exchange, exchange rate and other economic leverage, optimize the industrial structure, is the direction of rapid economic development. For example, the scale and investment of bank credit funds directly affect production and circulation, and affect the balance between aggregate supply and aggregate demand. Banks provide foreign exchange funds for enterprises, introduce foreign advanced technology and equipment, and speed up the technological transformation of enterprises; Play the role of regulating internal and external capital and economic relations.

2.3 Functions of Banks

Main Functions of banks are:

- Adjusting economy,
- Create credit,
- As a credit intermediary.

Adjusting economy means that commercial banks adjust the shortage of funds in various sectors of society through credit intermediary activities. Under the guidance of the central bank's monetary policy and other countries' macro policies, the adjustment of economic structure, consumption ratio, investment and industrial structure will be realized. In addition, commercial banks can adjust the balance of payments through their financing activities in the international market. Because of its extensive function, commercial banks have a great influence on the whole social and economic activities. It plays a special and important role in the whole financial system and even the national economy.

Create credit refers to the credit creation function of commercial banks on the basis of credit intermediary function and payment intermediary function.

Commercial banks is the ability to absorb a variety of bank deposits, and loans by the absorption of all kinds of deposits and the circulation of the check and transfer settlement, on the basis of the derived for deposits, loans and extracted in this account,

on the basis of cash or incomplete withdrawal, you increase the source of funds of commercial banks, and finally in the entire banking system, the formation of several times the original deposit derived deposits.

Credit intermediary is the most basic function of commercial banks, which can best reflect the characteristics of their business activities. The essence of this function is to concentrate the idle money of society in the banks, through their liabilities, and to channel it into the economy, through their assets.

As the intermediary or representative of the lender and borrower of monetary capital, commercial banks realize the financing of capital, and obtain profit income from the difference between the cost of absorbing capital, interest income of issuing loans and investment income, thus forming bank profits. Commercial banks became "big traders" buying and selling "capital goods".

The bank carries on the clearing and settlement service for the customer and the customer because of the commodity trade, the service charge, the fund loan and so on the collection and payment which produces between the customer and the customer receives and pays, is the transfer settlement. Chinese banks mainly use cheque, promissory note, bill of exchange, bank card and so on as settlement tools in transfer and settlement.

Payment through transfer settlement has the following advantages: customers can save a lot of cash counting, custody, escort and other labor, security is also greatly improved; The state can save money by printing large amounts of money; Banks can charge fees by providing money transfer and settlement services.

Banks play an important role in social and economic life. Banks raise and allocate funds for China's economic construction and provide financial services for the operation of various sectors of the national economy and enterprises.

2.4 Characteristics of China's Banking Industry

The China Banking Insurance Regulatory Commission (CIRC) released "The List of Banking Financial Institution Legal Persons (as of the end of December 2019) " on

March 24, showing that the number of banking financial institution legal persons in 2019 totaled 4,607, 19 more than that of the end of December 2018.

By the end of December, China had 22 types of banking financial institutions and 4,072 legal entities that can be called Banks. One of the development financial institutions: China Development Bank; Two policy banks: the Export-Import Bank of China and the Agricultural Development Bank of China; Six large state-owned commercial banks: Bank of China, Agricultural Bank of China, Industrial and Commercial Bank of China, Construction Bank, Bank of Communications, Postal Savings Bank; 12 joint-stock commercial banks: Citic, Everbright, China Merchants, Pudong Development, Minsheng, Huaxia, Ping an, Xingye, Guangfa, Bohai, Zheshang, Hengfeng Bank; 134 city commercial banks: city commercial banks mainly represented by Beijing Bank and Shanghai Bank; 18 private banks; 1624 rural banks: in 2019, there were 6 new rural banks, and in 2018, there were 54 new rural banks, showing a slowdown in the growth rate. 30 rural cooperative banks; 1,423 rural commercial banks: the total number of rural commercial banks increased by 26 compared with the end of 2018; Rural credit cooperatives: the number of rural credit cooperatives decreased by 30 from the end of 2018, and the current number of rural credit cooperatives is 782. And 41 foreign incorporated banks.

In addition to these so-called banks, there are 13 loan companies, 5 money brokers, 4 financial asset management companies, 70 financial leasing companies, 256 corporate finance companies, 25 auto finance companies, 68 trust companies and other financial institutions.

The China Banking Association released "the China Banking Services Report 2019" on March 11. By the end of 2019, China's banking and financial institutions had 228,000 branches, among which 15,591 were transformed during the year, according to the report. The number of community outlets reached 7,228, and the number of small and micro outlets reached 3,272. There are 1.0935 million self-help devices in China, of which 4,805 are innovative self-help devices. The number of transactions using self-service devices reached 35.385 billion, with a transaction value of 61.85 trillion yuan.

By the end of 2019, the balance of agriculture-related loans in local and foreign currencies by banking financial institutions was 35.19 trillion yuan, up 7.7 percent year-

on-year. Small micro enterprise loan balance of 36.9 trillion yuan, year-on-year growth of 10.1%, among them, single-family total credit of \$10 million and the following pratt & whitney type small micro enterprise loan balance of 11.7 trillion yuan, the year growth rate of 24.6%, loan balance number more than 2100, the year 3.8 million, new lending for pratt & whitney type small micro enterprise average interest rate on the average fell by 0.64% in 2018.

2.5 China's Banking System

China's banking system consists of the central bank, regulatory authorities, self-regulatory organizations and banking financial institutions.

Under the leadership of the state council, the People's Bank of China, the central bank, is responsible for formulating and implementing monetary policies, preventing and defusing financial risks and maintaining financial stability.

The China banking and insurance regulatory commission is responsible for supervising the banking financial institutions and their business activities in the country. Main responsibilities: in charge of policy (monetary policy), money (management of the issuance and circulation of RMB), market (inter-bank interbank market and inter-bank bond market), foreign exchange (inter-bank foreign exchange market), gold (gold market), reserves (foreign exchange reserves and gold reserves), Treasury, clearing and anti-money laundering

China banking association is a national non-profit social organization registered in the ministry of civil affairs and a self-regulatory organization of China's banking industry. Main responsibilities: in charge of examination and approval (bank establishment, change, termination, etc.), in charge of qualification (qualifications of directors and executives), in charge of rules (making prudent operation rules), in charge of supervision (off-site supervision and on-site inspection), in charge of balance sheet, in charge of emergencies (handling of emergencies), in charge of statistics (handling of statistical data of the national banking industry), in charge of self-discipline (the association of Chinese Banks is subject to CBRC), in charge of daily management (mainly refers to the daily management of the supervisory boards of key banking financial institutions)

China's banking financial institutions include policy banks (the State Development Bank, Export-Import Bank of China, Agricultural Development Bank of China), large commercial banks (the Industrial and Commercial Bank of China, Bank of China, Agricultural Bank of China, China Construction Bank, Bank of Communications), small and medium-sized commercial banks, rural financial institutions, as well as the Postal Savings Bank of China and foreign banks. Non-bank financial institutions regulated by the CBRC include financial asset management companies, trust companies, enterprise group finance companies, financial leasing companies, auto financing companies and currency brokerage companies.

3 Characteristics of Retail Bankig Products in Accordance with Fintech

This chapter will focus on Fintech. Understand its meaning and characteristics, as well as the development status in China. The first part is to understand the characteristics of fintech. This part will analyze from three aspects: online banking, cashless society and cryptocurrency. Among the online banks, the contents of current account, electronic bank, payment card and e-wallet are analyzed.

The second part is analyze the characteristics of crowdfunding and P2P lending, and find the difference between crowdfunding and P2P lending by understanding the characteristics of both.

The next part is focus on consumer loans. Understand what is consumer loans and the changes and characteristics of consumer loans in China.

Finally, the last part is the development of Fintech in China. Through understanding a series of government policies on the development of Fintech; Understanding the cooperation and development between fintech and Chinese commercial banks; And provide some ideas for its future development.

3.1 Characteristics of FinTech

Fintech, as its name implies, is the combination of finance and technology. Fintech is a relatively new development in finance. With the development and application of the new generation of information technologies such as big data, cloud computing and artificial intelligence, financial and technological developments are converging. Fintech effectively provides the availability and convenience of financial services to reduce financial transaction costs.

KPMG's understanding of Fintech is that non-traditional companies are using technology as a cutting edge to enter the financial sector, grab markets with more efficient technology, improve the efficiency of financial services and better manage risk.

3.1.1 Online Banking

The main types are:

- Current account,
- Electronic banking,
- Payment card,
- E-wallets.

Current account is a major component of a country's balance of payments. It mainly includes the balance of trade in goods, i.e. the import and export of tangible goods, and the balance of trade in services, i.e. the flow of services such as tourism, banking and insurance. The current account does not contain flows of long-term borrowing and investment, which are capital account items.

The current account is the most basic and important account of international economic transactions. It includes goods, services, revenue and regular transfers. Current account and capital, as opposed to the financial account, are financial flows arising from trade and services in the balance of payments. This part is therefore seen as a more reasonable flow of capital.

The current account in the balance of payments is the sum of the balance of trade (exports of goods and services minus imports), factor income (such as interest and dividends), and then transfer payments (such as foreign aid). A current account surplus (surplus) increases a country's net foreign capital by a corresponding amount; The current account deficit (deficit) is just the opposite.

The balance of trade is typically the most important part of the current account. That is to say, changes in the trade position are a major factor in the current account. However, for those few countries with significant overseas assets and liabilities, net factor payments can be significant.

Changes in the current account, the capital account, the financial account and the official reserves all add up to zero to make up the definition of the account. This sum is called the balance of payments. Normally, the change in official reserves is very small.

Electroni banking refers to our bank's communication channels or public networks open to the public; And the establishment of a special network for specific self-service facilities or customers. Provide out of the counter financial services to customers. It mainly includes online banking, telephone banking, manual banking, self-service banking and other counter services.

Electronic banking mainly includes online banking using computers and the Internet. Mobile banking using mobile phones and wireless networks; And other devices and networks that utilize electronic services. A network service in which a customer completes a financial transaction through a self-aware service.

Banks use Internet technology; Through the Internet to provide customers with account opening, closing, inquiry, account checking, advising the bank within the transfer, inter-bank transfer, credit, online securities, investment and financial management and other traditional services. Enable customers to safely and conveniently manage current and fixed deposits, cheques, credit cards and personal investments without leaving their homes. It can be said that online banking is the virtual bank counter on the Internet.

The advantages of e-banking are as follows: first, it provides banking services without place and time limit to improve customer satisfaction. Second, reduce banking costs and improve profitability. Third, shorten the time to respond to new market and customer demands, and maintain a competitive advantage. Fourth, provide personalized banking services to meet the diverse financial needs of specific enterprises and individuals. Fifth, enhance the ability to compete with large international banking groups.

The disadvantages of e-banking are: relying on electricity and network, conditional restrictions; Machine operation, lack of humanization, explanation is not clear; There are hidden dangers in network security; The kinds of services are restricted and cannot be withdrawn.

Payment card types according to different classification basis, can have different kinds. In China, cards can be divided into debit and credit cards according to an individual's credit limit, which is the most common classification method.

Debit card is divided into transfer card, special card and stored value card by function. A debit card cannot overdraw. Transfer card has the function of transferring money, withdrawing cash and consuming.

Special card is in specific area, special purpose (refers to the department store, catering, entertainment industry outside the use of the debit card) used, with the transfer, access to cash function. Stored value card is a prepaid wallet debit card that the bank transfers funds to the card according to the cardholder's requirements and stores the money in the card.

Debit card can be consumed online or at POS or transferred and withdrawn via ATM, but cannot overdraw. The amount in the card is charged with interest on demand deposits. When money is spent or withdrawn, it is withdrawn directly from a savings account. Debit cards generally require a PIN when used. Debit cards by grade can be divided into ordinary cards, gold cards and platinum cards; According to the scope of use can be divided into domestic cards and international cards.

Credit card is divided again borrow write down card and quasi borrow write down card. Borrow write down card is to point to hair card the bank gives the credit line that holds card person certain, hold the credit card person to be able to consume first inside credit line, the credit card of reimbursement after. Quasi credit card is to point to hold card person to press the bank to ask to deposit the petty cash of certain amount first; A credit card that allows you to overdraw within the credit limit specified by the issuing bank when payment of petty cash is insufficient.

In addition, the bank card can also be divided into magnetic stripe card and chip card according to the information carrier;

It is divided into domestic card and overseas card according to whether the issuing entity is in China;

Divided into individual cards and unit cards according to different issuing objects;

According to the account currency is divided into RMB card, foreign currency card and double currency card.

Electronic wallet is a payment tool commonly used by customers in e-commerce shopping activities. Shopping with an e-wallet usually requires an e-wallet service. The e-commerce activities in the e-wallet software is usually free to provide, you can directly use with their bank account connected with the e-commerce system server on the e-wallet software, also can be called on the Internet, using a variety of confidential ways to use the Internet e-wallet software.

There are already e-wallets available: GooglePay, ApplePay, Epay, PayPal, Skrill, Alipay, etc. Countries where e-wallets are already available include Singapore, the Netherlands, and France. Countries such as China and India are also leading the global shift towards electronic transactions.

Google Pay uses near field communication (NFC) to transmit card information, which helps transfer money to retailers. It replaces credit or debit card chips and PIN or magnetic stripe transactions by allowing users to upload them to the point-of-sale terminal. It is similar to contactless payments already used in many countries/regions, and adds a two-factor validation. The service allows Android devices to use near-field communication (NFC) antennas to communicate wirelessly with point-of-sale systems based on host card emulation (HCE). And Android security.

Google Pay takes advantage of physical authentication, such as an available fingerprint ID. On devices without a fingerprint ID, Google Pay is activated using a password. When a user pays a merchant, Google Pay does not send a credit or debit card number with the payment. Instead, it generates virtual accounts that represent user account information. This service keeps customer payment information confidential and sends a one-time security code instead of card or user details.

ApplePay, a mobile payment function based on NFC, was launched by apple at the 2014 apple fall product launch event. It was officially launched in the United States on October 20, 2014. Since its launch, ApplePay has accounted for 1% of the digital payments market. Two-thirds of new ApplePay users used the service several times in November. The average ApplePay user uses ApplePay 1.4 times per week. At 5:00 am on February 18, 2016, ApplePay business was launched in China. On June 6, 2017, apple iOS11 was released, and ApplePay supported friend transfers.

AliPay, a payment tool owned by alibaba, is China's leading third-party payment platform. AliPay is a one-stop-shop scenario platform that centers on everyone and is based on real name and trust. AliPay not only supports online consumption payment, but also expands offline payment services, including catering, supermarkets, convenience stores, taxis and public transportation, through the form of code scanning payment. At the same time, AliPay has also made great efforts to expand its overseas payment business and made some achievements in the domestic financial sector, such as providing payment services for financial products such as yu 'ebao and fund. AliPay has established strategic cooperative relations with more than 180 domestic and foreign banks, as well as international organizations such as VISA and MasterCard, and has become the most trusted partner of financial institutions in the field of electronic payment.

3.1.1 Cashless Society

Cashless society refers to a society in which cashless payment methods such as credit card payment and mobile payment become the mainstream payment methods by replacing cash payment with non-cash payment.

Cashless payment refers to the use of electronic payment wherever cash can be paid, making "cashless" a mainstream payment method. "Cashless" is not about "killing cash", it is about freeing payments from the constraints of cash, allowing people to carry their mobile phones without cash.

The UK has been one of the fastest countries to switch to cashless payments, according to the institute of British finance. In 2018, cash accounted for just 28 per cent of all transactions in the UK. By 2028, the number is projected to drop to about 10 percent.

More than 5,000 atms have been withdrawn in the past 18 months, the equivalent of 10 a day, according to a new survey.

In addition, according to a ranking published by a global market research institute, the UK ranks third among the countries with the highest mobile payment penetration in the world, behind China and Norway. In 2018, 7.2 million people in the UK, or 13 percent of the population, used mobile payments.

However, cashless transactions also cause problems for some people. According to the survey, 54 percent of consumers in remote areas of the UK are having difficulty accessing their money due to cashless transactions, with small business owners, the elderly and some on low incomes being the worst affected. Some residents had to drive long distances to get money.

Many older people are used to paying with cash, and can neither use nor learn to pay without cash. In Japan, mobile payments are hard to promote because of the large elderly population. We often use qr codes for mobile payments, but in Japan, where they were born, mobile payments are not widespread, with four-fifths of transactions still in cash. Our population is very old, with more than 28% of the population over 65 years old. For them, adopting new technologies and changing their habits is no small challenge.

Advantages of Cashless Society

First, convenience. The most immediate benefit of being cashless is that it is fast and convenient, reducing the frequency of deposits and withdrawals, saving time and making it more convenient for normal consumption. It's also easier for sellers to collect money without needing change.

Second, safety. Security lies in the absence of cash, there is no or very little cash stolen directly; At the same time, due to the lack of cash, so the use process will not directly contact with cash and reduce the exposure to bacteria.

Third, revenue. General cash in the hand is won't produce income basically, but when network pays, still can produce certain income, get the favour of consumer more so.

Fourth, stimulate consumption. Online consumption is more convenient, to some extent because of the lack of cash, and online consumption is more convenient to promote consumption and stimulate the development of the economy. It can be seen every year in China during the singles day and 12-12 shopping festival.

Disadvantages of Cashless Society

First, there are certain financial risks. In today's cashless society, much of the idle money is concentrated in online companies, or internet finance; Therefore, there will be some financial risks, and the recent measures taken by the central bank have indeed strengthened supervision.

Second, the cultivation of several large internet payment oligarchs. Full competition is the performance of the free market, from the current point of view, the situation of payment oligopoly will not be effectively improved temporarily.

Third, the traditional financial institutions have caused a certain impact. Due to the existence of advantages, Internet finance grows barbarously in the cashless society, absorbing a large number of idle funds from the public and the volume is huge. This has a certain impact on the deposit-taking function of traditional financial institutions.

3.1.2 Cryptocurrency

Cryptocurrency is a medium of exchange that uses cryptographic principles to secure transactions and control the creation of trading units. Cryptocurrency is a form of digital (or virtual) currency. Bitcoin became the first decentralized cryptocurrency in 2009, and since then the term cryptocurrency has mostly referred to such designs. Since then several similar cryptocurrencies have been created, often referred to as altcoins. Cryptocurrencies are based on decentralized consensus mechanisms, as opposed to banking and financial systems that rely on centralized regulatory systems.

Money in economics, narrowly defined, is the standard article used to exchange goods; Broadly speaking, it is used as a medium of exchange, a measure of value, a means of payment and a store of value. Specifically, money has such functions as medium of exchange, standard of value, standard of deferred payment, store of value, and world currency. Bitcoin is a digital currency with a constant amount of 21 million. Like the Internet, it is decentralized, global and anonymous. It means transferring bitcoins to the other side of the world, as simple as sending an email, with low cost and no limits, so bitcoins are used for cross-border trade, payments, remittances and other fields.

Bitcoin's liquidity and finiteness determine whether bitcoin can function as a currency equivalent to a general equivalent, or as a measure of money, but not as a physical measure like gold, but as a digital product.

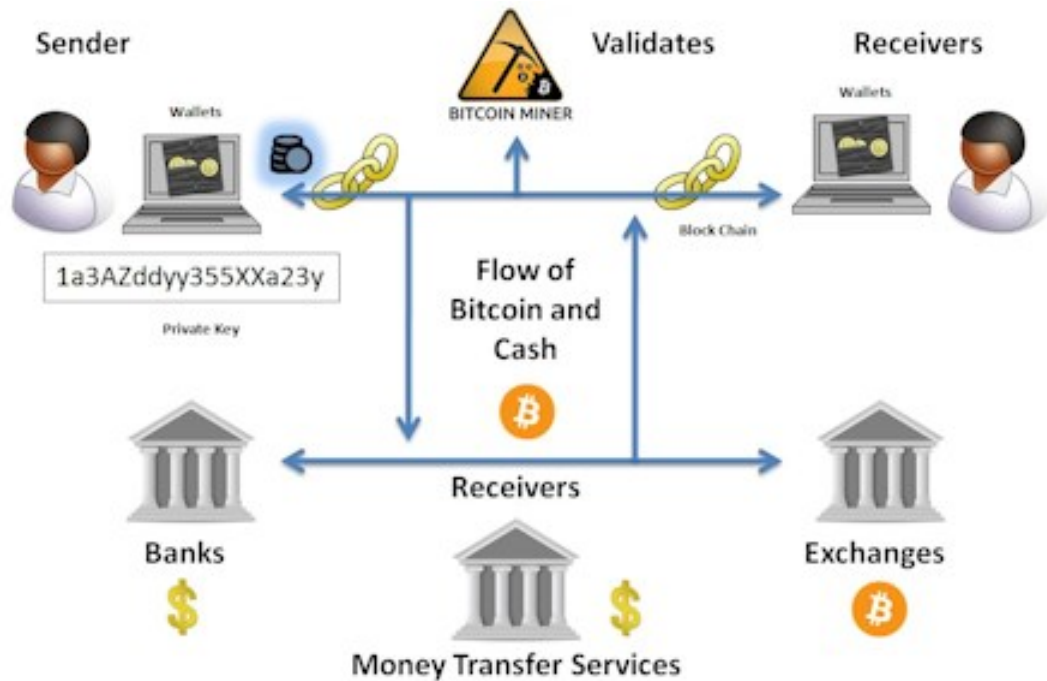
The concept of Bitcoin was first proposed by Satoshi Nakamoto on November 1, 2008, and was officially born on January 3, 2009. Based on the ideas of Satoshi Nakamoto, design and release of open source software and construction of P2P network on it. Bitcoin is a peer-to-peer form of virtual cryptographic digital currency. Peer-to-peer transmission means a decentralized payment system.

Unlike all currencies, bitcoin is not issued by a specific monetary institution. It is generated by a large number of calculations based on a particular algorithm. The bitcoin economy USES a distributed database of nodes in the entire P2P network to confirm and record all transactions, and USES cryptographic design to ensure the security of all links in the currency circulation. The decentralized nature of P2P and the algorithms themselves ensure that the currency cannot be manipulated artificially by churning out bitcoins. Cryptographic-based design allows bitcoin to be transferred or paid for only by the real owner. It also ensures the anonymity of currency ownership and transactions. The biggest difference between bitcoin and other virtual currencies is that its total quantity is very limited and it is extremely rare.

One of the basic points to understand about bitcoin is that there are no coins in a Bitcoin wallet at all, and the bitcoin books record only wallet-related transactions.

Bitcoin doesn't exist anywhere, even on a hard drive. If someone holds a bitcoin, they actually have the address of a particular bitcoin, but the coin doesn't exist directly at that address, it's like your bank account. But there is no tangible object in the world, or a data file, that can be called a "bitcoin." There are only transfer records between various addresses, the balance increases and decreases. All transactions are held in a very large ledger known as the blockchain. The balance corresponding to the bitcoin address is not directly stored on the blockchain, but all transactions related to this address need to be found in the blockchain and calculated according to the transaction amount. The trading process can be referred to in Figure. 3.1.

Figure.3.1- Bitcoin transaction process



Source: captainaltcoin.com

For the entire network to record the transaction, you first have the sender sign the transaction with its private key, and then wait for the entire network to confirm.

How are coins sent in bitcoin transactions? You need two things, the bitcoin address and the corresponding private key. Unlike a bank account, bitcoin addresses don't require you to sign a bunch of documents to apply. They are randomly generated strings of letters and numbers. The private key is also a similar string, but this is strictly confidential. The bitcoin address is like a transparent piggy bank. Everyone can see what's inside, but only the person with the private key can open it. When user A wants to transfer money to user B, it uses the private key to sign a message that includes the input, number, and output of the three items already mentioned.

That way, the message is broadcast to the bitcoin network, and the miners can verify the transaction and add it to the blockchain. Transactions need to be verified by miners before they can be written into the blockchain, so you have to wait for them to dig successfully. Mining process is actually a bookkeeping process, mining success means

that the whole network has recorded the transaction of user A, bitcoin will be sent successfully.

3.2 Characteristics of Crowdfunding and P2P Lending

This chapter describes the meaning and characteristics of crowdfunding and P2P lending, and analyzes the differences between them.

3.2.1 What is Crowdfunding

Crowdfunding refers to the activities of open microfinance through the Internet, with the characteristics of "open, small and public". Through the crowdfunding platform, the fund raisers can get funds from a certain number of individuals or organizations to meet their needs, and the investors can get corresponding returns. According to different ownership relationships and return types, crowdfunding can be divided into equity crowdfunding, debt crowdfunding, charity (public welfare) crowdfunding and in-kind crowdfunding.

Equity-based crowdfunding: it refers to the activities of public small-amount equity financing through the Internet approved by the securities regulatory body under the state council. Specifically, it refers to the activities of innovative entrepreneurs or small and micro enterprises that publicly raise capital through the Internet platform of equity crowdfunding intermediaries.

Debt crowdfunding: the financing party conducts financing in the form of debt through the crowdfunding platform. Investors receive relatively stable expected interest rates.

In-kind crowdfunding: the crowdfunding provider attracts potential buyers on the crowdfunding platform in the form of products and ideas to obtain project funds in advance. Investors can obtain the products and services provided by the financing party at a relatively favorable price.

Charity (public welfare) crowd-funding: public welfare projects that release public information to ordinary users by taking advantage of the efficiency and speed of the Internet to meet the charity needs of the society. Sources of charitable (public welfare) crowdfunding projects include charitable foundations and individuals and groups that meet public welfare and compliance requirements.

3.2.2 The Characteristics of Crowdfunding

First, high efficiency and low cost. For crowdfunding, the release, promotion and transaction of the project are all realized through the Internet. This greatly improves the communication and transaction efficiency between the investment and financing parties, and at the same time reduces the start-up cost, marketing cost and transaction cost.

Second, reward diversity. For crowdfunding investors, they can obtain enterprise equity, physical products, cultural performances, film and television works in addition to capital returns. The diversity of crowdfunding returns can meet the different needs of various investors.

Third, small investment. According to relevant regulations, crowdfunding requires investors to make small investments with a certain amount of wealth and annual income and a corresponding risk tolerance. This meets the different needs of the participants at each level.

3.2.3 The Characteristics of P2P Lending

First, low cost. Using the Internet as a medium, the supply and demand of money can be matched and traded online. There is no intermediary cost in traditional offline transaction, and the time cost is greatly reduced. For financial institutions, P2P platforms allow them to save the costs of physical stores and invest more money into their operations. For consumers, P2P platforms are more flexible and can independently find suitable financial products.

Second, high efficiency. Internet finance relies on advanced computer technology, and the operation process is completely completed by computers, with higher precision and faster speed in business processing, which improves the efficiency of financial

business. Most of the online loans can be completed online, which greatly saves the time of customers and continuously improves the efficiency of the loan business.

Third, the coverage is wide. There is no limitation of time and space in the Internet field, and consumers can find the financial business they need on the Internet anytime and anywhere. Financial services have a broader customer base. Through the Internet technology to continue to promote customer channels, for more users to provide timely financial help.

Fourth, faster development. Internet finance is the direction of future development, so P2P platforms grow very fast and become a force that cannot be underestimated in the financial field.

3.2.4 The Difference Between Crowdfunding and P2P Lending

Firstly, the essence of P2P is a person-to-person transaction mode, while the essence of crowdfunding is to collect project funds from netizens in the form of group purchase and pre-purchase.

Second, P2P financing is a way to attract investment by issuing investment projects on P2P platforms. P2P platforms often have their own funds to support their business. However, crowdfunding mainly relies on fundraising projects published on the Internet to attract financial support.

Third, P2P mainly focuses on investment and financial management to obtain profits, while crowdfunding mainly focuses on projects and products.

Fourth, P2P is aimed at enterprises and individuals with capital needs, mainly for the public investment and financial management, to meet users with certain economic capacity. Crowdfunding also plays a role in this regard, but mainly calls on the public to participate in the investment as the sponsor of the project returns.

Fifth, P2P financing, the platform loan project requirements are mainly the borrower's repayment ability. However, the crowdfunding financial project requires the project's creativity to be showable before it can be approved.

3.3 Consumer Loans

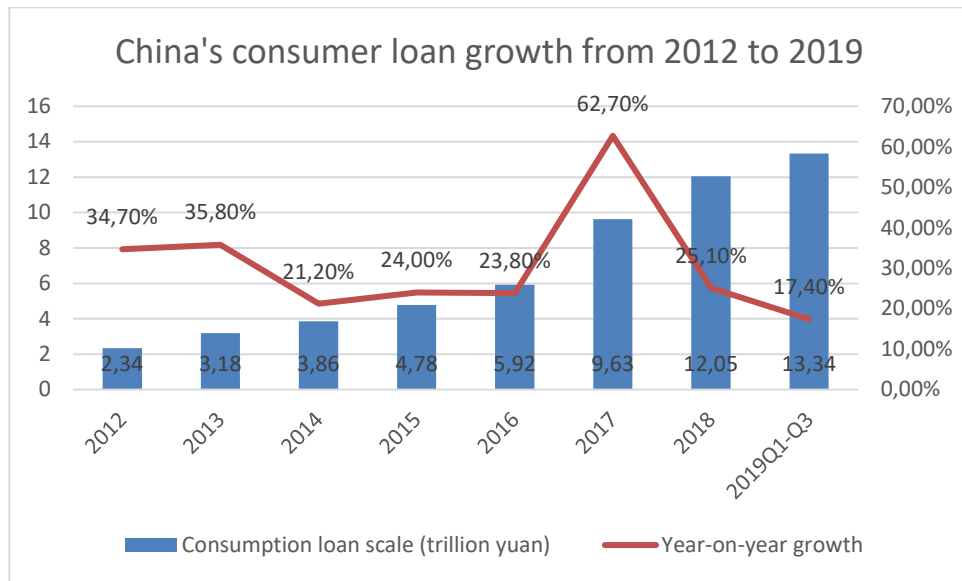
Consumer loan is a personal loan to a consumer for the purchase of consumer durables or for various expenses. For a long time, commercial Banks mainly extended loans to industrial and commercial enterprises or other various institutions and groups, and generally did not provide subsidies for personal consumption expenditures.

3.3.1 The Development of Consumer Loans in China

In recent years, consumption has become the main force driving China's economic growth. Final consumer spending contributed 78.5% of GDP growth in the first half of 2018. In this context, the state has issued a series of policies to strongly encourage the development of consumer finance, with the purpose of taking consumer finance as a new financing channel to boost domestic demand, transform the economic development mode and promote consumption upgrading. The report predicts that by 2020, consumer credit will reach a scale of more than 10 trillion, with huge potential for industry development.

The scale of consumer loans maintained rapid growth, reaching 13.34 trillion yuan by the end of September 2019, up 17.4% year on year. See Tab. 3.1.

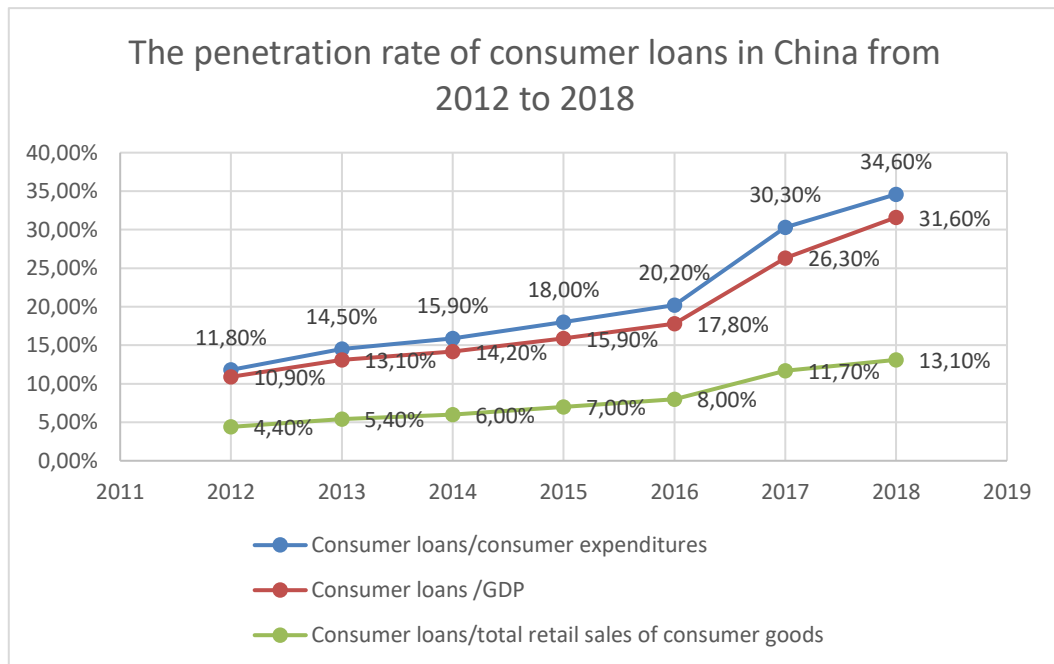
Tab. 3.1- China's consumer loan growth from 2012 to 2019



Source: Wind Information

The penetration rate of consumer finance increased rapidly, from 20.2% in 2016 to 34.6% in 2018, and gradually approached the level of consumer finance penetration rate of 42% in the United States. See Tab. 3.2.

Tab. 3.2- The penetration rate of consumer loans in China from 2012 to 2018



Source: Wind Information

The lending scale of Internet consumer finance continued to grow, from 0.02 trillion yuan in 2014 to 7.8 trillion yuan in 2018, an increase of nearly 400 times.

The number of credit CARDS issued and the number of CARDS held per capita have maintained rapid growth and reached a record high. At the end of 2018, the number of credit CARDS issued reached 970 million, up 22.8 percent year-on-year. The average person holds 0.7 cards, up 79.5% year on year.

The number of consumer finance companies continues to expand and the scale continues to grow. At present, 24 consumer finance companies have officially opened 30, and 3 have not yet opened. In addition, there are more than 10 proposed to set up.

With the in-depth combination of financial innovation and information technology, the consumer finance industry chain is increasingly mature, the participants are more and more abundant, the division of labor is more detailed, the third-party service institutions tend to be more specialized, credit investigation and risk control services continue to optimize, significantly improve the consumer finance customer experience and operational efficiency.

The financial technology market is growing exponentially, and core technologies such as biometrics, big data, artificial intelligence, blockchain and the Internet of things are driving the iterative upgrading of the industrial and value chains of consumer finance.

The consumer finance business model is becoming more and more mature, the scene party, the capital party, the technology party are more open, the multi-party cooperation situation is gradually formed, the competition of consumer finance has evolved into the competition of ecosystem and open platform.

Industry supervision tends to improve, various consumer financial industry chaos can effectively curb. Financial business licensing, leverage ratio, risk margin and other regulatory measures began to be widely applied to the entire industry.

3.4 The Develop of FinTech in China

This chapter analyzes the impact of fintech on China's commercial banks, and puts forward Suggestions for the development and application of commercial banks and fintech.

3.4.1 The Impact of FinTech on China's Commercial Banks

The main impacts are:

- The impact of Fintech on intermediate business of commercial banks,
- The impact of Fintech on the asset and liability ends of commercial banks,
- Financial technology accelerates financial disintermediation,
- The impact of fintech on the customer groups of commercial banks.

The impact of Fintech on the intermediary business of commercial banks.

Payment and settlement have always been one of the most basic intermediary services for commercial banks. Commercial banks can alleviate information asymmetry to a certain extent, so that commercial banks have advantages in the field of payment and settlement. As a typical representative of financial technology, mobile payment has shaken the dominant position of commercial banks. Mobile payment reduces the cost, realizes the efficient storage and data calculation of customer information based on cloud computing and other technologies, and reduces the information asymmetry more effectively. And the solution is more convenient and quicker. Crucially, there is a natural link between money and payment methods. Therefore, the impact of Fintech on payment and settlement is reflected in the trend of digitization of money. The digital cryptocurrency with blockchain as the core technology has built a global distributed account system, and payment activities can be completed without the support of banks as intermediaries.

The impact of Fintech on the assets and liabilities of commercial banks. In terms of assets, the most important and traditional asset business of commercial banks is loan business. On the liability side, the most important is the deposit business; The traditional loan business of commercial banks was first impacted by Internet finance. Commercial banks bear a large number of regulatory costs and fixed costs, while online finance can

complete credit assessment and deliver credit to customers at a lower cost, providing customers with more cost-effective consumer financial services, which will undoubtedly compress the profit space of commercial banks.

Financial technology accelerates financial disintermediation. The development of Fintech will accelerate the "disintermediation" trend of commercial banks. From the perspective of payment, mobile payment has been equipped with various payment and settlement functions, effectively replacing the traditional payment business of commercial banks. From the perspective of assets, through the Internet platform to match the capital needs of enterprises and individuals, successful financing can reduce the dependence on traditional credit of commercial banks. From the perspective of debt, the development of Fintech has greatly promoted the process of interest rate liberalization.

The impact of Fintech on the customer groups of commercial banks. With the big data and cloud computing technology owned by Fintech, the credit behaviors and credit records of smes can be truly and completely displayed. Internet finance can help solve the financing difficulties of small and micro businesses. To some extent, it makes up for the supply gap of the traditional financial system and improves the allocation efficiency of financial resources. On the other hand, network finance can easily meet the financing needs of small and micro enterprises, forming multiple external economies, economies of scale and economies of scope. As a result, Fintech will inevitably lead to increased competition in the banking sector.

3.4.2 The Application of FinTech in the Development of Commercial Banks

The main applications are:

- Improving the financial infrastructure construction of commercial banks,
- Make adaptive adjustments to the supervision of fintech and commercial banks,
- The change of mentality and cultural values of commercial banks.

Improving the financial infrastructure construction of commercial banks. The most basic premise for commercial banks to realize the deep integration with Fintech is

to have a mature and perfect financial infrastructure suitable for them. Chris Skinner sees a "three-step" strategy to transform or rebuild traditional commercial banks into "new banks". One is the background of the cloud; Second, realize the middle-level resource opening; The third is to provide a good user experience in the foreground. Obviously, this undoubtedly requires solid hardware and software conditions. In terms of hardware, we need high-performance computers and cloud servers, massive storage and so on. In terms of software, it needs powerful data mining and computing, distributed storage and advanced artificial intelligence.

Make adaptive adjustments to the supervision of Fintech and commercial banks. Some experts have come up with the corresponding concept of "Regtech" for Fintech. Regulation itself often lags behind, and fintech innovation is changing fast. Therefore, the corresponding regulatory system, regulatory rules, regulatory policies and concepts also need to keep pace with The Times. To adapt to the supervision of fintech and commercial banks, on the one hand, we should strengthen supervision and innovate the business forms and services outside the existing supervision system. At the same time, regulation should be forward-looking. On the other hand, there should also be room and space for regulation to both prevent risks and encourage the innovative integration of fintech and commercial Banks. Strike a balance between risk management and efficiency gains, and leave policy space for deeper and broader financial innovation.

The change of mentality and cultural values of commercial banks. First, financial technology has an impact on traditional commercial banks, resulting in increased competition and lower profits. Commercial banks need a balanced psychology. Scientific research, learning to accept new technologies, grasping new trends, transformation and upgrading of commercial Banks, and formulating long-term strategic plans for sustainable development in the future. Secondly, for customers, commercial banks should actively change the cultural value orientation of "loathe the poor and love the rich" under the traditional financial model. Grasp the future trend, target customer segmentation, understand the public demand for financial services.

4 Comparison of Consumer Loans and P2P Lending in China

This chapter includes an introduction to multi-criteria decision-making and a multi-criteria analysis method, and will use this method to compare bank consumer loans and P2P lending. The first part introduces decision theory. The second part is several analysis methods of multi-criteria decision-making. The third part will compare several bank loans and P2P loans according to the needs of customers and find out the most favorable solution. Finally, summarize the comparison results.

4.1 Decision Theory

Decision theory is a relatively complete theoretical system related to decision process, criteria, types and methods by applying system theory, operations research and computer science to management decision problems.

The viewpoint of decision theory is mainly manifested in three aspects:

- First, highlight the position of decision-making in management. The theory of decision management holds that the essence of management is decision making, which runs through the whole process of management and determines the success or failure of the whole management activities. If the decision is wrong, the organization's resources are rich, and the technology is advanced, it is useless.
- Secondly, the principle of decision making is expounded systematically. Simon made a scientific analysis of the procedures, criteria, types and techniques of decision making. In addition, "satisfaction criteria" is proposed to replace the traditional "optimization criteria" in decision theory. The method of conflict resolution in decision-making process is studied.
- Third, it emphasizes the role of decision makers. Think of an organization as a system of individual decision makers. Therefore, we should not only pay attention to the application of quantitative methods, computing technology and other new scientific methods in decision-making; Moreover, we should pay attention to the role of psychological factors, interpersonal relationships and other social factors in decision-making.

There are many kinds of administrative decision-making theories, and different scholars have different perspectives to expound the problems. The representative theories include the following.

Complete rational decision theory: also known as objective rational decision theory. It is believed that people are economic people who insist on seeking the maximum value. Economic people have the maximum rationality and can make the best choice to achieve the organizational and individual goals.

Continuous limited comparative decision theory: it considers human action can't be suitable for fully rational. Decision-makers are administrators with bounded rationality, who cannot foresee all the results and can only choose a "satisfactory" plan from the alternatives. In fact, the degree of rationality has a great influence on decision makers, but the role of organizational factors in decision making should not be ignored.

Rationality and group decision theory: to admit the existence of individual rationality, and that as a result of human's rational personal wisdom and ability, must with the aid of the role of the organization. By organizing the division of labor, each decision-maker can define his own work, understand more action plans and action results, and thus increase the rationality of decision-making. The rationality of decision makers is measured by organizational goals rather than individual goals.

Reality gradual decision theory: the base point is not rational, but facing the reality, and the gradual change of reality. He believed that the decision-maker could not have all the human intelligence and all the information about the decision, so the decision-maker could only adopt the way to cope with the situation. The theory requires the decision-making process to be simplified, and the decision-making is practical, feasible and in line with the requirements of interest groups, so as to solve practical problems. This theory emphasizes the reality and gradual change, which has been attached importance to by administrative decision makers.

Irrational decision theory: its basis is neither human reason nor the reality faced by human beings, but human passion. They believe that human behavior is largely dictated by the unconscious mind. Decision-makers often deal with problems emotionally and make unwise arrangements.

4.2 Methodology of Multi-Criteria Decision-Making

Multi-criteria decision making (MCDM) can be divided into multi-attribute decision making (MADM) and multi-objective decision making (MODM) according to whether the decision scheme is finite or infinite.

Multi-attribute decision making: Multi-attribute decision making is also called multi-objective decision making of finite scheme. It refers to the decision problem of selecting the optimal alternative scheme or sorting schemes when considering multiple attributes. It is an important part of modern decision science. Its theories and methods have been widely used in engineering, technology, economy, management and military.

Multi-objective decision making: Multi-objective decision making is a decision that requires consideration of two or more objectives at the same time. If an enterprise wants to choose one product from several products to produce; It is necessary to consider both the size of profit, but also to consider the existing equipment can be produced and the supply of raw materials is sufficient to choose one of the factors. The optimal decision is made only when these interrelated and mutually restrictive factors can be best coordinated, coordinated and satisfied.

Compared with conventional evaluation methods, multi-criteria decision evaluation has the following characteristics:

- It can judge, queue and select the best of multiple projects.
- Second, when conducting research on a project, each impact factor is treated as the criterion for judging the project. In addition, a series of information processing and extraction should be carried out for the value of factors, and the importance of each factor should be given weight.
- Thirdly, the project evaluation form is regarded as a decision judgment matrix, and more than ten decision judgment methods are used to organize the information. Combined into a dynamic analysis system with strong analytical mechanism; Then by means of modern computer technology to complete information processing quickly; Decision-making meetings can also be

organized to quickly respond to the opinions of decision participants, which is conducive to forming a consistent view.

4.2.1 Methods of Determination of Criteria Value

The method of weight determination induces the comprehensive evaluation of multiple indicators, which means that people choose the corresponding evaluation form according to different evaluation purposes and choose multiple factors or indicators accordingly. Through certain evaluation methods, multiple evaluation factors or indicators are transformed into information that can reflect the overall characteristics of the evaluation object. Among them, the determination of evaluation index and weight coefficient will directly affect the result of comprehensive evaluation. According to the weight generation method of different multi-index comprehensive evaluation method can be divided into subjective weighting evaluation method, objective weighting evaluation method and combination weighting method.

Combination weighting method is also called subjective and objective synthetic weighting method. The two commonly used methods are "multiplication" integration method and "addition" integration method. The formulas are:

$$w_i = \frac{a_i b_i}{\sum_{i=1}^m a_i b_i}, \quad (4.1)$$

$$w_i = \alpha a_i + (1 - \alpha) b_i, (0 \leq \alpha \leq 1), \quad (4.2)$$

where w_i represents the combinatorial weight of the i th index; a_i and b_i are the objective weight and subjective weight of the i th attribute respectively. The combination of the former is essentially the normalization of multiplicative synthesis, which is used in the case of more indexes and more uniform weight distribution. The latter is essentially linear weighting and is called linear weighting combination weighting method. When decision-makers have preferences for different weighting methods, α can be determined according to the preference information of decision-makers.

4.2.2 Analytic Hierarchy Process (AHP)

Analytic Hierarchy Process (AHP) was proposed by professor Saaty in the early 1970s. AHP is a simple, flexible and practical multi-criteria decision making method for quantitative analysis of qualitative problems. It is characterized by the various factors in complex problems by dividing them into interrelated ordered levels. According to the subjective judgment structure of certain objective reality (mainly pairwise comparison), the expert opinion and the objective judgment result of the analyst are directly and effectively combined. Then the importance of pairwise comparison of the first level elements is quantitatively described. Then, the weights reflecting the order of relative importance of the elements at each level are calculated mathematically. The relative weights of all elements are calculated and sorted by the total order between all levels.

The steps of ahp to construct the system model:

- build a hierarchical model,
- construction judgment (paired comparison) matri,
- hierarchical single sort and its consistency chce,
- hierarchical total ordering and its consistency check.

Build a hierarchical model: the objectives, factors (decision criteria) and objects of decision are divided into the highest, middle and lowest levels according to their mutual relations, and a hierarchical structure is drawn. The highest level is the purpose of the decision, the problem to be solved. The lowest level is the alternative at the time of the decision. The middle layer refers to the factors to be considered and the criteria for decision making. For the two adjacent layers, the upper layer is called the target layer and the lower layer is called the factor layer.

Construct a judgment: in the determination of the weight between the various levels of factors, if only qualitative results, it is often not easy to be accepted by others. Thus, Saaty et al. proposed the uniform matrix method. That is, instead of comparing all the factors together, we compare them in pairs. The relative scale is adopted to reduce the difficulty of comparing different factors with each other as much as possible, so as to improve the accuracy. For example, pairwise comparison of the schemes under a certain criterion is carried out, and the schemes are graded according to their importance. a_{ij} is

the comparison result of the importance of factor i and factor j , and Saaty gives 9 importance levels and their assigned values. The matrix formed by pairwise comparison is called the judgment matrix. The judgment matrix has the following properties:

$$a_{ij} = \frac{1}{a_{ji}}. \quad (4.3)$$

The scaling method of element a_{ij} of judgment matrix is shown in Tab.4.1:

Tab.4.1-Comparative scale

Quantitative values	Meaning
1	The two factors are of equal importance
3	Compared with the two factors, one factor is slightly more important than the other
5	Compared with the two factors, one factor is obviously more important than the other
7	Compared with the two factors, one factor is demonstrate more important than the other
9	Compared with the two factors, one factor is absolutely more important than the other
2, 4, 6, 8	The influence of the two factors is between the above two adjacent grades

Then we can get the judgment matrix, which is the weight ratio of each two factors:

$$A = \begin{pmatrix} 1 & \frac{a_1}{a_2} & \dots & \frac{a_1}{a_n} \\ \frac{a_2}{a_1} & 1 & \dots & \frac{a_2}{a_n} \\ \frac{a_{11}}{a_1} & \frac{a_{12}}{a_2} & \dots & \frac{a_{1n}}{a_n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{a_n}{a_1} & \frac{a_n}{a_2} & \dots & 1 \end{pmatrix}. \quad (4.4)$$

Hierarchical single sorting and its consistency test : The eigenvector corresponding to the maximum eigenroot λ_{max} of the judgment matrix is denoted as W after normalization (making the sum of the elements in the vector equal to 1). The element of W is the sorting weight of the relative importance of a factor of the same level to the factor of the previous level. This process is called hierarchical single sorting. Can confirm the level of single sorting, then need to conduct a consistency test. The so-called consistency test refers to the determination of the allowable range of inconsistency for A . Where, the unique non-zero characteristic root of n -order uniform matrix is n ; The maximum characteristic root of n -order positive reciprocal matrix A is $\lambda \geq n$, if and only if $\lambda = n$, A is a uniform matrix.

Since λ is continuously dependent on a_{ij} , the larger λ is than n , the greater the inconsistency of A will be. The consistency index is calculated by CI . The smaller the CI is, the greater the consistency is. The eigenvector corresponding to the maximum eigenvalue is used as the weight vector of the influence degree of the factors being compared on a certain factor on the upper level. The greater the inconsistency degree is, the greater the judgment error will be caused. Therefore, the inconsistency degree of A can be measured by the value of $\lambda - n$. The consistency index is defined as:

$$CI = \frac{\lambda - n}{n - 1}. \quad (4.5)$$

$CI=0$, it's completely consistent; CI is close to 0, with satisfactory consistency; The larger the CI , the greater the inconsistency.

To measure the size of CI , random consistency indicator RI is introduced:

$$RI = \frac{CI_1 + CI_2 + \dots + CI_n}{n}. \quad (4.6)$$

Among them, the random consistency index RI is related to the order of the judgment matrix. In general, the greater the order of the matrix, the greater the possibility of consistent random deviation. The corresponding relationship is shown in Tab.4.2:

Tab.4.2-Random consistency index *RI* standard value

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.52	0.89	1.11	1.25	1.35	1.4	1.45	1.49

Source: Saaty (2010, p. 121)

Considering that the deviation of consistency may be caused by random reasons. Therefore, when testing whether the judgment matrix has satisfactory consistency, it is necessary to compare *CI* and random consistency index *RI* to obtain the test coefficient *CR*. The formula is as follows:

$$CR = \frac{CI}{RI}. \quad (4.7)$$

In general, if $CR < 0.1$, the degree of inconsistency of *A* is considered to be within the allowable range, and the judgment matrix can be used as the weight vector by its normalized feature vector after passing the consistency test. Otherwise, there will be no satisfactory consistency, so we need to reconstruct the comparison matrix and adjust *A*.

Hierarchical total sorting and its consistency test: Calculating the weight of the relative importance of all the factors at a certain level to the highest level (the total goal) is called the total order of levels. This process proceeds from the highest level to the lowest level.

4.2.3 Methods of Multi-Criteria Evaluation of Alternatives

MCDM is a set of methods to help the decision makers to describe, evaluate, rank and select alternatives according to several criteria. Two main classes of methods are:

- MOP (multi-objective programming),
- MCE (multi-criteria evaluation).

The components in MCE are:

Figure.4.1-Components in multi-criteria evaluation

Weights	Criteria	Alternatives					
		$A_1, A_2, \dots, A_j, \dots$	\dots	\dots	\dots	\dots	A_m
w_1	C_1	e_{11}	e_{12}	\dots	e_{1j}	\dots	e_{1m}
w_2	C_2	\vdots	\ddots				\vdots
\vdots	\vdots	\vdots	\ddots				\vdots
w_i	C_i	\vdots			e_{ij}		\vdots
\vdots	\vdots	\vdots			\ddots		\vdots
\vdots	\vdots	\vdots				\ddots	\vdots
w_n	C_n	e_{n1}	e_{n2}	\dots	\dots	\dots	e_{nm}
		$S_1, S_2, \dots, S_j, \dots, S_m$					

Among them $w_i \dots w_n$ represents the index $m \dots n$ combination weight; $C_1 \dots C_n$ represents the different criteria used to judge the selection; $A_1 \dots A_M$ is the variable selected for evaluation; $e_{11} \dots e_{nm}$ is to calculate the weight of each criterion in pairs; $S_1 \dots S_m$ is the combined weight of all criteria.

The purpose of the multi-criteria evaluation method is to find the best scheme and determine the advantages of each scheme according to the given criteria. The solution may be influenced by several factors, such as the choice of weights or the way they are used. Next we will introduce some simple evaluation methods.

Analytic Hierarchy Process (AHP) is a systematic and hierarchical analysis method combining qualitative and quantitative analysis. The characteristic of this method is based on the deep research on the essence, influencing factors and their internal relations of complex decision problems. Use less quantitative information to make the thought process of decision making mathematical. Thus, a simple decision method is provided for complex decision problems with multiple objectives, multiple criteria or no structural characteristics. It is a model and method for making decisions on complex systems that are difficult to quantify completely.

The principle of ahp is based on the nature of the problem and the overall goal to be achieved. Then, the problem is decomposed into different components, and the factors are aggregated and combined at different levels according to their correlation and subordination. Then form a multi-level analysis structure model. Finally, the problem comes down to the determination of the relative important weights of the lowest level

(scheme, measure, etc.) relative to the highest level (general objective) or the arrangement of relative advantages and disadvantages.

4.3 Input Data

This section compares the consumer loans provided by 8 banks and 3 P2P loans based on the actual needs of customers. Through two different multi-criteria analysis methods, find the most beneficial solution for customers.

4.3.1 Client Profile

Sylvia is an employee of a company in China, and her monthly salary is 4,000 RMB. She wants to buy a new laptop for 10,000 RMB. But she didn't have enough money to make a lump sum payment, so she took out a loan and hoped to pay it off in 12 installments a year. But she is not clear about the requirements and content of consumer loans and P2P lending platforms offered by different banks in the market. In the following content, we will consider different standards according to the customer's needs. Finally, compare and determine the best option for Sylvia's loan.

4.3.2 Alternative Selection

Possible alternatives are Chinese banks and peer-to-peer lending platforms that offer consumer loans.

In this model example, eight banks and three P2P lending platforms are selected. The banks selected eight of China's largest banks based on their total assets and number of customers. Among them are four state-owned banks. There are also four joint-stock banks. In addition, it also selected three P2P lending platforms with stable development and large number of customers in China. All the banks will appear in Tab.4.3.

Tab.4.3-Alternative selection

Alternatives	Bank Name
v1	Bank of China
v2	Industrial and Commercial Bank of China
v3	China Construction Bank
v4	Agricultural Bank of China
v5	China Minsheng Banking Corp. Ltd.
v6	China Everbright Bank
v7	China Merchants Bank
v8	Shanghai Pudong Development Bank
v9	Renrendai
v10	Yirendai
v11	PPDAI

4.3.3 Criteria of Decision

Setting criterias is an essential part of multi-criteria analysis. To avoid unnecessary confusion, there are not too many criterias. Therefore, the following factors that are closely related and have great influence are selected in the model:

- Criterion 1 (c1)—Interest rate,
- Criterion 2 (c2)—Min salary,
- Criterion 3 (c3)—Process fee,
- Criterion 4 (c4)—Repayment grace period,
- Criterion 5 (c5)—Availability of information.

In order to be able to apply for consumer loans, one of the most important criteria for customers is interest rate. Whether lending at a bank or P2P lending platform, interest rates are required. Interest rate standards are very important to determine the relationship between lenders and customers. The interest rate is directly related to the transaction price and repayment price. So interest rate is one of the essential criteria. We set a range from 1 to 10, where 10 represents the lowest interest rate and 1 represents the highest interest rate.

For most banks and financial institutions, loans have certain income requirements. Therefore, the minimum salary is also one of the essential standards. For customers, the minimum salary requirement determines whether they are eligible for a loan. And to ensure that the customer has a certain ability to repay, which means that the minimum salary requirement is necessary. We set a range of 1 to 10, where 9 represents the minimum salary requirement and 1 represents the maximum salary requirement.

Every bank and financial institution has prescribed loan procedures. These will incur some fees for banks, and different institutions will have different costs. Therefore, they require customers to pay some process fees. For customers, the lowest process fee is ideal. So in the range of 1 to 10, 10 represents the lowest process fee and 1 represents the highest process fee.

When customers apply for consumer loans, they need to repay on time. But most banks will provide customers with a privilege to allow customers to repay a few days after the repayment period. There is a grace period for repayment. This means that when the specified repayment date is reached, the customer can choose to postpone the repayment without affecting the repayment amount. We set a range of 1 to 10, with 10 representing the longest repayment grace period and 1 representing no repayment grace period.

Before lending, it is necessary to know the loan information of banks and other financial institutions in advance. Most people will choose to learn related information on the website. Therefore, the availability of online information is also very important, which may affect the choice of customer loans. So we set the range from 1 to 10. 10 means that the information availability of the website is very high and easy to understand; 1 means that the information on the website is very incomplete and the website is complex.

Let's say Sylvia wants to buy a laptop worth 10,000 RMB, but wants to keep some money in her account. So he decided to borrow 10,000 RMB from a bank or peer-to-peer lending platform to pay for her laptop. Her wanted the money to be paid monthly for a year. This is of course a minimum standard. The one with the least overpayment will be no. 1, and the one with the most overpayment will be no. 11. An overview of all the criteria is shown in Tab.4.4.

Tab.4.4- Bank consumer loans and P2P lending factors

Criterion /Alternative	Interest rate (c2)	Min salary (c1)	Process fee (c4)	Repayment grace period (c3)	Availability of information (c5)
v1	4.35% p.a.	24,000 RMB	0	3 days	4
v2	4.35% p.a.	24,000 RMB	0	Not grace period	2
v3	4.35% p.a.	20,000 RMB	0	5 days (Call to explain the delay)	10
v4	4.35% p.a.	24,000 RMB	0	2 days (Call to explain the delay)	8
v5	4.35% p.a.	24,000 RMB	0	3 days	6
v6	4.35% p.a.	20,000 RMB	0	3 days (Call to explain the delay)	6
v7	4.35% p.a.	24,000 RMB	0	3 days	7
v8	4.35% p.a.	24,000 RMB	0	3 days	5
v9	18.25% p.a.	24,000 RMB	2.80%	Not grace period	7
v10	10.56% p.a.	48,000 RMB	9.60%	2 days	7
v11	15.60% p.a.	0	4.00%	Not grace period	7

We ranked the integrity of information provided by banks and P2P lending platforms. Availability information is rated on a scale of 1 to 10, with 0 indicating almost no availability information and 10 indicating that the information is complete. The range from 0 to 4 is a small amount of availability information; 5, 6 means there is basic information; A range of 7 to 10 indicates that there is sufficient availability information.

4.3.4 Computing The Vector of Criteria Weight

To calculate the criterion weight vector, we need to use the Saaty's method. The first step is to sort each criterion into a table based on its importance. The rows and columns are based on the criteria mentioned earlier. All criteria are compared in pairs to determine the most important criteria. In addition, the Saaty method dictates the importance of this preference, the degree to which one criterion is more important than another. We used Saaty's nine-point scale, as shown in table 4.2.

The preference matrices for the various criteria are shown in table 4.5

Tab.4.5- Saaty's matrix

	c1	c2	c3	c4	c5
c1	1	2	5	7	9
c2	0.50	1	4	5	9
c3	0.20	0.25	1	3	5
c4	0.14	0.20	0.33	1	4
c5	0.11	0.11	0.20	0.25	1

Next, we will calculate the geometric mean of the Saaty's matrix according to Tab.4.5. And then we have to calculate the weight of each criterion. These results are shown in Tab.4.6.

Tab.4.6-The Saaty's method determines the weight

Criterion	c1	c2	c3	c4	c5	Total
Geometric mean	3.630	2.460	0.944	0.520	0.228	7.782
Criterion weight	0.466	0.316	0.121	0.067	0.029	1
Order	1	2	3	4	5	

The last step is to test the consistency of the matrix according to Tab.4.4, Tab.4.5 and Tab.4.6, and the results are as follows (the complete results are shown in Annexes 1) :

CI	0.066834
CR	0.060211

$CR < 0.1 \rightarrow$ the matrix is consistent.

As can be seen from Tab.4.6, criterion 1 (c1) -- interest rate has the highest weight; Criterion 5 (c5) -- the availability of information has the lowest weight. The Saaty's method (AHP method) is the most accurate method to determine the weight of the criteria. This will continue to be used in the selection evaluation using the WSM method in the next section.

4.3.5 Alternatives Evaluation

This section will pass too many criteria evaluation methods. Find the bank that is most conducive to lending to customers.

Weighted Sequence Method (WSM)

In the weighted sequence method, all schemes need to be graded according to multiple criteria. The score is between 1 and 10. 1 is the most detrimental to the customer; 10 is the most important for customers and the best interests.

Tab.4.7- Weighted order method - partial variance evaluation

Variant / Critirion	c1	c2	c3	c4	c5
v1	8	5	10	7	4
v2	8	5	10	1	2
v3	8	6	10	9	10
v4	8	5	10	3	8
v5	8	5	10	7	6
v6	8	6	10	6	6
v7	8	5	10	7	7
v8	8	5	10	7	5
v9	1	5	6	1	7
v10	4	1	1	4	7
v11	2	10	4	1	7

The next step of weighted sequence method; Based on the ratings in Tab.4.7, the evaluation of each scheme is multiplied by the weight of each criterion (the weight of each criterion is shown in Tab.4.6). All the data are added up and then we get the final evaluation of each scheme. Finally, the evaluation of the scheme is sorted in descending order. The highest option is the best option for the customer. The final evaluation and ranking of the four schemes are shown in Tab.4.8.

Tab.4.8- Complete evaluation and sequencing of the program

Varianta/Criterion	c1	c2	c3	c4	c5	Total	Order
v1	3.7316	1.5803	1.2132	0.4680	0.1172	7.1103	6
v2	3.7316	1.5803	1.2132	0.0669	0.0586	6.6506	8
v3	3.7316	1.8964	1.2132	0.6017	0.2931	7.7360	1
v4	3.7316	1.5803	1.2132	0.2006	0.2345	6.9602	7
v5	3.7316	1.5803	1.2132	0.4680	0.1759	7.1690	4
v6	3.7316	1.8964	1.2132	0.4011	0.1759	7.4182	2
v7	3.7316	1.5803	1.2132	0.4680	0.2052	7.1983	3
v8	3.7316	1.5803	1.2132	0.4680	0.1466	7.1397	5
v9	0.4664	1.5803	0.7279	0.0669	0.2052	3.0468	10
v10	1.8658	0.3161	0.1213	0.2674	0.2052	2.7758	11
v11	0.9329	3.1607	0.4853	0.0669	0.2052	4.8509	9

As can be seen from Tab.4.8. According to the weighted sequence method, the most favorable choice for customers is to make loans in China Construction Bank (CCB), while the most unfavorable one is to make loans on Yirendai platform. The second best option is China Everbright Bank; The third is China Merchants Bank. In the evaluation of weighted sequence method, the evaluation result is most affected by the c1--interest rate. It can be seen that state-owned banks and some large joint-stock banks have lower interest rates because of the policy. However, some P2P lending platforms offer much higher interest rates, which means that interest-conscious customers will not choose P2P lending platforms for loans. The second factor is c2--minimum salary requirements. Most banks and institutions have modest minimum salary requirements. In addition to the PPDAI platform salary requirements; Yirendai's minimum salary requirement was as high as 48,000 RMB, which largely resulted in pleasant loan being the most unfavorable choice with customers.

Saaty's Method

Saaty's multi-criteria alternative assessment method is similar to the analytic hierarchy process (AHP). But in this method, the criteria are not compared, but each alternative is compared. First create a Saaty matrix, and then compare the alternatives based on each criterion. The following shows a complete matrix of all the tables and the associated first criterion, the rest of the columns of the matrix in Annexes. In the Saaty matrix, according to a given criterion, the importance of the difference between

alternatives is described in pairs. Among them, the most valuable choice is the most important choice, with a score ranging from 0 to 10.

Tab.4.9- Saaty matrix for partial evaluation of criterion c1

	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11
v1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	2.00	3.00
v2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	2.00	3.00
v3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	2.00	3.00
v4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	2.00	3.00
v5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	2.00	3.00
v6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	2.00	3.00
v7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	2.00	3.00
v8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.00	2.00	3.00
v9	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1.00	0.60	0.85
v10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.67	1.00	1.50
v11	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	1.18	0.67	1.00

In the following Tab.4.10, according to Tab.4.9, the geometric mean of the alternatives (GM) and the partial evaluation of the alternatives within the given criteria (PE) are calculated.

Tab.4.10- Partial evaluation of variants according to criteria c1

var	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	Total
GM	1.335	1.335	1.335	1.335	1.335	1.335	1.335	1.335	0.343	0.657	0.440	12.12
PE	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.028	0.054	0.036	1

Verify the consistency of the matrix.:

CI	0.000326371
CR	0.000214717

$CR < 0.1 \rightarrow$ the matrix is consistent.

The partial evaluation of variants according to criteria c2 is shown in Tab.4.11.

Tab.4.11-Partial evaluation of variants according to criteria c2

var	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	Total
GM	0.967	1.030	1.161	0.967	0.967	1.161	0.967	0.967	0.967	0.454	2.061	11.67
PE	0.083	0.088	0.099	0.083	0.083	0.099	0.083	0.083	0.083	0.039	0.177	1

Verify the consistency of the matrix:

CI	0.012550013
CR	0.008256588

$CR < 0.1 \rightarrow$ the matrix is consistent.

The partial evaluation of variants according to criteria c3 is shown in Tab.4.12.

Tab.4.12-Partial evaluation of variants according to criteria c3

var	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	Total
GM	1.530	1.629	1.530	1.530	1.530	1.530	1.530	1.530	0.545	0.159	0.383	13.43
PE	0.114	0.121	0.114	0.114	0.114	0.114	0.114	0.114	0.041	0.012	0.029	1

Verify the consistency of the matrix:

CI	0.008899857
CR	0.005855169

$CR < 0.1 \rightarrow$ the matrix is consistent.

The partial evaluation of variants according to criteria c4 is shown in Tab.4.13.

Tab.4.13-Partial evaluation of variants according to criteria c4

var	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	Total
GM	1.387	0.492	2.311	0.924	1.387	1.387	1.387	1.387	0.462	0.924	0.462	12.51
PE	0.111	0.039	0.185	0.074	0.111	0.111	0.111	0.111	0.037	0.074	0.037	1

Verify the consistency of the matrix:

CI	0.008897137
CR	0.00585338

$CR < 0.1 \rightarrow$ the matrix is consistent.

The partial evaluation of variants according to criteria c4 is shown in Tab.4.14.

Tab.4.14-Partial evaluation of variants according to criteria c5

var	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	Total
GM	0.837	0.357	1.674	1.339	1.004	1.004	1.172	0.837	1.172	1.172	1.172	11.74
PE	0.071	0.030	0.143	0.114	0.086	0.086	0.100	0.071	0.100	0.100	0.100	1

Verify the consistency of the matrix:

CI	0.008896058
CR	0.00585267

$CR < 0.1 \rightarrow$ the matrix is consistent.

The next step of the Saaty's method is to calculate the comprehensive evaluation of all alternatives according to Tab.4.6. Then, the alternatives are sorted in descending order according to the total valuation. Finally, the program with the highest total valuation after ranking is the most beneficial program for customers. The final order of all schemes is shown in Tab.4.15:

Tab.4.15-Alternative evaluation and ranking

Alternatives	Rating	Order
v1-Bank of China	0.100901428	6
v2-Industrial and Commercial Bank of China	0.097525647	8
v3-China Construction Bank	0.113170945	1
v4-Agricultural Bank of China	0.099685135	7
v5-China Minsheng Banking Corp. Ltd.	0.101319640	4
v6-China Everbright Bank	0.106559797	2
v7-China Merchants Bank	0.101737750	3
v8-Shanghai Pudong Development Bank	0.100901712	5
v9-Renrendai	0.049730989	10
v10-Yirendai	0.046872165	11
v11-PPDAI	0.081594793	9

4.3.6 Comparison Results

Since we use two multi-criteria analysis methods, we need to compare the results of these two methods. Using the arithmetic average, calculate the average order of the alternatives under the two methods, and then determine the final ranking based on the average order. Tab.4.16 shows the ranking of alternatives, average ranking and overall ranking of each scheme.

Tab.4.16-Alternative total ranking

Alternatives	Weighted Sequence Method	Saaty's Method
v1-Bank of China	6	6
v2-Industrial and Commercial Bank of China	8	8
v3-China Construction Bank	1	1
v4-Agricultural Bank of China	7	7
v5-China Minsheng Banking Corp. Ltd.	4	4
v6-China Everbright Bank	2	2
v7-China Merchants Bank	3	3
v8-Shanghai Pudong Development Bank	5	5
v9-Renrendai	10	10
v10-Yirendai	11	11
v11-PPDAI	9	9

It can be found by comparing the tables that the sorting under the two methods is the same. Therefore, the best choice for customers is China Construction Bank, which is the first. Ranked second and third are China Everbright Bank and China Merchants Bank. And at the end of the ranking are two P2P lending platforms, Renrendai and Yirendai, which are the tenth and eleventh places, respectively.

4.4 Summary

To determine the optimal solution, we must first determine the weight of the criterion. And we use Saaty's method to determine the weight of the criterion. The results are shown in Tab.4.17.

Tab.4.17-Summary of individual criteria weight

Criterion	Geometric mean	Order
c1	0.466	1
c2	0.316	2
c3	0.121	3
c4	0.067	4
c5	0.029	5

Prioritize the weight of each criterion, with 1 being the most important and 5 being less important. Among the five criteria we choose, the c1-interest rate is the most important, and it can determine the price of the loan and the number of years the customer is willing to pay in installments. The second important thing is the c2-minimum salary, because it can qualify customers for loans and have certain repayment ability. The least important criterion is c5-availability of information.

Tab.4.18 shows the overall ranking of alternatives. It can be seen that China Construction Bank is the best choice, followed by China Everbright Bank. In contrast, Yirendai and Renrendai are the last two, and customers are least recommended to make loans here.

Tab.4.18-Alternative overall ranking

Alternatives	Order
v3-China Construction Bank	1
v6-China Everbright Bank	2
v7-China Merchants Bank	3
v5-China Minsheng Banking Corp. Ltd.	4
v8-Shanghai Pudong Development Bank	5
v1-Bank of China	6
v4-Agricultural Bank of China	7
v2-Industrial and Commercial Bank of China	8
v11-PPDAI	9
v9-Renrendai	10
v10-Yirendai	11

According to the actual situation of the current assessment, applying for consumer loans through China Construction Bank is the most beneficial option for customers. Because it ranks first among all alternatives and meets all criteria. Each criterion has an

impact on the final choice, and banks with low interest rates, low salary requirements, low processing fees, longer grace periods and more complete information can get higher rankings. By sorting, we will find that the last three rankings are all P2P lending platforms. Although the P2P lending platform allows customers to obtain funds as quickly as possible, due to the bank's loan speed and approval procedures. But their high interest rates and high processing fees will still cause customers not to choose them.

Multi-criteria decision-making will be influenced by decision makers. Because each decision maker needs to determine the priority and evaluate when evaluating criteria and other alternatives. These will all be subjectively influenced by policy makers. Therefore, the overall evaluation result is also determined by the decision-makers' subjective decisions.

Through the comparison of bank consumer loans and P2P lending, we can find that both have their own advantages. China's big banks, affected by the rules, have fixed interest rates, similar minimum salary requirements and do not charge consumers processing fees. However, most bank loans have a relatively cumbersome handling process, as well as a long approval time, not conducive to some customers in a hurry to use money. P2P lending is mostly private small loans with abundant sources of funds and fast lending speed. But at the same time, most P2P lending platforms have relatively high and unstable interest rates and processing fees, and different P2P lending platforms have different requirements on salary. So consumers in the choice of loans, according to the actual situation, choose the most favorable way to borrow.

The rapid development of P2P lending platforms has brought huge impact to the loan business of commercial banks. In order to resist the impact, some banks are also considering the development of P2P lending. There are also good reasons for commercial banks to develop P2P. First of all, the development of P2P business helps commercial banks occupy the commanding heights of Internet finance. Internet finance is the general trend of The Times. Commercial banks should take the initiative to grasp the trend and lead the trend. Secondly, the involvement of P2P is conducive to the transformation of commercial banks. With the acceleration of interest rate liberalization and the deepening of financial disintermediation, banks are facing many problems. The traditional commercial banks' reliance on a small number of big firms has highlighted weaknesses,

so banks must shift from big firms to small ones. The shift from wholesale to retail is a good way to do it. By providing services to small and micro businesses through P2P lending platforms, commercial banks can not only get the corresponding administrative fees and other income, but also use P2P lending platforms to help increase savings. The development of traditional credit and venture capital business can also improve the speed of capital turnover and profitability.

In order to better develop the P2P banking system, commercial banks should make full use of their strengths and avoid their weaknesses, and learn from the development experience of P2P lending platforms. First, pay attention to the loan demand of small and medium-sized customers. As a part of loan business, small loan business is also a part that cannot be ignored. For most customers, commercial banks have more brand value and are more trustworthy. Second, strengthen the integration and analysis of customer social information. Commercial banks can also use social networks, e-commerce platforms and cloud computing technologies to obtain all kinds of information about borrowers, and to screen and integrate the information. Effectively review and approve the borrower's eligibility for a loan when assessing the borrower's credit. Third, continue to explore new ways of serving customers. The number and scope of P2P lending platforms are not limited, and the high utilization rate of funds provides space for the long-term development of small loan business. Commercial banks use manual or self-service terminals to provide services, which are far from being able to meet customers' needs for experience. Therefore, commercial banks should implement diversified services to meet the needs of different levels of customers. At the same time, the banking industry should continue to simplify the loan business process, improve the efficiency of business execution. To provide customers with faster and more convenient payment services.

5 Conclusion

This paper focuses on bank consumer loans. Compare bank consumer loan and P2P lending, and find the best way of personal consumer loan. But because most of the banks and financial institutions in the market have loan business, it is difficult to find the most suitable and favorable choice.

The goal of this paper is to make a comprehensive comparison between traditional bank loans and P2P lending under Fintech. Using the method of multi-criteria decision, we evaluate them in all aspects. Finally, we find the most favorable loan option for customers.

The paper is divided into five chapters, the first chapter is the introduction, the last chapter is the conclusion. Chapter two and three are the theoretical part, and chapter four is the computer practice part.

In chapter two, the characteristics of the banking industry. First, the history of banking. Understand the functions of banks and their role in economic development. Next, learn about China's banking system, including the introduction of the six major commercial Banks and their current development in China. Finally, the characteristics of the banking industry are summarized.

In the third chapter, the definition and application of Fintech are introduced. Second, introduce the bank products, focusing on consumer loans. Third, analyze the cooperation between Fintech and banking industry. The fourth part analyzes the data changes of China's current account in the past 20 years. Next, analyze the current situation of mobile payment in China and understand its impact on the economy through charts. Finally, it summarizes the development of the banking industry in the era of fintech. Some ideas are provided for the further development of banking industry and Fintech.

The fourth chapter is the practical part of the thesis. The multi-criteria decision method was used to evaluate different banks and P2P lending platforms. Our client Sylvia, an office worker in China, earns RMB 4000 per month. She wants to buy a laptop computer worth 10,000 RMB and wants to find the best option for her. Our assessment of the alternatives was based on five criteria: interest rate, minimum salary, process fee,

repayment grace period and availability of information. On the basis of the evaluation and sorting, comparison and selection of the optimal scheme.

P2P lending has many advantages over commercial bank loan business, and bank loans also have certain advantages over P2P. Users are generally more optimistic about the bank's capital scale and brand protection. Commercial banks should continue to promote this advantage and optimize their loan business to promote the diversified development of banks. Although the P2P lending platform is developing rapidly, due to the insufficient credit system in China, there are still great challenges in the future. Therefore, P2P lending platforms should also strengthen supervision, improve the credit environment, and reduce risks. Both parties should continue to strengthen their capabilities in accordance with the characteristics of their respective business development, while actively learning lessons from each other. This will lay the foundation for future competition in the loan business market.

In summary, P2P lending, as a representative of Fintech, heralds the coming of the era of Fintech. This also caused a huge impact on the development of the banking industry. On the one hand, the era of Fintech has greatly squeezed the market share of the banking industry, and banks have lost a large number of customers. On the other hand, the development of Fintech has brought about innovation in economic development technology, and traditional banks also lack technological motivation. In order to seek transformation and new development methods in the Fintech era, the banking industry should absorb the experience of the Fintech era. Actively quote and learn advanced Fintech technologies to promote the development and transformation of its own operations. Continuously explore and practice innovative paths suitable for the development of banks under the new situation. In order to achieve the healthy and sustainable development of the banking industry in the new era.

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List of Abbreviations

AHP	Analysis Hierarchy Process
ATM	Automatic Teller Machine
CBRC	China Banking Regulatory Commission
MCDM	Multi-criteria Decision Making
MCE	Multi-criteria Evaluation
P2P	Peer to Peer
WSM	Weighted Sequence Method

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Annex 4: Saaty matrix for partial evaluation of Alternatives according to criterion c4, geometric mean and I max results.

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Annexes

Annex 1: Criteria weight, Geometric mean, Criterion weight and I max results.

Geometric mean	Criterion weight	I max	Average
3.629678090	0.466445785	2.436956	5.224522
2.459509486	0.316068755	1.632639	5.165456
0.944087511	0.121323608	0.640737	5.281226
0.520204540	0.066850891	0.354385	5.301123
0.228085143	0.029310961	0.157234	5.364357
7.781564770	1		5.267337

Annex 2: Partial evaluation of Alternatives according to criterion c1, geometric mean and I max results.

Geometric mean	Criterion weight	I max	Average
1.334976895	0.110151206	1.211728861	11.00059545
1.334976895	0.110151206	1.211728861	11.00059545
1.334976895	0.110151206	1.211728861	11.00059545
1.334976895	0.110151206	1.211728861	11.00059545
1.334976895	0.110151206	1.211728861	11.00059545
1.334976895	0.110151206	1.211728861	11.00059545
1.334976895	0.110151206	1.211728861	11.00059545
1.334976895	0.110151206	1.211728861	11.00059545
1.334976895	0.110151206	1.211728861	11.00059545
0.343205041	0.02831843	0.311979407	11.01683286
0.656516217	0.054170266	0.596424954	11.01019062
0.439957665	0.036301653	0.399467514	11.00411369
12.119494084	1		11.00326371

Annex 3: Saaty matrix for partial evaluation of Alternatives according to criterion c2, geometric mean and I max results.

	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11
v1	1.00	1.00	0.83	1.00	1.00	0.83	1.00	1.00	1.00	2.00	0.50
v2	2.00	1.00	0.83	1.00	1.00	0.83	1.00	1.00	1.00	2.00	0.50
v3	1.20	1.20	1.00	1.20	1.20	1.00	1.20	1.20	1.20	2.40	0.60
v4	1.00	1.00	0.83	1.00	1.00	0.83	1.00	1.00	1.00	2.00	0.50
v5	1.00	1.00	0.83	1.00	1.00	0.83	1.00	1.00	1.00	2.00	0.50
v6	1.20	1.20	1.00	1.20	1.20	1.00	1.20	1.20	1.20	2.40	0.60
v7	1.00	1.00	0.83	1.00	1.00	0.83	1.00	1.00	1.00	2.00	0.50
v8	1.00	1.00	0.83	1.00	1.00	0.83	1.00	1.00	1.00	2.00	0.50
v9	1.00	1.00	0.83	1.00	1.00	0.83	1.00	1.00	1.00	2.00	0.50
v10	0.50	0.50	0.42	0.50	0.50	0.42	0.50	0.50	0.50	1.00	0.13
v11	2.00	2.00	1.67	2.00	2.00	1.67	2.00	2.00	2.00	8.00	1.00

Geometric mean	Criterion weight	I max	Average
0.967387010	0.082886572	0.917472555	11.06901312
1.030306915	0.088277605	1.000359128	11.33196948
1.160881297	0.099465333	1.10098324	11.06901472
0.967390527	0.082886874	0.917475871	11.06901287
0.967390527	0.082886874	0.917475871	11.06901287
1.160889740	0.099466057	1.100991197	11.06901422
0.967394045	0.082887175	0.917479186	11.06901262
0.967394045	0.082887175	0.917479186	11.06901262
0.967394045	0.082887175	0.917479186	11.06901262
0.454158086	0.038912665	0.436670031	11.221797
2.060628816	0.176556494	1.990609034	11.27462935
11.671215054	1		11.12550013

Annex 4: Saaty matrix for partial evaluation of Alternatives according to criterion c3, geometric mean and I max results.

	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11
v1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.80	9.60	4.00
v2	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.80	9.60	4.00
v3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.80	9.60	4.00
v4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.80	9.60	4.00
v5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.80	9.60	4.00
v6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.80	9.60	4.00
v7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.80	9.60	4.00
v8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.80	9.60	4.00
v9	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	1.00	3.43	1.40
v10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.29	1.00	0.42
v11	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.71	2.40	1.00

Geometric mean	Criterion weight	I max	Average
1.529962695	0.113945096	1.260807562	11.06504449
1.629473135	0.12135621	1.374752659	11.32824321
1.529962695	0.113945096	1.260807562	11.06504449
1.529962695	0.113945096	1.260807562	11.06504449
1.529962695	0.113945096	1.260807562	11.06504449
1.529962695	0.113945096	1.260807562	11.06504449
1.529962695	0.113945096	1.260807562	11.06504449
1.529962695	0.113945096	1.260807562	11.06504449
1.529962695	0.113945096	1.260807562	11.06504449
0.545411584	0.040619929	0.449472166	11.06531153
0.159369098	0.011869131	0.131332465	11.06504499
0.383199379	0.028539056	0.315786734	11.06507304
13.427192058	1		11.08899857

Annex 5: Saaty matrix for partial evaluation of Alternatives according to criterion c4, geometric mean and I max results.

	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11
v1	1.00	3.00	0.60	1.50	1.00	1.00	1.00	1.00	3.00	1.50	3.00
v2	0.67	1.00	0.20	0.50	0.33	0.33	0.33	0.33	1.00	0.50	1.00
v3	1.67	5.00	1.00	2.50	1.67	1.67	1.67	1.67	5.00	2.50	5.00
v4	0.67	2.00	0.40	1.00	0.67	0.67	0.67	0.67	2.00	1.00	2.00
v5	1.00	3.00	0.60	1.50	1.00	1.00	1.00	1.00	3.00	1.50	3.00
v6	1.00	3.00	0.60	1.50	1.00	1.00	1.00	1.00	3.00	1.50	3.00
v7	1.00	3.00	0.60	1.50	1.00	1.00	1.00	1.00	3.00	1.50	3.00
v8	1.00	3.00	0.60	1.50	1.00	1.00	1.00	1.00	3.00	1.50	3.00
v9	0.33	1.00	0.20	0.50	0.33	0.33	0.33	0.33	1.00	0.50	1.00
v10	0.67	2.00	0.40	1.00	0.67	0.67	0.67	0.67	2.00	1.00	2.00
v11	0.33	1.00	0.20	0.50	0.33	0.33	0.33	0.33	1.00	0.50	1.00

Geometric mean	Criterion weight	I max	Average
1.386668030	0.110843778	1.226490691	11.06503873
0.492268241	0.039349628	0.445763377	11.32827417
2.311079767	0.184736942	2.044121593	11.06503967
0.924411736	0.073893164	0.817630902	11.0650411
1.386698287	0.110846196	1.226518016	11.06504381
1.386698287	0.110846196	1.226518016	11.06504381
1.386698287	0.110846196	1.226518016	11.06504381
1.386698287	0.110846196	1.226518016	11.06504381
0.462222677	0.036947926	0.40883023	11.06503873
0.924445353	0.073895852	0.817660461	11.06503873
0.462222677	0.036947926	0.40883023	11.06503873
12.510111628	1		11.08897137

Annex 6: Saaty matrix for partial evaluation of Alternatives according to criterion c5, geometric mean and I max results.

	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11
v1	1.00	2.50	0.50	0.63	0.83	0.83	0.71	1.00	0.71	0.71	0.71
v2	0.80	1.00	0.20	0.25	0.33	0.33	0.29	0.40	0.29	0.29	0.29
v3	2.00	5.00	1.00	1.25	1.67	1.67	1.43	2.00	1.43	1.43	1.43
v4	1.60	4.00	0.80	1.00	1.33	1.33	1.14	1.60	1.14	1.14	1.14
v5	1.20	3.00	0.60	0.75	1.00	1.00	0.86	1.20	0.86	0.86	0.86
v6	1.20	3.00	0.60	0.75	1.00	1.00	0.86	1.20	0.86	0.86	0.86
v7	1.40	3.50	0.70	0.88	1.17	1.17	1.00	1.40	1.00	1.00	1.00
v8	1.00	2.50	0.50	0.63	0.83	0.83	0.71	1.00	0.71	0.71	0.71
v9	1.40	3.50	0.70	0.88	1.17	1.17	1.00	1.40	1.00	1.00	1.00
v10	1.40	3.50	0.70	0.88	1.17	1.17	1.00	1.40	1.00	1.00	1.00
v11	1.40	3.50	0.70	0.88	1.17	1.17	1.00	1.40	1.00	1.00	1.00

Geometric mean	Criterion weight	I max	Average
0.836988674	0.071296562	0.788899805	11.06504701
0.356603335	0.030376267	0.344107064	11.32815503
1.673934738	0.142589493	1.577759684	11.06504867
1.339154182	0.114072139	1.262213736	11.06504836
1.004386866	0.085555913	0.946680752	11.0650535
1.004384811	0.085555738	0.946678827	11.06505364
1.171808646	0.099817273	1.10448301	11.06504891
0.836961281	0.071294228	0.788874138	11.06504916
1.171821430	0.099818362	1.104494989	11.0650482
1.171746884	0.099812012	1.104420612	11.06500697
1.171746884	0.099812012	1.104420612	11.06500697
11.739537732	1		11.08896058