Charles University

Faculty of Social Sciences
Institute of Economic Studies

MASTER'S THESIS

Impact of Regional Differences on
P2P Lending: Evidence from China

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Declaration of Authorship

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Acknowledgments

Abstract

Taking the representative P2P lending platform Renrendai as an example, this paper focuses on the impact of borrower's region on the behavior of lenders and borrowers in the market. According to the Chinese six geographical regions the borrowers are from, this paper empirically analyzes the difference of success rate of borrowing and default rate in the six regions using the binary logistic regression model and further studies the reasons behind the regional difference. The result shows that the impact of regional difference is significant and the borrower from northern China are more likely to fund successfully, but the impact of regional difference on the default rate is insignificant, and the economic, financial and education development level in regions have a significant impact on the success rate of borrowing. This paper studies the regulatory differences of P2P platforms in various regions of China, the result shows that eastern China, central and southern China, and Beijing (in northern China) have paid more attention and importance to the regulation of P2P platforms.

Abstrakt

Vezměme -li jako příklad reprezentativní úvěrovou platformu P2P Renrendai, tento dokument se zaměřuje na dopad regionu vypůjčovatelů na chování věřitelů a vypůjčovatelů na trhu. Podle šesti zeměpisných čínských regionů jsou vypůjčovatelé z, tento dokument empiricky analyzuje rozdíl mezi úspěšností výpůjčky a míry selhání v šesti regionech pomocí binárního modelu logistické regrese a dále zkoumá důvody pro regionální rozdíl. Výsledek ukazuje, že dopad regionálního rozdílu je významný a vypůjčovatel ze severní Číny je pravděpodobnější, že bude úspěšně financovat, ale dopad regionálního rozdílu na míru selhání je zanedbatelný, a úroveň hospodářského, finančního a vzdělávacího rozvoje v regionech mají významný dopad na úspěšnou míru půjček. Tento dokument zkoumá regulační rozdíly mezi platformami P2P v různých regionech Číny, výsledek ukazuje, že východní Čína, střední a jižní Čína a Peking (v severní Číně) věnovaly větší pozornost a význam regulaci platforem P2P.

Klasifikace	F12
Klíčová slova	Čína, půjčky P2P, míra úspěšnosti půjček, regionální rozdíly, politika regulace
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Acronyms

P2P   Peer-to-Peer Lending

CBRC   China Banking Regulatory Commission

MPS   Ministry of Public Security of the People's Republic of China

MIIT   Ministry of Industry and Information Technology

NIFA   National Internet Finance Association of China

ICP   Internet Content Provider

SEC   Securities and Exchange Commission

P2PFA Peer-to-Peer Lending Finance Association

FCA   Financial Conduct Authority

PBC   People's Bank of China

VIF   Variance Inflation Factor

GFCI   Global Financial Centres Index

Master's Thesis Proposal

Author:	Bc. Na Liang
Supervisor:	Mgr. Magda Pečená, Ph.D
Defense Planned:	September 2019

Proposed Topic:

Impact of Regional Differences on P2P Lending：Evidence from China

Motivation:

As a new financial intermediary between borrowers and lenders, P2P lending refers to unsecured lending between lenders and borrowers through online platforms without the intermediation of any financial institutions. It is favored by borrowers and investors due to its declared low lending interest rates and fast liquidity, but credit issues such as adverse selection and moral hazard in P2P lending platform make it also become an obstacle to further development of the P2P industry. In June 2007, China established the first P2P platform company, then the number of P2P platforms showed nearly explosive growth. At the end of December 2015, the online loan industry platform reached 2,595, which increased by 1,020 compared with the end of 2014; The online loan transaction volume reached 982.304 billion yuan, which increased by 288.57% compared with the annual net loan transaction volume (252.8 billion yuan) in 2014 (Net Loan Home and Yingcan Consulting, 2016). However, While the P2P industry in China is experiencing rapid development, there are big problems due to poor supervision and management. According to the data of China Online Loan Home, by September 2018, the cumulative number of P2P platforms in China reached 6,396, of which the number of cumulative problematic platforms reached 2,414, and the number of normal operating platforms was only 1,528.

Many researchers have studied the factors affecting the P2P lending platform, such as, Dongyu Chen, Lou Hao and Hong Xu (2013) have studied that there is significant gender discrimination in P2P lending market in China, female borrowers are less likely to be funded than male borrowers, but their default rates are lower. Enrichetta Ravina (2008) found out that beautiful borrowers are 1.41 percent more likely to get a loan and pay 81 basis points less than an average-looking borrower with the same credentials. What's more, Caimei Lu and Lu Zhang (2018) thought that platform strength, profitability, risk control, liquidity, and transparency can predict the probability of the platform becoming problematic.

However, according to the existing research, there are few studies that focus on the influence of regional differences on P2P lending. China is the third-largest country in the world, there are huge differences in the economic development of different regions, according to the classification of the National Bureau of Statistics of China on June 13, 2011, due to the different basic conditions, resource advantages and economic and financial development of various provinces and cities, China is divided into four economic regions: western, central, eastern and northeast. Hence,

based on the transaction data of the P2P online lending platform, this paper will empirically test whether the huge differences in economic development between different regions in China will have an impact on the P2P lending platform, especially on the success rate of borrowing and default rate and the problematic P2P lending platform in China. Then further explore the reasons behind the differences from the aspects of the economy, finance, and supervision, then help investors more accurately and rationally choose borrowers and P2P lending platform to improve the stability of China's P2P lending market.

Hypotheses:

1. Hypothesis #1: There exist regional differences in the success rate of borrowing in different regions of China;
2. Hypothesis #2: There exist regional differences in default rates in different regions of China;
3. Hypothesis #3: There is a different ration of problematic P2P platforms in different regions in China;
4. Hypothesis #4: The ratio of problematic P2P lending platform is decreasing with economic development;
5. Hypothesis #5: The ratio of problematic P2P lending platform is decreasing as the number of traditional financial institutions is increasing;
6. Hypothesis #6: The problematic P2P platforms are those platforms that are not regulated.

Methodology:

Method of Literature review: The first step is collection of primary studies, this paper will sort out and analyze a large number of relevant literature, then summarize the theory and research methods related to P2P lending, and determine the research ideas and research contents of this paper based on the current development status of China's P2P lending platform.

Probit model method: First using the probit regression model to test whether the success rate and default rate of borrowings are significantly different among the four economic regions of China. I will classify the borrowing data of the P2P lending platform according to China's four major economic regions, and wield the probit regression to explore the relationship between the basic information of borrowers, lending information with the success rate of borrowing and default rate, then empirically study the specific reasons for the difference and make heterogeneity analysis on lending that classified according to economics, finance and regulations.

Additionally, to test the hypothesis#6 "The problematic P2P platforms are those platforms are not be regulated", I have to collect the data from P2P lending platform with regulation and without regulation in Chinese four economic regions. However, because there is no useful and official data source from P2P lending platform which is not be regulated, so I will use the P2P platform with acquiring a ICP license (Internet Content Provider, the purpose is to prevent illegal business activities on the Internet, If the website is not registered, it is likely to be closed after investigation) to describe the P2P lending platform with license.

Expected Contribution:

In contrast to previous studies on this topic, I will take into account the impact of the regional differences on P2P lending, especially I will further study the reasons behind. The success rate of borrowing, default rate and number of problematic P2P platform in different regions are expected to be different, and the reasons behind the regional differences on P2P lending which will be tested as hypothesis are expected to be of three aspects: 1) Economics: The default rate of borrowing is decreasing with the economic development; The success rate of borrowing and the number of P2P lending platform is increasing with the economic development. 2) Finance: The default rate of borrowing and success rate of borrowing are higher in the region with more traditional financial institutions; The number of problematic P2P platform is less in the region with more traditional financial institutions. 3) The regional regulations: The default rate and a number of problematic P2P lending platform are lower in the region with strict regulation and the success rate of borrowing is higher in this region.

This study will summarize the regional characteristics in different regions in China and will discuss the disadvantages of current supervision in a P2P platform, then provide some advice in order to improve the recent turmoil of P2P platform in China.

Outline:

1. Introduction: I will introduce the background and the motivation for this topic. And will briefly describe the P2P lending and status quo of P2P lending in China and the world;
2. Literature Review: I will summarize the previous research, which is related to the factor of impacting P2P lending.
3. Data Description: I will explain how I will collect dates and classify the dates.
4. Empirical Part: I will use the probit regression model to analyze if there are differences between China's four economic regions, and further use heterogeneity analysis to identify the reasons behind the differences in P2P lending between different regions in China.
5. Results: I will analyze and discuss the results of the regression.
6. Conclusion: I will summarize my findings and their implications for policy and future research.

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Author   **Supervisor**

1 Introduction

Peer-to-peer lending (P2P) is a small lending model among individuals, which is usually operated by an e-commerce lending platform. Essentially, the P2P lending platform is a third-party online lending platform that connects individuals and lenders, it combines traditional lending and internet technology. The borrower provides his/her information on the platform, the platform reviews and evaluates the borrower's credit status and the loan request, and then announces the approved, or declined the order on the P2P platform so that the lender can invest in the approval order. On the one hand, the lender can realize the value-added of his/her asset; on the other hand, borrowers can meet their own funding needs at usually lower interest rate than via traditional lending channels. So, the P2P lending platform has been developing rapidly in some developed countries. In March 2005, as the first P2P platform in the world, Zopa was launched in London. Subsequently, the United States established the first P2P platform Prosper in 2006. The first Chinese P2P platform named Paipaidai was established in June 2007, then the number of P2P platforms showed nearly explosive growth in China. According to the "2018 P2P Online Loan Industry Annual Report" issued by the Wangdaizhijia[1], the cumulative number of ever existing platforms (including the platforms that were already closed) in China reached 6616 by the end of December 2018. The transaction volume of the Chinese P2P online lending industry reached 179.48 billion Chinese Yuan (26 billion USD[2]) in the 2018 year.

As an internet investment platform, P2P has developed rapidly in China. However, P2P problematic platforms emerged gradually since 2013. According to the statistics of wangdaizhijia[1], by the end of December 2018, the cumulative number of China's suspended and closure platforms reached 5,595, the cumulative number of operating platforms was only 1021. Figure1.1 and figure 1.2 show the trend of the number of P2P lending platform.

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[1] Wangdaizhijia: wangdaizhijia is the first and the largest third-party online lending information platform in China. The website is: www.wdzj.com.

[2] Based on the exchange rate in May 23, 2019: 1 USD=6.9064 CNY.
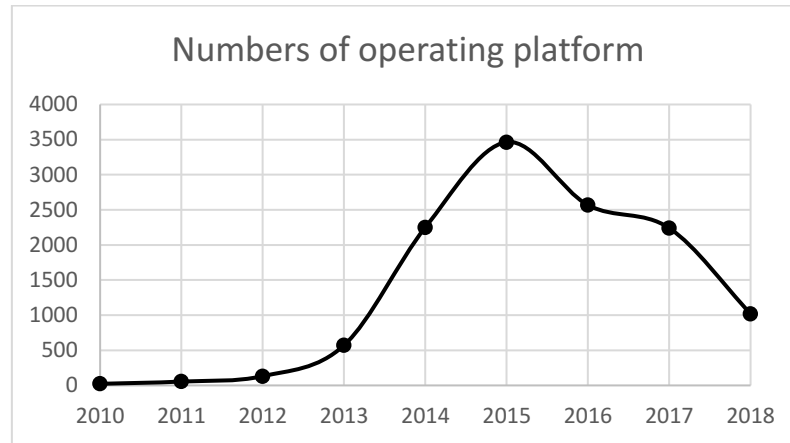
Figure 1.1: Number of operating platforms

Source: wangdaizhijia[1]
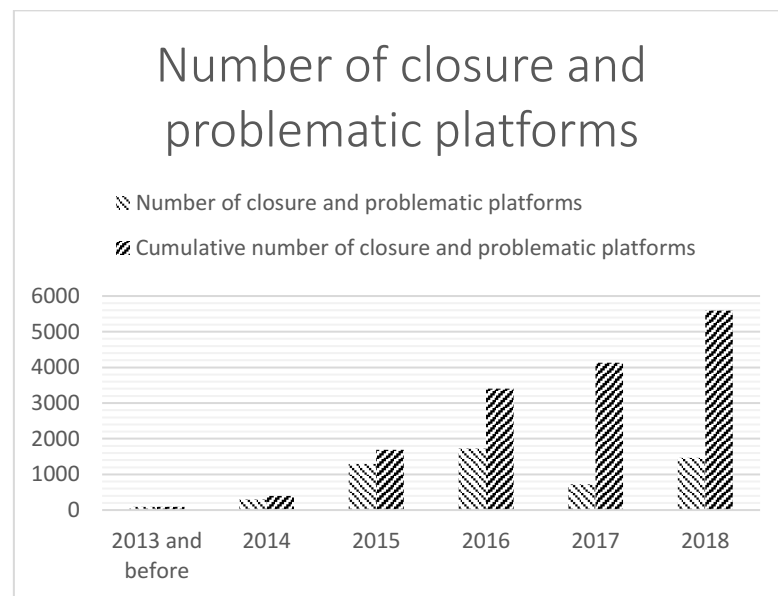
Figure 1.2: Number of closure and problematic P2P lending platforms

Data source: wangdaizhijia[1]

There are significant differences in economic development levels, consumption concepts, and values in various regions in China and these geographical differences affect P2P lending behavior (Peng et al. 2016). According to the statistics of the problematic platform in China, it can be found that the proportion of problem platforms is different in different regions(Guo 2016). According to the regional P2P development report released by wangdaizhijia1, the 1021 normal operating platforms are distributed in 30 provinces (excluding Hong Kong, Macao, Taiwan, and Tibet) at the end of December 2018. The number of normal operating platforms in Guangdong is 236; Beijing and Shanghai have 211 and 114 respectively; followed by Zhejiang, where the

number of normal operating platforms is 79. The number of normal operating platforms in these four provinces accounted for 63% of the total number of normal operating platforms in the country. In 2018, the total number of online closure and problematic lending platforms was 1,279, of which Zhejiang Province had the largest number, reaching 299; followed by Shanghai, Guangdong, and Beijing. The number of closures and problematic platforms in the four provinces and cities accounted for 69% of the total number of closures and problematic platforms. Therefore, this paper would ask questions: Is there a regional difference in China's P2P lending industry? What is the reason behind the geographical difference? What are the regulatory measures in China?

Hence, this paper gathered 28439 transaction orders from Renrendai to study the questions. As a developing country with a large population and a vast territory, China has significant differences in natural, geographical, social and historical conditions in different regions, and its development performance is different. According to the regulations of the Central People's Government of the People's Republic of China, China is divided into six major geographical regions: northeastern China, northern China, eastern China, central and southern China, southwestern China and northwestern China based on China's administrative region and geographical location. This paper will set the information related the borrowers' characteristics and credit, the information related to the loan listing as the control variable, the six regions as a key variable, and run the logit regression model to analyze the relationship between borrower's geographical difference and 1) borrowing success rate and 2) loan default rate, and will further explore the reasons behind the differences from the aspects of economy, finance and supervision.

The research framework of this paper is as follows: Chapter 2 describe literature review; Chapter 3 introduce the background of the P2P lending market; Chapter 4 illustrate the data and the empirical methodology; Chapter 5 discuss the empirical results; Chapter 6 discusses the supervision of the P2P industry; Chapter 7 concludes the paper.

2   Literature Review

Different literature has different definitions of P2P lending. Davis & Murphy (2016) state that the P2P lending as 'an online service that allows individuals to directly

borrow money from each other without going through traditional financial intermediaries', and it is a type of sharing economy service (Yu & Shen 2018). There is a further explanation where P2P lending is related to sharing economy by Ye et al. (2018), who states that P2P lending is the combination of e-commerce and sharing economy. It is a lending method.

The emergence of the P2P lending platform has greatly facilitated the lending of individual borrowers and start-ups. First, the P2P lending platform uses the internet as a medium, therefore the transaction information is transparent and transaction costs are relatively lower (Wen et al. 2017). Secondly, because in the P2P lending platform, borrowers can obtain loans only by providing their personal information and their request about the loan, indicates that the transactions through P2P lending platform are more efficient than via traditional commercial banks (Wen et al. 2017). However, the high efficiency and low cost of the P2P platform also bring corresponding risks to the P2P platform, especially the information asymmetry between the borrower and the lender will cause the problem of adverse selection or moral hazard problems (Gu & Yao 2015; Yum et al. 2012). For example, the borrower conceals information that is not conducive to the success of the loan when borrowing and leads to default after the loan is successfully granted (Greiner & Wang 2009).

2.1 Research on factors affecting the P2P lending

Many scholars have conducted a lot of researches on various aspects affecting the success rate of borrowing and default rate in P2P lending platform. Gu & Yao (2015) pointed out that different classified information of borrowers has different effects on borrower default rate and loan success rate. Iyer et al. (2009) divided the borrower's information into "hard information[3]" and "soft information[4]", and Yum et al. (2012) believe that the mutual complementation of the two types of information can increase the reliability of the information. Ma et al. (2018) divided the factors into four categories: loan details (the borrowing amount, loan term, etc.) financial status (borrowers' annual income, etc.), credit status (maximum credit limit, etc.) and personal information of the borrower.

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[3] Hard information is a kind of quantitative information, which is easy to transmit, such as the age, amount, etc. source: https://www.nber.org/papers/w25075.

[4] Soft information is a kind of information that cannot be collected and processed in a standard way, such as the non-financial information of borrowers. (Liberti & Petersen 2019)

This paper will summarize and analyze the past scholars' empirical research on P2P online lending platform from four aspects: 1) The description about the requested loan of borrowers; 2) borrower's demographic characteristics; 3) borrowers' credit information; 4) geographical differences.

Loan description

Dorfleitner et al. (2016) used data from two differently designed leading European P2P platforms (Auxmoney P2P lending platform and Smava P2P lending platform), used probit regressions to analyze the role that description texts related to the loan plays in the process of funding, and found out that the spelling error, the length of text, and the positive words have significant impact on the funding probability on Auxmoney, both the text length and the positive words related to business or debt restructuring are positively correlated to the funding probabilities, misspelled word and keywords related to leisure activities appear to be negative correlation with success rate of borrowing. However, the results showed that the text-related factors are not related to the default probabilities in both Auxmoney and Smava P2P lending platform. After researching the transaction data of the Prosper platform, Larrimore et al. (2011) found that an extending length of loan description is significantly related to the success rate of the borrowing, but the benefit of adding words to short loan description is stronger than adding words to a loan description already with too many words (the range of word-count observations from 20 to 817 is always positive to be added additional words). They conducted that the non-financial personal detail (such as I love my daughter, etc.) in the loan description has a negative relation with the success rate of the borrowing.

Demographic characteristics

Pope & Sydnor (2011) found that there are age discrimination and gender discrimination on the Prosper platform. Su & Cheng (2017) analyzed the impact of borrowers' age on the default rate and found out that the borrowers' age was significantly positively related to the default rate. Some scholars have also shown that the borrowing success rate of young people is low, and they are regarded as the high-risk and high-defaulting groups when borrowing from the P2P lending platform (Gonzalez & Loureiro 2014). After controlling other factors, Chen et al. (2013) found that female borrowers have a lower success rate of borrowing but they are less likely to default than male borrowers, which showed that there is significant gender discrimination (due to out of prejudice) in P2P lending market in China. However, some scholars have found that there is no gender discrimination on the platform by studying

Smava, the largest P2P platform in Germany and Europe (Barasinska & Schafer 2014), they found that female borrowers set higher borrowing rates than male borrowers to attract investors because female borrowers believe they will be discriminated in the process of borrowing and are less likely to be funded successfully. Additionally, there is a significant negative relationship between the education level of borrowers and their default rate (Su & Cheng 2017), borrowers with higher education degree are more likely to be self-discipline and less likely to default.

Literature shows a relationship between personal appearance and success rate of borrowing in the P2P lending platform. For example, by studying the data from Prosper lending platform in the US and setting a rating procedure to evaluate the picture of borrowers by three female and three male raters who are students from the New York University[5], Ravina (2008)found out that under the same conditions, borrowers whose beauty is rated above neutral are more likely to get a loan than the borrowers whose beauty is rated under neutral. However, there is another theory that goes beyond the general theory about the positive effect of beauty, that found out that some pieces of evidence support the "beauty is beastly" effect by running an online experiment (Gonzalez & Loureiro 2014). Additionally, Herzenstein et al. (2011) found out that the success rate of borrowing of African-American borrowers is less than the borrowers of other races according to the data from Prosper lending platform, Pope & Sydnor (2011) also confirmed that the applicants with uploading pictures of African-American have a low success rate.

Credit information

According to research by Klafft (2008), the credit rating of borrowers is a great important factor of affecting the borrower's success rate, he studied the data from Prosper, and the result shows that only 5.5% of borrowers with a credit rating of HR can successfully obtain loans, but 54% of borrowers with a credit rating of AA are able to successfully obtain loans[6]. Iyer et al. (2009) evaluated the role of borrowers' credit information in the lending process of Prosper, based on the empirical result, the credit score can predict the likelihood of default, the probability of default will decrease by

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[5] The rating is on a 7-point scale: Extremely Attractive/Creditworthy/Trustworthy/ Neutral/Not Attractive/Not Creditworthy/ Not Trustworthy at All.

[6] The credit rating of borrower in Prosper is divided into seven levels: AA, A, B, C, D, E, and HR. The borrower with a credit rating of HR means that the borrower has the worst credit rating, the borrower with a credit rating of AA means that the borrower has the best credit rating.

1% when the credit score increased by 40 points. Since each borrower in Prosper are assigned to one of seven credit rates based on the credit score, Iyer et al. (2009) further studied whether the credit score is negatively related to the default rate conditional on credit rates, the results showed that an increase of 40 points in credit scores for each credit rate means 1.2% lower default rates. The Lending Club classifies each loan from grade A1 to G5 based upon the borrowers' FICO credit score[7] and other information such as the number of recent credit inquiries, etc. The borrower with grade A1 means that he/she has the highest credit rating, while the borrower with grade G5 has the lowest credit rating. Emekter et al. (2015) concluded that the borrowers with higher FICO score and lower debt-to-income ratio have lower default risk.

Regional difference

Existing literature indicates that geographical differences have an impact on lending behavior in P2P online lending. Burtch et al. (2013)analyzed the impact of cultural and geographic differences between the lenders and borrowers on the P2P lending market, the result implied that the investors are more willing to lend money to borrowers with similar culture and geography to themselves. Based on the data from Renrendai, Liao et al. (2014) confirmed that there is a huge difference in the funding probability between 31 provinces in China, they further studied the default probability in 31 provinces by using the probit regression and the result showed that there is no significant and high default rate in the provinces with significant low probability of funding successfully, which suggests that the geographical discrimination in Renrendai is a kind of taste-based discrimination, which indicates that the provinces with high default rate do not have a low success rate of borrowing. Jiang & Zhou (2016) also found out the geographical discrimination is affected by regional income, and the success rate of borrowing in high-income areas is higher than that in low-income areas. Li et al. (2018) explored the reasons for the geographic difference in the probability of fund successfully in China and the result shows that the significant difference in the success rate of borrowing in different cities is mainly due to the difference in borrowers' characteristics (especially the difference in borrowers' credit quality, identity authentication), rather than the characteristics of the city itself. Peng et al. (2016) empirically studied the reasons for the regional differences in P2P lending from four perspectives: differences in economic development levels, differences in marketization

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[7] FICO credit score is a kind of personal rating method, developed by the US Personal Consumer Credit Rating Corporation. It predicts future probabilities of borrowers' repayment based on the his/her credit history.

index[8], differences in numbers of traditional financial institutions, and differences in education levels, and the result suggests that the borrowers in provinces with a higher level of economic development, higher education level and higher marketization index are more likely to get funded

2.2 Research on the supervision of P2P lending platform

The United States has incorporated P2P online lending into the securities industry for supervision, mainly targeting the entry barriers of the lending platform, financial status, and information disclosure of borrowers. Slattery (2013) pointed out that the Consumer Financial Protection Agency (CFPB) should replace the US Securities and Exchange Commission (SEC) as a regulatory agency to protect consumer rights. He indicated that the SEC regulation of P2P lending market has three problems: first, the SEC regulation created huge compliance cost to P2P lending platforms; second, the substantial compliance cost is ultimately passed through to consumers in the P2P lending market, which is unbeneficial to borrowers and investors; third, the SEC regulation creates barriers to entry in the P2P lending market, the start-up company can operate only they registered. However, Lo (2016) explored the role of SEC regulation in the P2P lending market in the United States and concluded that the SEC should continue as a regulation to protect the consumers, with some recommended modifications.

In China, most researches on supervision of P2P network lending still stay at the theoretical and macro level. Different regions have different perceptions of P2P platform supervision (Guo 2016), P2P platform in Shanghai, Guangdong and other provinces of China can be allowed to register as the financial industry, while Shandong, Beijing and other regions of China have strict control over the industry attributes of P2P platforms. Some scholars have put forward suggestions and requirements for the supervision of China's P2P online loans from different aspects. Ye (2014)believes that industry self-discipline of P2P online lending should be strengthened. Ma et al. (2018)suggested that the government should pay enough attention to the accuracy, integrity, and timeliness of the information disclosure (Yu & Shen 2018). Combining the regulatory experience of European countries and the US, Liu & Shen (2015) proposed that China's credit system should be improved to prevent the occurrence of

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[8] The marketization index refers to the level and extent of regional marketization development.

regulatory arbitrage. Xu et al. (2018) selected the data from one of China's representative P2P platform, Renrendai, as the sample to study if it has the effect since China started to implement the supervision in P2P lending market, he compared the success rate of borrowing and default rate before China's policy supervision (August 7, 2015) with that after the policy supervision, the experimental results show that the policy supervision increased the success rate of borrowing and reduced the default rate of P2P lending platform.

2.3   Related theoretical analysis

2.3.1   The herd behavior

The herd behavior is also known as Sheep-flock effect. The "herd behavior" in financial markets refer to the behavior of investors affected by other investors when the information environment is uncertain. Herzenstein et al. (2011) empirically demonstrated that there is a phenomenon strategic herding in the P2P lending auctions on Prosper, which shows that the lenders are more likely to invest to the loan listing already with more, the likelihood of an additional bid will increase by 15% as the number of bid increases by 1%, the herd behavior of lenders will diminish once the loan is fully funded. He also shows that the herding behavior is beneficial for both investors and borrowers, the borrowers are quicker to get fund and investors are able to earn a higher interest rate.

Using the order data of Renrendai from 2011 to 2013, Liao et al. (2014) empirically test the impact of geographical differences on the success rate of P2P lending by establishing a probit regression model, and further examine whether the difference in the success rate of borrowing between provinces stems from the difference in default rates, which conclude that the geographical discrimination behavior of the lender is irrational, hence verify that there exists a herding behavior in lenders.

2.3.2   Information asymmetry

Information asymmetry means that the subjects in the market economy activities have different information, that is, some participants in the market activities have mastered information that other participants do not possess. The theory provides explanations for many market phenomena such as changing in stock price, unemployment in the labor market, etc.

In the P2P lending market, the information asymmetry occurs when the borrower intentionally conceals personal information. In China, the information asymmetry of the P2P lending market is mainly caused by borrowers' incomplete

information and inadequate review and processing of P2P lending platforms (Zheng 2016). Luo & Lin (2013) found out that information asymmetry brings the greater critical issue in the P2P lending market than in traditional credit markets based on data from Prosper.com.

3 P2P Lending Background

3.1 The development of the P2P industry

The United Kingdom

In March 2005, the UK established Zopa, the world's first P2P online lending platform. The platform's loans are mainly for individuals to purchase cars, repay credit cards and consumption. In October 2010, Rateetert was established and it was the first P2P lending platform in the UK to launch a "reserve fund". In 2011, the UK established Market Invoice, an online bill financing platform. The operating model is that small and medium-sized enterprises holding bills can obtain the funds of investors via the platform. In July 2014, Ablrate was established in the UK, which is the abbreviation of Asset-Backed Lending Rate, indicating that every P2P project on the platform has assets as collateral.

United State

In February 2006, in the United States the first P2P online loan platform Prosper established; in May 2007, Lending Club was established, which only provided personal credit loans in the early stage, including loans for personal education expenses and loans for medical expenses. On December 11, 2014, Lending Club was listed on the New York Stock Exchange and become the world's first P2P lending company listed on the US stock market.

China

The development of P2P online lending platform in China can be divided into four stages: initial development period (2007-2011); rapid expansion period (2012-2013); risk outbreak period (2014-2016); Policy adjustment period (2017-present).

Initial development stage (2007-2011): China established the first P2P lending platform in June 2007, subsequently, some of the adventurous investors began to launch other P2P online lending platforms. At this stage, the P2P platform lacks an investigation of the borrowing purpose, the source of repayment, and the collateral of borrowers and China does not have appropriate laws and regulation related to the P2P lending industry, which lead to a high bad debt rate of the P2P lending platform. Representative platforms are Paipaidai, Creditease, Hongling Capital.

Rapid expansion period (2012-2013): The P2P platform at this stage strengthens the investigation of the borrower's repayment ability and repayment willingness, conducting on-the-spot investigations on the borrower's assets and funds, and thus effectively reducing the risk of borrowing. The number of lending platforms increased from 161 in 2012 to 692 in 2013.

Risk outbreak period (2014-2016): At this stage, the number of closure and problematic platforms has increased significantly. According to the data of wangdaizhijia[1], the cumulative number of closure and problematic P2P platforms reached 3,407 at the end of 2016, but the number of that at the end of 2014 is 395.

Policy adjustment period (2017-present): Chinese government has released a large number of documents to regulate the P2P lending market, forming the "1+3" (one measure and three guidelines) institutional. "One measure" refers to the document issued on August 2016: "Interim Measures for the Administration of the Business Activities of Online Lending Information Intermediary Institutions", which states that the nature of the P2P lending platform is information intermediary. Then the China Banking Regulatory Commission (hereinafter referred to as the CBRC) issued three documents: "Guidelines for the Administration of Recordation and Registration of P2P Lending Information Intermediary Institutions" to enhance the manager of the registration of P2P lending platform, "Guidelines for the Online Lending Fund Depository Business", and "Guidelines for the Disclosure of Information on the Business Activities of Online Lending Information Intermediary Institutions".

3.2　The business model of P2P lending platform

The United States

As the main P2P lending platform, LendingClub and Prosper have a similar business model. Then borrower provides his/her personal information and descriptions about the loans they request to the website of the P2P platform, according to the

borrower's credit history, income and the desired loan amount, the platform assigns the borrower a credit rating and the borrowing interest rate. Based on the information supplied on the website, investors select the loans they would like to invest in.

The United Kingdom

The Zopa[9] in the UK provides system support for the user, the investor's money will be split across multiple borrowers in order to achieve the purpose of diversifying risks, and the borrowers pay the commission fee to the platform if they fund money successfully.

China

The typical business model of P2P online lending in China is that the borrowers apply for a loan on the P2P platform and the lenders make the investment decision according to the provided information of borrowers, the lending platforms receive commission fee to make a profit. With the development of the industry and the innovation of business models, some platforms have introduced advances, risk reserves, third-party guarantees, etc. into P2P, thus creating some new business models. According to the current law system and supervision framework, Ye (2014) divided China's P2P lending platform into four basic business models:

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[9] Zopa was founded in 2004, is the first peer-to-peer lending company in the world, the website is: https://www.zopa.com/.

Table 3.1: The business model in China

Business model	Institutions	Representative platforms
Pure platform model	P2P lending platform	Paipaidai
Guaranteed principal model	P2P lending platform and guarantee agency	Hongling Capita；Renrendai
Securitization model of credit assets	P2P lending platform, guarantee agency, and small loan company	Lufax；Yooli.com
Model of transfer the obligee's right	P2P lending platform and third-party lender	CreditEase

Source: the literature (Ye 2014, pg.72)

Pure platform model

The P2P lending platform serves as the intermediary between the borrowers and lenders, the platform charges a certain commission from borrowers after the borrower fund successfully. The representative platform is Paipaidai.

Guaranteed principal model

The P2P lending platform with guaranteed principal model promises to guarantee the lender's principal or principal and interest do not suffer loss, which is both an intermediary and a guarantee institution, the representative platforms are Hongling Capita and Renrendai.

Securitization model of credit assets

The P2P lending platform with securitization model of credit assets converts financial assets that were not tradable into tradable securities. The guarantee institution or small loan company cooperates with the P2P lending platform to sell its own guarantee products or credit assets to the investors via the P2P platform. The representative platforms are Lufax and Yooli.com in China.

Model of transfer the obligee's right

Investors do not lend money to borrowers directly, but the third-party individual

who is closely related to the P2P platform lend money first, then he/she transfer the creditor's rights to the investors. The representative platform is CreditEase, in which the chief executive officer of CreditEase lends money to borrowers personally, then he transfers his claim to lenders who are willing to invest.

Figure 3.1 shows the proportion of loan balance of business types in the P2P lending market in China by the end of 2018. We can see that the current loan balance of personal credit accounted for 84.49%, which is the most important business form of the current P2P online loan industry.
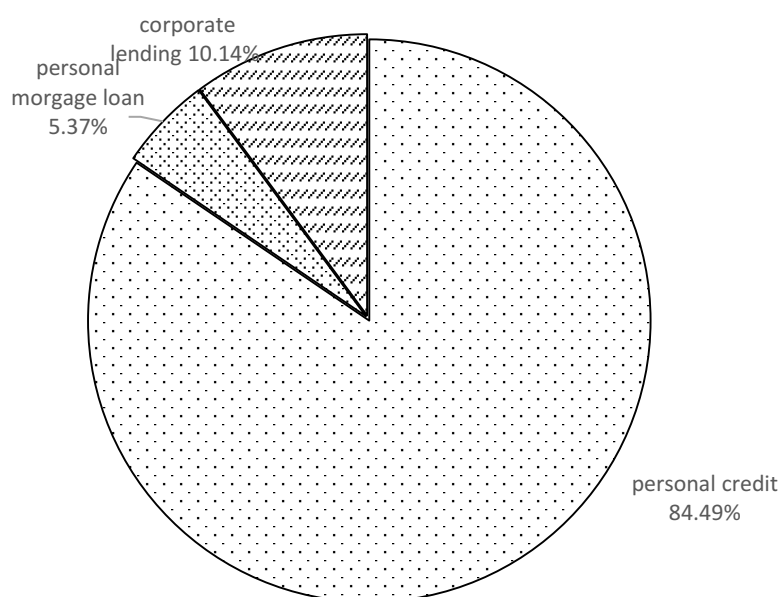
Figure 3.1: The structure of loan balance in the P2P lending market in China

Data source: wangdaizhijia[1]

To compare the loan structure of the P2P lending market with the loan structure of traditional Chinese financial institutions (banks), this paper collects the loan structure of China's five largest banks from 2008 to 2018 (the figure 3.2). The cumulative loan scale of the five largest banks[10] is 527 648.762 billion Chinese yuan (76,399.97 billion USD2), where corporate loan and advance accumulated 268 646.977 billion Chinese yuan (38 898.26 billion USD[2]), accounting for 51%. The cumulative personal loan and advances are 123,107.939 billion Chinese yuan (17,825.20 billion USD[2]), accounting for 23%, individual housing loan accumulated 91,210.47 Chinese billion yuan

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[10] China's five largest banks refer to five large state-owned banks, we select the data from A-share listed banks of five largest banks in China.

(13,206.66 billion USD[2]), accounting for 17%. Hence, we can see that the corporate loan is the main type of loan in China's banks while personal credit is the main type of loan in China's P2P lending market.
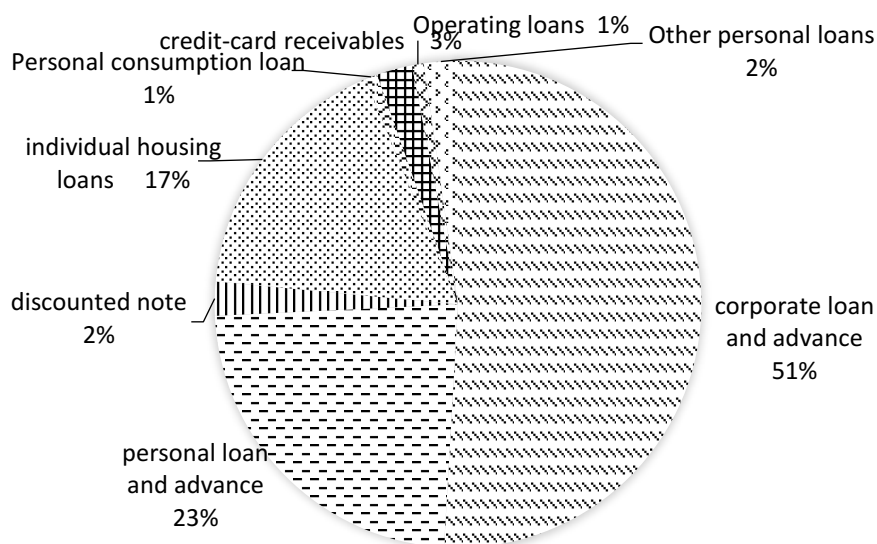
Figure 3.2: The loan structure of China's five largest banks

Source: wind

4   Data and Methodology

4.1 Data

This study selects all the loan list as data from the Renrendai online platform, since the paper studies the success rate of borrowing and default rate of borrowers, and the loan term is usually 3 to 36 months in Renrendai lending platform, it is necessary to select the loan list that has been issued at least three years ago in order to identify whether the borrowers paid the loan on time. In summary, this paper selects the data of Renrendai from January 1, 2015, to December 31, 2015, as a full sample for the study of this paper to explore the impact of regional differences in China on the lending behavior in the P2P online lending platform. After excluding the incomplete loan list, we got 28439 loans as our data set and 22 variables.

4.1.1   Data source

Founded in 2010, Renrendai is one of the earliest P2P online lending platforms in China. After years of development, the Renrendai serves more than 2 million users and the business has covered 34 provinces in China. Renrendai platform has always insisted on dispersed loans in a small amount, which brings great experience to borrowers, lenders and the platform itself. Based on the data from wangdaizhijia[1], by the end of 2018, the cumulative turnover of Renrendai exceeded 76.4 billion Chinese yuan (11.06 billion USD[2]), the transaction volume in December 2018 was 3.493 billion Chinese yuan (0.506 billion USD[2]). The huge role of Renrendai in P2P lending industry of China is not only reflected in the volume of transactions, but also by the fact, that Renrendai handed over the trading funds to China Minsheng Bank for depository management in February 2016, becoming one of the earliest platforms which have bank depository business in China. Moreover, as one of the top 100 Chinese Internet companies released by the Internet Society of China and Ministry of Industry and Information Technology in 2015 and 2016, and Renrendai was awarded the AAA rating in China's online loan evaluation system (composed of the Chinese Academy of Social Sciences and the China Institute of Finance and Capital Markets) for four consecutive quarters. According to the statistics of the wangdaizhijia[1], Renrendai has always been the TOP 5 online lending platform in China's online P2P lending platform rating. In the "Top 60 List of P2P Online Credit Ratings in February 2019" released in the wangdaizhijia[1], which is the well-known P2P online lending industry portal website, Lufax, Yirendai, Renrendai, Paipaidai, Weidaiwang ranked top five of the development index.

Table 4.1: China's online P2P lending platform rating in February 2019

Rank	Platform	Develop-ment Index	Deal (14%)	Popula-rity (11%)	Techno-logy (5%)	Lever (5%)	Fluidity (12%)	Dispersion (5%)	transpar-ency (10%)	Brand (19%)	Compli-ance (19%)
1	Lufax	83.93	96.76	89.22	74.74	5	77.42	94.37	78	86.29	96.75
2	Yirendai	83.52	92.13	87.62	77.47	21.54	73.06	98.99	73.5	91.62	92.4
3	Renrendai	82.42	90.68	83.46	81.59	7.27	81.23	93.88	81.8	80.23	96
4	Paipaidai	82.31	89.32	82.17	75.43	25.78	87.3	98.13	64.8	85.01	93.1
5	Weidaiwang	80	78.95	78.47	77.19	5	72.24	96.97	90	81.55	95.75
6	Xiaoying wangjin	77.28	82.94	63.79	83.99	17.61	80.22	99.68	78.5	74.75	89
7	Jimuhezi	75.44	65.85	70.51	87.46	20.55	72.38	98.38	84.5	68.8	94.4
8	Madaicaifu	75.12	78.57	70.94	78.29	5	79.2	96.93	74.5	70.57	89.2
9	Yilongdai	75	79.12	62.34	75.56	5	69.25	89.93	85.5	75.22	91.5
10	51renpin	72.75	79.01	60.61	48.93	5	69.48	98.4	75	75.16	91

Source：wangdaizhijia[1]

In order to ensure the validity of the data and experimental results, this paper has done the following processing on the data:

1. Excluding the loan listing with a vague description of borrowing information and incomplete information of borrowers' marital status, education status, working years, income and location;

2. Dropping the order if the borrower is younger than 18 years old;

3. Excluding order from Hongkong, Macao, and Taiwan, this paper only studies the loan listings on the P2P platform in mainland China；

4. Removing the repeated order: If a borrower borrows the same amount of money in multiple times using the same account with the same purpose, we randomly draw a loan listing as a sample in the same account considering the purpose of the study.

As a result, our sample is 28439 loans, where 6462 were successfully funded and the remaining 21977 requests were failed to fund. Among all loan listings that were successfully funded, there were 1063 loans defaulted and 5399 orders were repaid on time.

4.1.2　Variable selected and summary statistics

Variable selected

Renrendai requires the user to submit personal credit information when the user applies for financing loan and gives the final approval opinion after reviewing and evaluating the borrower's personal information and order information. Therefore, this paper divides the sample data into two parts. The first is the borrower's information, including borrowers' age, gender, education level, income worktime, certificate information and credit grade of borrowers. The credit information submitted to the P2P online lending platform by the borrower is composed of two parts, one is the necessary certification indicator, the other is the optional certification indicator. The necessary certification indicators include the borrowers' identity certification, credit report certification, job certification, and income certification. This paper only discusses the necessary certification indicators. The second is the basic information on the loan, such as the amount of the loan, the interest rate, the term of the loan. Based on the above classification, the existing literature on the factors affecting users' behaviors in P2P lending platform and the research purpose of this study, this paper divides all variables into three categories: explained variables, core explanatory variables and control variables. The definition of variables is shown in Table 4.2.

Table 4.2: Variables and definition

classification	variation	variable description
Explained variable	Success	1 if the loan is funded successfully; otherwise, 0.
	Default	1 if the loan has been default；0 if the borrower repays the loan on time.
Key explanatory variable	Region	1 if the borrower is from northeastern China; 2 if the borrower is from northern China; 3 if the borrower is from eastern China; 4 if the borrower is from central and southern China; 5 if the borrower is from southwestern China; 6 if the borrower is from northwestern China.
Control variable	Loan amount (Chinese yuan)	The loan amount borrowed by the borrower. (Chinese yuan)
	Interest rate	The interest rate needed to pay on the loan by the borrower.
	Loan term	The loan term requested by the borrower. (monthly)
	Credit Rating	The credit rating of borrower. categorized: 1=HR; 2=E; 3=D; 4=C; 5=B; 6=A; 7=AA.
	Credit Grade	The credit grade of borrower
	Age	The real age of the borrower.
	Gender	The borrower's gender. 1 if the borrower is female; 0 if the borrower is male.
	Marital status	1 if the borrower is married; 0 if the borrower is divorced or unmarried or widowed.
	Education level	The education level of borrowers, 1 if senior high school; 2 if college; 3 if undergraduate; 4 if postgraduate and above.
	Income	The Income level of borrowers
	Work time	Work time of borrowers, categorized: 1 if less than 1(inclusive) year; 2 if 1-3(inclusive) years; 3 if 3-5(inclusive) years; 4 if more than 5 years.
	House	1 if the borrower has a house; otherwise, 0.
	House loan	1 if the borrower has a house mortgage; otherwise, 0.
	Car	1 if the borrower has a car; otherwise 0.
	Car loan	1 if the borrower has a car loan; otherwise, 0.
	Job certification	1 if the borrower has a work certificate; otherwise, 0.
	Credit report certification	1 if the borrower has a credit report certificate; otherwise, 0.

Identity certification	1 if the borrower has an identity certificate; otherwise, 0.
Income certification	1 if the borrower has an income level certificate; otherwise, 0.

Source: author's computations.

(1) Explained variable

Success: Dummy variable, if the borrower borrowers successfully, it is 1; otherwise it is 0.

Default: Dummy variable, If the borrower does not pay off the loan on time, it is 1; otherwise, it is 0.

(2) Key variable

Region: The region where the borrower is from.

(2) Control variable

Loan amount: The borrower's expected loan amount. The Renrendai platform stipulates that the loan amount must be 3000-500,000 Chinese yuan (434.38 USD – 72396.6USD[2]), in the experiment, we use the logarithm of the loan amount.

The interest rate of borrowing: The annual interest rate of the borrowing. The Renrendai sets the range of the borrowing interest rate (10%-24%) for all the loan project, after the borrower submits the loan application, the Renrendai further clarifies the borrower's interest rate interval according to the borrower's credit rating and the borrowing period, lastly the borrower sets their interest rate autonomously within the scope of the interest rate Renrendai set.

Borrowing term: The borrower's repayment period is determined by the borrower and is measured in months (3, 6, 9, 12, 15, 18, 36 months).

Credit grade: The borrower's credit grade is obtained if his/her materials were approved by Renrendai, the borrower can (1) submit the "optional certification information" and (2) keep a good repayment record on the Renrendai platform to improve credit grade.

Credit rating: The Renrendai platform reviews the materials and application information submitted by the borrower and rates the borrower's credit based on the review result. The credit rating is divided into seven levels: AA, A, B, C, D, E, and HR.

AA represents the best credit rating of the borrower, and HR represents that the borrower has the worst credit rating.

Table 4.3: The relationship between credit rating and credit grade

Credit rating	HR	E	D	C	B	A	AA
Credit grade	0-99	100-109	110-119	120-129	130-144	145-159	>160
Service rate	5%	3%	2.5%	2%	1.5%	1%	0%

Source: www.renrendai.com

Age: The borrower's age.

Gender: If the borrower is man, it is 0; if the borrower is a woman, it is 1.

Educational level: The borrower's educational level, it is 1 if the borrower has the high school degree or lower degree; it is 2 if the borrower has the college degree; it is 3 if the borrower has the bachelor degree; it is 4 if the borrower has the master degree or higher education;

Marital status: The marital status of the borrower.

Income status: The borrower's income level in every month, we use the logarithm of the income amount.

Working time: The borrower's working experience. it is 1 if the borrower has worked for less than one year; it is 2 if the borrower's working time is between one year and three years; it is 3 if the working time is between three years and five years; it is 4 if the borrower has worked for more than five years;

House: Whether the borrower owns the property, if the borrower has the property, it is 1; otherwise, it is 0.

House loan: If the borrower has a mortgage has, it is 1; otherwise, it is 0.

Car: If the borrower owns a car, it is 1; otherwise, it is 0.

Car loan: If the borrower has a car loan, it is 1; otherwise, it is 0.

Income certification: A proof of income is proof of the borrower's economic income. If the borrower can provide a proof of effective income, it is 1; otherwise, it is

0;

Job certification: A document proving the work of the borrower. If the borrower can provide a valid work certificate, it is 1; otherwise, it is 0;

Credit Report Certification: A document that records the credit activities of the borrower. If the borrower can provide a valid credit report, it is 1; otherwise, it is 0;

Identity certification: A material that proves the identity of the borrower. The borrower can provide a valid identity certification, it is 1, otherwise, it is 0.

Summary statistics of variables

Table 4.4 shows descriptive statistics for all variables, about 22.72% of loan listings in the sample successfully raised the fund, 16.45% of the borrowers who successfully funded has not repaid the loan on time. The average interest rate of borrowing is 12.18%, the average borrowing period is 16 months. The average credit rating of the borrower is 1.24, which means that the credit level of the borrowers in the sample is generally low. In terms of the borrower's personal information, the borrower's average age is 30, and 17.4% of borrowers are female borrowers, indicating that male borrowers are far more active than female borrowers in the P2P lending market. The average educational level of borrowers is 2.12, suggesting that there are more than half of the borrowers' academic level are college and above. The average working time of the borrower is between 3-5 years, only 16.27% of the borrowers work less than 1 year. A proportion of 46% of the borrowers own the house property, 17% of the borrowers have the mortgage. Considering the necessary certification materials that the borrower needs to provide, 56.71% of the borrowers provide valid identity certification, no more than 30% of the borrowers provide personal credit report certification, and 10% of borrowers provide income certification and job certification. Additionally, 63.4% of all borrowers are from eastern China or Central Southern China.

Table 4.4: Summary statistics of variables

Variables	Count	Average	Min	Max	Median	Sd
success	28439	0.2272	0	1	0	0.4190
default	6463	0.1645	0	1	0	0.3708
Region	28439	3.5193	1	6	4	1.2313
Amount	28439	46308.8505	3000	500000	30000	69957.4522
IR	28439	0.1218	0.07	0.13	0.13	0.0102
Term	28439	16.1028	3	24	15	7.5273
Credit Rating	28439	1.2407	1	7	1	0.6451
Credit Grade	28439	32.3898	-69	234	20	40.6310
Age	28439	30.0373	22	56	29	5.9672
Gender	28439	0.1274	0	1	0	0.3335
Education level	28439	2.1178	1	4	2	0.7992
Marital status	28439	0.4756	0	1	0	0.4994
Income	28439	10491.1140	13	99977	5961	14524.1072
House	28439	0.4559	0	1	0	0.4981
House loan	28439	0.1696	0	1	0	0.3752
Car	28439	0.2601	0	1	0	0.4387
Car loan	28439	0.0616	0	1	0	0.2404
Work time	28439	2.4112	1	4	2	0.9991
Education certification	28439	0.0941	0	1	0	0.2919
Job certification	28439	0.1018	0	1	0	0.3024

Income certification	28439	0.1008	0	1	0	0.3011
Identity certification	28439	0.5671	0	1	1	0.4955
Credit Report	28439	0.2926	0	1	0	0.4550

Source: author's computations.

4.2 Research hypothesis

This paper analyzes the impact of regional differences in the behavior of P2P online lending in China. According to China's administrative region and geographical location, the Central People's Government of the People's Republic of China divides China into six major geographical regions: northeastern China, northern China, eastern China, central and southern China, southwestern China and northwestern China. Hence this paper studies whether there is a difference between the success rate of borrowing among the six major regions in China and analyzes the reasons behind the regional differences from the perspectives of economic, financial, education and P2P regulatory policies in various regions.

Table 4.5: Division of China's regions

Regions	Province
Northeastern	Liaoning, Jilin, Heilongjiang;
Northern	Inner Mongolia, Beijing, Tianjin, Hebei, Shanxi;
Eastern	Zhejiang, Shandong, Fujian, Jiangxi, Anhui, Jiangsu, Shanghai;
Central and Southern	Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan;
Southwestern	Sichuan, Guizhou, Yunnan, Chongqing, Tibet
Northwestern	Shanxi, Gansu, Ningxia, Qinghai, Xinjiang;

Source: http://www.gov.cn/

Figure 4.1: The map of the location of Chinese mainland geographical regions and provinces

Source: https://www.researchgate.net/publication/325096801

In the lending relationship of P2P platform, many scholars have demonstrated the existence of geographical discrimination in China's P2P lending industry through empirical research on the domestic P2P platform. Li et al. (2018) analyzed the success rate of lending in developed urban groups and sub developed urban groups and verified the regional differences in the success rate of P2P lending. Peng et al. (2016) found out that there is a difference in the success rate of P2P online loans between different provinces. By conducting an empirical study on Renrendai, Jiang & Zhou (2016) found that the success rate of borrowing in high-income areas is higher than that in low-income areas, which verified the impact of geographical differences in P2P lending on the success rate of lending. However, few scholars have verified the impact of regional differences on the success rate of P2P online lending from the perspective of China's six geographic regions. Therefore, this paper proposes the following assumptions:

Hypothesis #1: Geographical differences have an impact on the success rate of borrowing in China's P2P online lending;

Hypothesis #2: Geographical differences have an impact on the default rate of borrowers in China's P2P online lending;

Regional economic development level measures its ability to undertake debts, lenders are more inclined to choose borrowers located in areas with a higher level of economic development. Regional GDP Per capita is a basic indicator for measuring the economic development level in regions, this paper proposes the hypothesis #3:

Hypothesis #3: In regions with higher GDP per capita, the borrower has a higher success rate of borrowing via a P2P lending platform;

The number of regional traditional financial institutions reflects the degree of development of traditional finance in the region and measures the difficulty of borrowing in the region through traditional financial institutions. The region with high levels of traditional financial development, residents have a greater understanding of financial knowledge, and lenders prefer to invest, based on this, this paper uses the number of traditional financial institutions per 10,000 people to measure the influence level of finance, and proposes the following assumptions:

Hypothesis #4: In regions with a larger number of traditional financial institutions per 10,000 people, the borrower has a higher success rate of borrowing via a P2P lending platform;

Since China is a country with extremely uneven economic and development, there are great differences in educational opportunities, education quality and educational equity between regions. People in areas with high levels of educational development have higher cultural literacy. Therefore, this paper proposes:

Hypothesis #5: In regions with more student in higher education[11], the borrower has a higher success rate of borrowing via a P2P lending platform;

The regulatory perceptions of P2P in different regions are different, and it will affect the success rate of borrowers, hence, the paper proposes:

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[11] The higher education refers to the college and university, this kind of educational institutions recruit high school graduates who pass the national college entrance examination.

Hypothesis #6:   In regions with stronger supervision [12] in P2P online lending platforms, the borrower has a higher success rate of borrowing via a P2P lending platform

4.3 Methodology

4.3.1   Statistical analysis of borrowing information

Figure 4.6 shows the order transactions in different regions. As we can see from the descriptive statistics, northwestern China has the highest success rate of borrowing and the lowest default rate, the northeastern have a lower success rate of borrowing and the highest default rate.

Table 4.6：Descriptive statistics of order transaction in various provinces

	funded			Not funded	Total	Success rate	Default rate
	with default	Without default	total				
North-eastern	**344**	**108**	**452**	**1714**	**2166**	**20.87%**	**23.89%**
Liaoning	108	33	141	660	801	17.60%	23.40%
Heilong jiang	140	48	188	616	804	23.38%	25.53%
Jilin	96	27	123	438	561	21.93%	21.95%
Northern	**541**	**116**	**657**	**2072**	**2729**	**24.07%**	**17.66%**
Inner Mongolia	125	30	155	400	555	27.93%	19.35%
Beijing	38	2	40	155	195	20.51%	5.00%
Tianjin	25	2	27	106	133	20.30%	7.41%
Hebei	220	47	267	860	1127	23.69%	17.60%
Shanxi	133	35	168	551	719	23.37%	20.83%
Eastern	**1757**	**301**	**2058**	**6797**	**8855**	**23.24%**	**14.63%**
Zhejiang	332	50	382	1077	1459	26.18%	13.09%
Shandong	379	65	444	1405	1849	24.01%	14.64%
Fujian	254	44	298	1241	1539	19.36%	14.77%
Jiangxi	199	55	254	770	1024	24.80%	21.65%
Anhui	220	39	259	977	1236	20.95%	15.06%
Jiangsu	313	43	356	1123	1479	24.07%	12.08%

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[12] The supervision to P2P lending platform in various regions include the regulatory policy, numbers of self-regulatory industry associations, numbers of P2P lending platforms with inline lending fund depository business, etc., which are hard to collect data to an empirical study, so the paper describes the difference in P2P regulation between regions in the fifth chapter instead of empirical analysis.

Shanghai	60	5	65	204	269	24.16%	7.69%
Central and southern	**1758**	**338**	**2096**	**7092**	**9188**	**22.81%**	**16.13%**
Henan	270	61	331	1227	1558	21.25%	18.43%
Hubei	307	56	363	1380	1743	20.83%	15.43%
Hunan	338	62	400	1454	1854	21.57%	15.50%
Guangdong	565	99	664	1992	2656	25.00%	14.91%
Guangxi	238	55	293	872	1165	25.15%	18.77%
Hainan	40	5	45	167	212	21.23%	11.11%
South-western	**649**	**140**	**789**	**3072**	**3861**	**20.44%**	**17.74%**
Sichuan	302	84	386	1601	1987	19.43%	21.76%
Guizhou	126	23	149	492	641	23.24%	15.44%
Yunnan	143	14	157	487	644	24.38%	8.92%
Chongqing	77	19	96	488	584	16.44%	19.79%
Tibet	1	0	1	4	5	20.00%	0.00%
North-western	**350**	**60**	**410**	**1230**	**1640**	**25.00%**	**14.63%**
Shanxi	158	32	190	593	783	24.27%	16.84%
Gansu	109	18	127	368	495	25.66%	14.17%
Ningxia	37	3	40	91	131	30.53%	7.50%
Qinghai	9	3	12	24	36	33.33%	25.00%
Xinjiang	37	4	41	154	195	21.03%	9.76%
Total	**5399**	**1063**	**6462**	**21977**	**28439**	**22.72%**	**16.45%**

Source: www.renrendai.com

However, the statistical analysis is not sufficient to prove that China's geographical differences have a significant impact on the success rate of borrowing and the default rate. In order to obtain more accurate results and arguments, it is necessary to control the impact of the basic information of orders and the personal information disclosed by the borrower. Therefore, this paper uses the binary logistic model to further study the role of regional differences in P2P lending behavior.

4.3.2   Analysis of the impact of regional difference on P2P lending

The impact of geographical differences on P2P lending

Based on the study purpose and variable description, the success rate of borrowing and the default rate as the dependent variable are both binaries, so both the logistic model and the probit model can be used. This paper uses the binary logistic model to test the impact of regional difference on borrower's and lender's behavior of P2P lending platform.

Based on the definition of the binary logit regression model,

$$P(Y = 1|X) = \frac{Exp(\beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_n x_n)}{1 + Exp(\beta_0 + \beta_1 x_1 + \ldots\ldots + \beta_n x_n)} \tag{4.1}$$

The empirical equation in this study is as follows:

$$Y_i = Pr\left(success_i\right) = \ln\left(\frac{P(y = 1|X)}{P(y = 0|X)}\right) = \beta_0 + \beta_1 region_i + \sum_{i=1}^{i=n} \beta_2 control_i + \varepsilon_i \tag{4.2}$$

where the dependent variable Y_i equal to 1 if the loan is funded successfully and 0 otherwise. The region is the key explanatory variable, which is represented in the northeastern, northern, eastern, central and southern, southwestern, and northwestern China if the i=1,2,3,4,5,6, $control_i$ is a vector of control variables, including the loan amount, interest rate and the borrowing term of the loan as well as the borrower's information such as the credit rating, credit grade, age, gender, education level, and income level, etc. ε_i is the error term.

$$Y_i = Pr\left(default_i\right) = \ln\left(\frac{P(y = 1|X)}{P(y = 0|X)}\right) = \beta_0' + \beta_1' region_i + \sum_{i=1}^{i=n} \beta_2' control_i + \varepsilon_i \tag{4.3}$$

where Y_i is the dependent variable, and it is equal to 1 if the borrower fails to repay the loan.

Analysis of reasons for geographical differences

This paper continues to examine the reasons behind regional differences based on binary logistic regression models.

$$Y_i = Pr(success_i) = \ln\left(\frac{P(y = 1|X)}{P(y = 0|X)}\right) = \beta_0 + \beta_1 per\ GDP_i + \sum_{i=1}^{i=n} \beta_2 control_i + \varepsilon_i \tag{4.4}$$

$$Y_i = Pr(success_i) = \ln\left(\frac{P(y = 1|X)}{P(y = 0|X)}\right) = \beta_0 + \beta_1 financial\ inst_i + \sum_{i=1}^{i=n} \beta_2 control_i + \varepsilon_i \tag{4.5}$$

$$Y_i = Pr(success_i) = \ln\left(\frac{P(y = 1|X)}{P(y = 0|X)}\right) = \beta_0 + \beta_1 student_i + \sum_{i=1}^{i=n} \beta_2 control_i + \varepsilon_i \tag{4.6}$$

The $per\ GDP_i$ represents the GDP per capita of the ith region, which is used to measure the impact of the economic level of the ith region on the borrowing behavior of the borrowers in the region. The $financial\ inst_i$ is representative of the number of traditional financial institutions per 10,000 people in different regions, used to measure the degree of financial development in the ith region. The $student_i$ represents the number of residents who are studying in college or university or have graduated from the college or university in every 100,000 people in each region, which measures the

degree of education development in the ith regions.

5 Empirical Result

5.1 Impact of regional differences on P2P lending

5.1.1 Analysis of correlation

In order to test whether there is multicollinearity between the explanatory variables, this paper carries out the correlation test of explanatory variables. Table 5.1 gives the correlation coefficient matrix and the significance level, it includes all the variables.

Table 5.1: Variable correlation matrix

	Amount	IR	Term	Credit Rating	Credit Grade	Age	Gender	Education on level	Marital status	Income
Amount	1									
IR	0.177** (0.012)	1								
Term	0.201** (0.00)	0.912** (0.00)	1							
Credit Rating	-.077** (0.00)	-.231** (0.00)	-.091** (0.00)	1						
Credit Grade	-.089** (0.00)	-.222** (0.00)	-0.138** (0.00)	0.74** (0.00)	1					
Age	0.169** (0.00)	-.002 (0.772)	0.027 ** (0.00)	0.126** (0.00)	0.099** (0.00)	1				
Gender	0.028** (0.00)	0.054** (0.00)	0.057** (0.00)	0.002 (0.725)	-0.007 (0.233)	0.022** (0.00)	1			
Education level	0.073** (0.00)	-.040** (0.00)	0.008 (0.187)	0.157** (0.00)	0.196** (0.00)	0.066** (0.00)	0.022** (0.00)	1		
Marital status	0.100** (0.00)	-.003 (0.623)	0.021** (0.00)	0.098* (0.00)	0.087** (0.00)	0.396** (0.00)	0.020** (0.001)	-.026** (0.00)	1	
Income	0.357** (0.00)	-.022** (0.00)	0.00 (0.986)	0.078** (0.00)	0.046** (0.00)	0.201** (0.00)	-.011 (0.076)	0.029** (0.00)	0.134** (0.00)	1
Worktime	0.093** (0.00)	-.011 (0.055)	0.024** (0.00)	0.160** (0.00)	0.156** (0.00)	0.406** (0.00)	0.024** (0.00)	0.107** (0.00)	0.260** (0.00)	0.078** (0.00)
House	0.106** (0.00)	-.025** (0.00)	0.003 (0.6)	0.099** (0.00)	0.100** (0.00)	0.314** (0.00)	-.004 (0.497)	0.099** (0.00)	0.323** (0.00)	0.120** (0.00)
House loan	0.090** (0.00)	-.022** (0.00)	0.0013** (0.035)	0.116** (0.00)	0.134** (0.00)	0.136** (0.00)	-.004 (0.555)	0.159** (0.00)	0.162** (0.00)	0.106** (0.00)
Car	0.174*** (0.00)	-.047** (0.00)	-.021** (0.00)	0.116** (0.00)	0.108** (0.00)	0.200** (0.00)	-.013* (0.027)	0.066** (0.00)	0.267** (0.00)	0.253** (0.00)
Car loan	0.100** (0.00)	-.011 (0.053)	0.004 (0.553)	0.054** (0.00)	0.047** (0.00)	0.051** (0.00)	-0.001 (0.875)	0.005 (0.376)	0.114** (0.00)	0.165** (0.00)
Income certification	-.096** (0.00)	-.096** (0.00)	-.047** (0.00)	0.329** (0.00)	0.346** (0.00)	0.073** (0.00)	-.007 (0.253)	0.091** (0.00)	0.060** (0.00)	0.064** (0.00)

	Work time	House	House loan	Car	Car loan	Income certification	Identity certification	Credit Report	Job certification	Region
Identity certification	-.067** (0.00)	-.028** (0.00)	0.023** (0.00)	0.320** (0.00)	0.442** (0.00)	0.089** (0.00)	-.014* (0.018)	0.145** (0.00)	0.050** (0.00)	0.038** (0.00)
Credit Report	-.088** (0.00)	-.088** (0.00)	-0.047** (0.00)	0.330** (0.00)	0.377** (0.00)	0.041** (0.00)	-.007 (0.219)	0.152** (0.00)	0.038** (0.00)	-.004 (0.506)
Job certification	-.096** (0.00)	-.099** (0.00)	-0.051** (0.00)	0.326** (0.00)	0.347** (0.00)	0.071** (0.00)	-0.001 (0.101)	0.090** (0.00)	0.058** (0.00)	0.067** (0.00)
Region	-.026** (0.00)	-.015 (0.01)	-.024 (0.00)	-.007 (0.23)	0.011 (0.072)	-.049** (0.00)	-.023** (0.00)	-.025** (0.00)	-.015** (0.012)	-.032** (0.00)

	Work time	House	House loan	Car	Car loan	Income certification	Identity certification	Credit Report	Job certification	Region
Work time	1									
House	0.271** (0.00)	1								
House loan	0.166** (0.00)	0.494** (0.00)	1							
Car	0.178** (0.00)	0.262** (0.00)	0.160** (0.00)	1						
Car loan	0.047** (0.00)	0.100** (0.00)	0.100** (0.00)	0.432** (0.00)	1					
Income certification	0.113** (0.00)	0.067** (0.00)	0.075** (0.00)	0.066** (0.00)	0.032** (0.00)	1				
Identity certification	0.141** (0.00)	0.063** (0.00)	0.068** (0.00)	0.044** (0.00)	0.025** (0.00)	0.292** (0.00)	1			
Credit Report	0.125** (0.00)	0.048 (0.00)	0.064** (0.00)	0.026** (0.00)	0.014** (0.00)	0.517** (0.00)	0.546** (0.00)	1		
Job certification	0.112** (0.00)	0.066 (0.00)	0.074** (0.00)	0.067** (0.00)	0.035** (0.00)	0.987** (0.00)	0.292** (0.00)	0.512** (0.00)	1	
Region	-.037** (0.00)	-.036** (0.00)	-.019** (0.002)	-.036** (0.00)	-.012* (0.049)	0.001 (0.884)	0.003** (0.035)	0.019** (0.002)	0.001 (0.866)	1

Source: author's computations.

We can see from table 5.1 that the correlation coefficient between the interest rate of borrowing and the borrowing term is 0.912, indicating that the two variables have a strong correlation. Since the borrower who provide the job certification generally provide the income certification, the correlation coefficient between the work certification and the income certification in the sample is 0.987. Hence, in order to avoid the problem of the collinearity of the independent variables in the regression, this paper eliminates the borrowing term and the borrower's work certification.

Table 5.2: Variance inflation factor

Collinearity Statistics

	Tolerance	VIF
IR	0.899	1.112
Credit Rating	0.435	2.296
Credit Grade	0.392	2.551
Age	0.7	1.43
Gender	0.993	1.007
Education level	0.916	1.092
Marital status	0.764	1.308
Income	0.802	1.247
Work time	0.781	1.28
House	0.648	1.544
House loan	0.733	1.364
Car	0.704	1.421
Car loan	0.805	1.242
Income certification	0.69	1.449
Identity certification	0.623	1.605
Credit Report	0.55	1.817
Amount	0.796	1.257
Region	0.994	1.006

Source: author's computations.

In this paper, the multivariate collinearity of the remaining independent variables is further tested by the Variance Inflation Factor (VIF), if the VIF of an independent variable is greater than 10, the regression model is multiple collinearities. As can be seen from Table 5.2, the variance Inflation factor of all explanatory variables is less than 10, so there is no multicollinearity between the explanatory variables after eliminating the borrowing term and the job certification.

5.1.2   The Impact of geographical differences on P2P lending

The impact of geographical differences on the success rate of borrowing

In this section, we verify Hypothesis #1 by testing the relationship between the borrower's region and the probability of the borrower obtaining the loan and report the experimental results in Table 5.3.

Table 5.3: Regression result on the success rate of borrowing

		(1)	(2)	(3)
Region	Northeastern	(0.00)		(0.001)
	Northern	0.184** (0.008)		0.204* (0.043)
	Eastern	0.138* (0.018)		0.151 (0.12)
	Central southern	0.114 (0.051)		0.086 (0.371)
	Southwestern	-0.026 (0.69)		-0.13 (0.092)
	Northwestern	0.234** (0.003)		0.165 (0.201)
ln_amount			-1.292** (0.00)	-1.296** (0.00)
Interest Rate			1.293 (0.622)	1.301 (0.62)
Credit rating			1.1878** (0.00)	1.18** (0.00)
Credit grade			0.008** (0.00)	0.008** (0.00)
Age			0.06 (0.073)	0.063 (0.06)
Ages' square			0.001 (0.454)	0.001 (0.402)
Gender			0.169* (0.021)	0.179* (0.014)
Education level			0.062* (0.046)	0.057 (0.067)
Marital status			0.081 (0.138)	0.074 (0.181)
ln_income			0.477** (0.00)	0.473** (0.00)
Work time			0.271** (0.00)	0.274** (0.00)
House			0.099 (0.091)	0.098 (0.097)
House loan			0.076 (0.286)	0.09 (0.208)
Car			-0.03 (0.631)	-0.034 (0.587)
Car loan			0.304** (0.005)	0.3** (0.006)
Identification			5.934** (0.00)	5.94** (0.00)
Credit report certificate			0.351** (0.00)	0.353** (0.00)
Income certificate			2.597** (0.00)	2.599** (0.00)
Constant		-1.333 (0.00)	-2.89** (0.00)	-2.96** (0.00)
Observations		28439	28439	28439

Cox & Snell R Square[13]	0.001	0.481	0.482
Nagelkerke R Square	0.001	0.732	0.733
Percentage Correct	77.30%	91.20%	91.20%

Source: author's computations.

In Table 5.3, the regression results in column (1) indicates that the borrower's geographical difference has a significant impact on the borrower's success rate in the P2P lending without control variables, the borrower from northwestern China has the highest probability of funding successfully and the success rate of borrowing in southwestern China is the lowest, this conclusion is consistent with the statistical analysis of the success rate of borrowing in Chapter 4. Based on the result of binary logistic regression for all variables in column (3), with the control variables, the impact of the borrower's geographical difference in the success rate of borrowing is lower, and the success rate of borrowing in northern China is higher than the result in the model without the control variable, we assume that under the same conditions, investors are more likely to invest in borrowers from richer region due to the higher economic development level in northern China. We can see that the borrower's loan amount, credit rating, credit score, borrower's gender, education level, working time, income, car, and car loan status, identity certification, credit report certification, and income certification have a significant impact on the success rate of borrowing.

According to the result in column (3), the regression coefficient of borrower's credit rating, credit score, borrower's working time, property status, borrower's income certification, identity certification, and credit report certification are greater than 0, those variables are the contributing factors of the borrower's success in P2P platform. It indicates that under the same conditions, the success rate of borrowing will increase by 3.25 (exp (1.18)) times for each additional unit of the borrower's credit rating, and the success rate of borrowing will increase by 1.008(exp (0.008)) times as the borrower's credit score increase by 1. The borrower who has the valid income certification, identity certification and provides the effective personal credit report is more likely to be funded successfully. Under the same conditions, the probability of successful borrowing of the female borrower is 1.2 times higher than the male borrowers, which is different from the result of Chen, et al. (2013). The regression coefficient of the borrowing amount is less than 0, so it is the inhibited factor for the success rate of borrowing, which indicates that the more loan amount the borrower

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[13] Cox & Snell R square is a transformation of the –2ln[L(MIntercept)/L(MFull)] statistic, which can determine the convergence of a logistic regression. https://stats.idre.ucla.edu/

request, the less likely for he/she to fund successfully. Moreover, after adding the control variables in the model, except the northeastern, the coefficient of northern China is significant positive while the coefficient of other regions is insignificant, which imply that the investors are more inclined to lend money to the borrowers from northern China. Based on table 10, we can see that, under the same conditions, the borrower from southwestern China has the lowest success rate of P2P borrowing, the success rate of borrowing in northern China is the highest, which is 2.37 times than that in southwestern China. All other factors being equal, the success rate of borrowing in southwestern China is 1.14 times lower than that in northeastern China, the success rate of borrowing in northern China is 1.23 times higher than that in northeastern China. Therefore, there is a regional difference in the success rate of borrowing in the platform of Renrendai, and Hypothesis #1 is verified.

The percentage correctness of the logistic model is 91.2%, indicating that the prediction ability of the model is very good, Cox & Snell R^2 is 0.482, Nagelkerke R^2 is 0.733, indicating that the model has good goodness of fit. since it is pseudo R^2, it is only used as a reference. The interest rate of borrowing and borrower's age, marital status, and education level have no significant effect on the borrowing success rate, which is inconsistent with the previous literature research conclusions, probably because the sample size is too small and the original data transaction is not perfect enough. Despite the empirical results do not verify the strong relationship between borrower's personal information and funding status, the personal information of borrowers on the Renrendai website can reduce the information asymmetry to a certain extent.

The impact of geographical differences on default rate

This section runs a binary logistic regression on the borrower's default rate, the default or not as the explanatory variable (default =1, pay on time=0), regional information as core explanatory variables, the related information of loan description, the credit of borrowers, and the personal information of borrowers as control variables. The regression results are reported in table 5.4. The column (1) of the regression results in the table shows that in the single-variable linear regression, the northeastern, northern, eastern, central and southern, southwestern and northwestern China are significant at 5%, the result reveals that borrowers in other regions of China have a lower default rate than that in the northeastern region. In column (3), we add the control variables to run the binary logistic regression, the results show that the borrower's geographical difference has no significant effect on the borrower's default rate at the 5% significance level after controlling other variables. Therefore, hypothesis #2 is rejected, we cannot

conclude that there is a regional difference on the default rate in China's P2P lending platform based on the sample.

Table 5.4: Regression result on the default rate

		(1)	(2)	(3)
Region	Northeastern	(0.00)		(0.414)
	Northern	-0.381** (0.011)		0.429 (0.173)
	Eastern	-0.606** (0.00)		0.006 (0.983)
	Central southern	-0.49** (0.00)		0.003 (0.991)
	Southwestern	-0.375** (0.009)		-0.005 (0.986)
	Northwestern	-0.605** (0.001)		0.39 (0.26)
ln_amount		-1.159** (0.00)	0.138 (0.327)	0.14 (0.321)
Interest Rate			-4.036 (0.577)	-4.046 (0.577)
Credit rating			-0.481** (0.00)	-0.48** (0.00)
Credit grade			-0.069** (0.00)	-0.069** (0.00)
Age			0.007 (0.948)	-0.007 (0.945)
Ages' square			0.001 (0.759)	0.001 (0.65)
Gender			0.377 (0.099)	0.355 (0.123)
Education level			-0.245** (0.006)	-0.258** (0.004)
Marital status			0.169 (0.284)	0.162 (0.304)
ln_income			0.184 (0.068)	0.193 (0.056)
Work time			0.041 (0.601)	0.036 (0.642)
House			-0.294 (0.083)	-0.325 (0.057)
House loan			-0.025 (0.899)	-0.015 (0.942)
Car			-0.045 (0.81)	-0.069 (0.717)
Car loan			0.293 (0.329)	0.295 (0.328)
Identification			-2.27 (0.458)	-2.353 (0.446)
Credit report certificate			-1.592** (0.00)	-1.599** (0.00)
Income certificate			1.405** (0.00)	1.48** (0.00)
Constant			0.34 (0.926)	0.519 (0.889)

Observations	6462	6462	6462
Cox & Snell R Square	0.004	0.491	0.492
Nagelkerke R Square	0.006	0.832	0.832
Percentage Correct	83.50%	94.70%	94.80%

Source: author's computations.

The results obtained from the preliminary analysis are summarised as follows: There exists a significant regional difference in the success rate of borrowing and insignificant regional difference in the default rate via P2P online lending platform in China. After adding the control variables, the regression results indicate that the default rate in southwestern China is the lowest and in northern China is the highest, the borrowers in southwestern China have the lowest borrowing success rate while the borrowers from the northern region are less likely to fund successfully.

5.2 Analysis of the reason of geographical differences

The analysis in chapter 5.1 verifies the existence of geographical difference in the success rate of borrowing in the P2P lending market. In order to further analyze the reasons behind the phenomenon, this paper performs a binary logistic regression on the success rate of borrowing according to the method described in chapter 4.3. The regression results are shown in Table 5.5.

Table 5.5: Regression result of the reason for geographical differences

	(1)	(2)	(3)
GDP per capita	0.006** (0.001)		
Number of financial institutions per 10 thousand people		0.178** (0.048)	
Number of students in higher education per 100000 Inhabitants			0.001** (0.01)
ln_amount	-1.295** (0.00)	-1.293** (0.00)	-1.294** (0.00)
IR	1.289 (0.623)	1.246 (0.635)	1.214 (0.644)
Credit rating	1.184** (0.00)	1.186** (0.00)	1.186** (0.00)
Credit grade	0.008** (0.00)	0.008** (0.00)	0.008** (0.00)
Age	0.063 (0.057)	0.06 (0.07)	0.06 (0.07)
Ages' square	0.001 (0.391)	0.001 (0.443)	0.001 (0.441)
Gender	0.174* (0.017)	0.167* (0.022)	0.169* (0.02)
Educational level	0.06 (0.056)	0.058 (0.062)	0.057 (0.068)
Marital status	0.079 (0.15)	0.083 (0.131)	0.084 (0.128)
ln_income	0.474** (0.00)	0.477** (0.00)	0.475** (0.00)
House	0.097 (0.099)	0.093 (0.114)	0.094 (0.11)
House loan	0.082 (0.246)	0.079 (0.267)	0.08 (0.259)
Car	-0.04 (0.53)	-0.036 (0.567)	-0.033 (0.601)
Car loan	0.307** (0.005)	0.310**(0.004)	0.308** (0.004)
Worktime	0.273** (0.00)	0.269** (0.00)	0.27** (0.00)
Income certification	2.597** (0.00)	2.594** (0.00)	2.594** (0.00)
Identity certification	5.94**(0.00)	5.936** (0.00)	5.937** (0.00)
Credit report certification	0.355** (0.00)	0.352** (0.00)	0.354** (0.00)
Constant	-3.200** (0.00)	-3.152** (0.00)	-3.775** (0.00)
Observations	28439	28439	28439
Cox & Snell R Square	0.482	0.482	0.482
Nagelkerke R Square	0.732	0.732	0.732
Percentage Correct	91.20%	91.20%	91.30%

Source: author's computations.

From Table 5.5, it can be seen that the economic development level, the financial development level and the degree of education development have a significantly positive impact on the borrowing success rate in the P2P lending platform.

According to column (1), under the same conditions, for every 1 thousand Chinese yuan (144.8 USD[2]) increase in per capita GDP of borrower's region, the borrower's success rate of borrowing will increase by 0.6%. The experimental results are consistent with the common sense of China, Beijing (in northern China), Shanghai (in eastern China), and Guangdong (in central-southern China) is China's major economic provinces, which also are the earliest provinces to develop the P2P online lending. Developed regional economy not only conducive to set up more P2P lending platforms but also shows that the region has a stronger ability to undertake debts. Investors tend to lend money to the borrowers in the region with higher economic development level. Therefore, the borrowers from northern China, eastern China, and central southern China have relatively higher success rates of borrowing via the P2P lending platform. Hence, the result does not reject hypothesis #3.

We can see the regression results in column (2), the number of financial institutions per 10,000 people is significant at 95% significance level, the number of financial institutions per 10,000 people in the borrower's area is increased by one, and the borrowing success rate of borrowers in the region will increase by 1.2 times, which verifies the hypothesis #4. In China, the financial foundation of northern China and eastern China is relatively abundant, based on the rank of Global Financial Centers Index 2018[14] , Shanghai (China's financial center), Beijing, Shenzhen, Guangzhou, and Qingdao is the top 5 cities in mainland China. In addition, the number of rural banks in northern China and eastern China is greater than that in western China, enabling more residents in eastern China to understand financial knowledge, which can indirectly improve the borrowers' success rate of borrowing in P2P lending market.

According to the regression coefficient of the number of students in higher education per 100,000 inhabitants showed in column (3), we can see that at the 5% significance level, the degree of education development has a slight but significant impact on the borrower's success rate, which suggests that the borrowers from regions with higher educational development level are more likely to fund successfully, this conclusion verifies the hypothesis #5. Additionally, Li & He (2018)used cluster

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[14] The Global Financial Centres Index (GFCI) is an evaluation system to evaluate the competitiveness of financial centers and rate the financial center in the world.

analysis to study the difference of college and university in various provinces in China and the results showed that Beijing, Shanghai, Jiangsu and Shandong provinces have higher development level of education than that in other provinces, which is compliance with the result in table 5.4.

5.3 Robustness analysis

This paper will use the following methods to verify the robustness of the above empirical results: (1) Using different samples; (2) Replacing variable.

Using the different sample

The amount of loan required for Renrendai ranges from 3,000 Chinese yuan to 500,000 Chinese yuan (from 434.38 USD to 72396.6USD[2]). This paper selects the data with the borrowing amount below 50,000 yuan as a sample for binary logistic regression and tests whether the previous results are valid under different loan amount.

The result in table 5.6 shows that there are significant regional differences in borrower's borrowing success rate. The borrower's age, education level, marital status, whether has the property and the car has no significant impact on the success rate of borrowing via P2P online lending platform, the borrower's credit rating, credit score, gender, income level, personal credit report, identity certification, income certification, the economic, financial, and educational development levels of the borrower's region are significantly positively related with the success rate of borrowing. The robustness of the results described above is tested.

Table 5.6: Robustness analysis of a different sample

	(1)	(2)	(3)	(4)
GDP per capita			0.005**	
			(0.001)	
Number of financial institutions per 10 thousand people				0.201**
				(0.031)
Number of Students in higher education Per 100000 Inhabitants				0.001**
				(0.007)
Northeastern	(0.015)			
Northern	0.154**			
	(0.043)			
Eastern	0.067			
	(0.503)			

Central southern	0.025 (0.804)			
Southwestern	-0.177* (0.095)			
Northwestern	0.15 (0.061)			
ln_amount		-0.974** (0.00)	-0.973** (0.00)	-0.971** (0.00)	-0.971** (0.00)
IR		-3.833 (0.1656)	-3.811 (0.168)	-3.896 (0.158)	-3.95 (0.153)
Credit rating		1.34** (0.00)	1.336** (0.00)	1.338** (0.00)	1.338** (0.00)
Credit grade		0.008** (0.00)	0.008** (0.00)	0.008** (0.00）	0.008** (0.00）
Age		0.044 (0.212)	0.044 (0.198)	0.043 (0.223)	0.043 (0.223)
Ages' square		0.001 (0.719)	0.001 (0.689)	0.001 (0.742)	0.001 (0.738)
Gender		0.153* (0.045)	0.15* (0.049)	0.144* (0.059)	0.146* (0.055)
Educational level		0.06 (0.068)	0.064 (0.05)	0.0642 (0.058)	0.061 (0.063)
Marital status		0.093 (0.103)	0.097 (0.088)	0.100 (0.077)	0.101 (0.074)
ln_income		0.422** (0.00)	0.422** (0.00)	0.424** (0.00)	0.422** (0.00)
House		0.106 (0.076)	0.108 (0.076)	0.102 (0.092)	0.104 (0.088)
House loan		0.104 (0.167)	0.098 (0.195)	0.095 (0.207)	0.096 (0.201)
Car		-0.027 (0.684)	-0.034 (0.614)	-0.032 (0.629)	-0.028 (0.671)
Car loan		0.248* (0.037)	0.252* (0.034)	0.256* (0.031)	0.253* (0.033)
Worktime		0.28** (0.00)	0.2778** (0.00)	0.276** (0.00)	0.277** (0.00)
Income certification		2.767** (0.00)	2.766** (0.00)	2.764** (0.00)	2.763** (0.00)
Identity certification		5.784** (0.00)	5.784** (0.00)	5.780** (0.00)	5.781** (0.00)
Credit report certification		0.369** (0.00)	0.37** (0.00)	0.369** (0.00)	0.37** (0.00)
Constant		-4.623** (0.00)	-4.897** (0.00)	-4.934** (0.00)	-5.589** (0.00)

	(1)	(2)	(3)	(4)
Observations	28439	28439	28439	28439
Cox & Snell R Square	0.502	0.502	0.502	0.502
Nagelkerke R Square	0.734	0.734	0.734	0.734
Percentage Correct	91.00%	90.90%	90.90%	90.90%

Source: author's computations.

Variable replacement

Since the strong correlation between the borrowing interest rate and the borrowing term, this paper excluded the borrowing term when running the model. In the robustness test, we use the borrowing term to replace the interest rate of borrowing and rerun the model. The regression results are reported in Table 5.7.

Table 5.7: Robustness analysis of variable replacement

		(1)	(2)	(3)	
GDP per capita			0.005**		
			(0.01)		
Number of financial institutions per 10 thousand people				0.196*	
				(0.036)	
Number of Students in higher education Per 100000 Inhabitants					0.001**
					(0.008)
region	Northeastern	(0.015)			
	Northern	0.162*			
		(0.042)			
	Eastern	0.076			
		(0.453)			
	Central southern	0.033			
		(0.738)			
	Southwestern	-0.168			
		(0.094)			
	Northwestern	0.157 (0.24)			
ln_amount		-1.031**	-1.029**	-1.027**	-1.028**
		(0.00)	(0.00)	(0.00)	(0.00)
Term		0.007	0.007	0.007	0.007
		(0,077)	(0,078)	(0,083)	(0,085)
Credit rating		1.337**	1.337**	1.335**	1.335**
		(0.00)	(0.00)	(0.00)	(0.00)
Credit grade		0.009**	0.009**	0.009**	0.009**
		(0,00)	(0,00)	(0,00)	(0,00)
Age		0.048	0.05 (0.174)	0.047	0.047
		(0.174)		(0.184)	(0.183)

Ages' square	0.001 (0.648)	0.001 (0.62)	0.001 (0.669)	0.001 (0.666)
Gender	0.143 (0.062)	0.14 (0.067)	0.133 (0.08)	0.136 (0.074)
Educational level	0.06 (0.067)	0.064* (0.049)	0.062* (0.057)	0.061* (0.062)
Marital status	0.089 (0.118)	0.093 (0.101)	0.097 (0.089)	0.098 (0.085)
ln_income	0.44** (0.00)	0.44** (0.00)	0.442** (0.00)	0.44** (0.00)
House	0.111 (0.068)	0.112 (0.065)	0.107 (0.078)	0.108 (0.075)
House loan	0.103 (0.175)	0.096 (0.204)	0.093 (0.217)	0.094 (0.211)
Car	-0.016 (0.811)	-0.022 (0.738)	-0.021 (0.755)	-0.017 (0.799)
Car loan	0.251* (0.035)	0.256* (0.031)	0.259* (0.029)	0.257* (0.03)
Worktime	0.28** (0.00)	0.28** (0.00)	0.276** (0.00)	0.277** (0.00)
Income certification	2.757** (0.00)	2.756** (0.00)	2.753** (0.00)	2.753** (0.00)
Identity certification	5.759** (0.00)	5.758** (0.00)	5.754** (0.00)	5.755** (0.00)
Credit report certification	0.377** (0.00)	0.378** (0.00)	0.377** (0.00)	0.378** (0.00)
content	-4.862** (0.00)	-5.125** (0.00)	-5.164** (0.00)	-5.81** (0.00)
Observations	28439	28439	28439	28439
Cox & Snell R Square	0.502	0.502	0.502	0.502
Nagelkerke R Square	0.734	0.734	0.734	0.734
Percentage Correct	91%	90.9%	90.9%	91%

Source: author's computations.

Compared with the previous results, the result shows that the regression coefficients and symbols of the main research variables were relatively stable, and the significance is not changed significantly. This conclusion indicates that the experimental results of the paper are robust.

6 Regulatory Issues in P2P lending

6.1 Current regulatory performance in P2P lending industry

6.1.1 Regulatory policy

The United States and the United Kingdom

In March 2008, the US SEC defined P2P online lending as a securities sales act, marking the official inclusion of the US P2P industry into the core regulatory system. The P2P lending platform needs to disclose important and relevant decisions related to securities trading decisions to investors on a regular or irregular basis and ensure that such information can be viewed on the SEC or P2P lending company website. The regulation of the P2P online lending market in the United States mainly involves three aspects: regulation of securities, regulation of e-commerce, and regulation of consumer protection. The securities supervision pay attention to the information disclosure, the e-commerce regulation focuses on protecting the process of transaction to keep the information security, and consumer protection supervision aims to protect the interests of consumers. In addition to complying with federal agency regulations, the P2P platform is also bound by the regulations in each state.

The UK's P2P industry regulation is dominated by industry self-regulation, P2P Finance Association (P2PFA), and is combined with government agency supervision, the Financial Conduct Authority (FCA). In March 2014, The FCA released the first regulation for P2P lending market, "The FCA's regulatory approach to crowdfunding over the internet and the promotion of non-readily realizable securities by other media". The UK government requires the P2P industry to abide by the related documents issued by the government while strictly complying with the operating rules established by P2PFA.

China

On March 25, 2014, the "Opinions on Several Issues Concerning the Application of Laws in Handling of Illegal Fund-raising Criminal Cases" was released by China's Supreme People's Procuratorate, China's Supreme People Court, and the Ministry of Public Security (MPS), the opinion is the first policy related to the supervision of the P2P lending market in China. Since then, the Chinese government has intensively introduced a number of important policies, forming a comprehensive

regulatory system of P2P lending market.

In July 2015, the People's Bank of China (PBC), the MPS and other 10 departments issued the "Guidance Opinions on Promoting the Sound Development of Internet Finance" and pointed out the CBRC is the primary regulator in China, responsible for the online lending business, and the "guidance opinion" specifically defined the functions of P2P online lending, which are providing investors and borrowers with services of information exchange and credit evaluation.

On August 24, 2016, the CBRC, the MIIT, the MPS issued "Interim Measures for the Administration of the Business Activities of Online Lending Information Intermediary Institutions", which clarified the legal nature of the online lending platform and introduced relevant supporting measures for P2P. In November 2016, the CBRC released the "Guidelines for the Administration of Recordation and Registration of P2P Lending Information Intermediary Institutions", which stipulates that the newly established platform must clarify the identity of intermediary service organization before registering.

"The Guidelines for the Online Lending Fund Depository Business" issued by the CBRC in February 2017 clarified the basic definitions and principles of funds depository business of online lending and stipulated the duties that client of the fund's depository business should perform. Subsequently, on August 2017, the CBRC formulated the "the Guidelines for the Disclosure of Information on the Business Activities of Online Lending Information Intermediary Institutions", which clearly stipulated the information disclosure content of the online lending platform, including the registering information of P2P online lending institutions (funds deposit information, information granted recordation, business license information) and organization information and audit information. In December 2017, the "Notice for the Special Campaign against Peer-to-peer Lending Risks on the Regulation and Rectification of the 'Cash Loan'" officially forbid the online lending platform to issue small loans that do not specify the borrowing purpose, and explicitly requires that no loans shall be granted to any borrower without an income source.

On August 8, 2018, the Office of the Leading Group for the Special Campaign against Internet Financial Risks issued the "Notice on Submitting Information on P2P Platform Borrowers' Escaped Debt" to the provinces, which asked the provinces to report the list of borrowers who maliciously escaped the debts in the risk event of P2P lending platform.

6.1.2   Regional difference in regulatory issues in China

Online lending fund depository business

The CBRC publicly promulgated the "Guidelines for the Online Lending Fund Depository Business" on February 22, 2017. This guideline provides a deeper definition of the responsibilities and obligations of the depository and the principal, and explain the transaction standards and functions of the fund depository business. In the guideline, the "depository" is given an exact definition, which means the commercial bank that provides fund depository services for the online lending business.

With the advancement of the special rectification work of internet finance, the number of platforms which are successfully connected with banks has been increasing in the past year. By the end of 2018, there are 553 formal operating platforms that implement the bank depository business, which is 54% of the formal operating platform. As can be seen from figure 6.1, the P2P lending platform in 30 provinces in China has signed a direct depository agreement with commercial banks. Among them, the number of platforms for depository management in Guangdong province has reached 236, which is the area with the largest number of depository platforms. Shanghai and Shenzhen city require the depository banks to be "localized" (with local operating entities), which is not required in other regions.
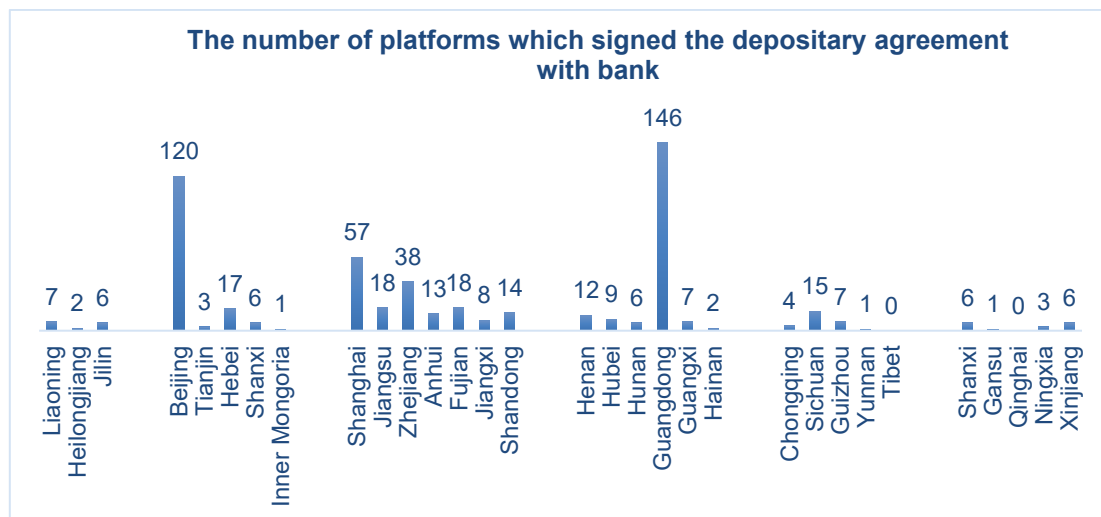

Figure 6.1: Number of platforms which signed the depositary agreement with the bank

Data source: wangdaizhijia[1]

Industry self-regulatory association

The industry self-regulatory association is a social intermediary that enterprises

organize spontaneously in order to coordinate business activities and communicate information between enterprises. The self-regulatory organization of the P2P industry in China is the National Interne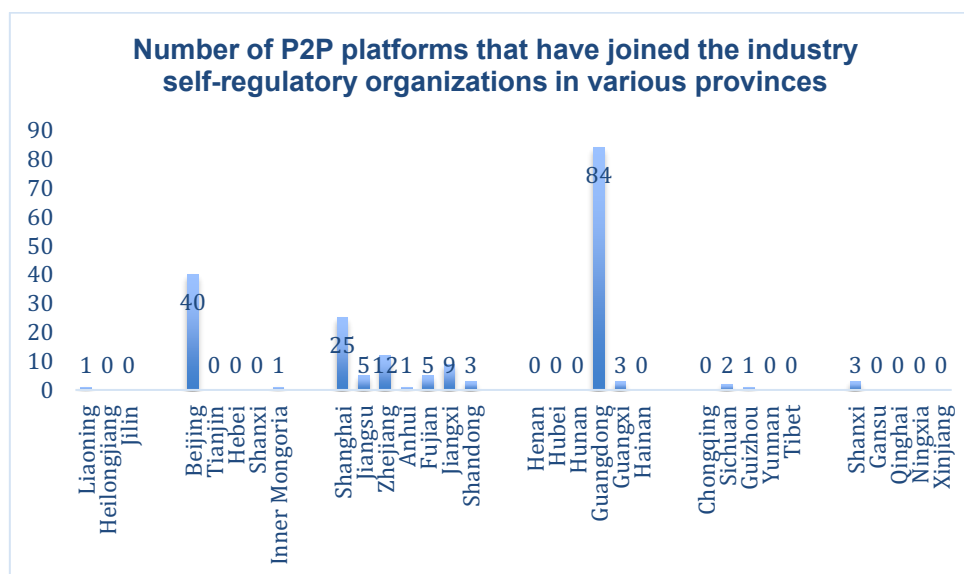t Finance Association of China (NIFA), which is established in December 2015. Figure 6.2 shows the number of P2P platforms that have joined the industry self-regulatory organizations in various provinces. The number of P2P lending platforms that have joined the industry self-discipline associations in Guangdong province is accounting for 43% of all P2P lending platform that has joined the self-discipline associations in China.

Figure 6.2: Number of P2P platforms that have joined the industry self-regulatory organizations in various provinces

Data source: wangdaizhijia[1]

According to the official website of the NIFA of China, the self-regulatory associations that have issued relevant regulations for the P2P online lending industry include the Guangdong Internet Financial Association, the Shenzhen Internet Finance Association, the Jiangsu Internet Finance Association, the Shanghai Internet Finance Industry Association, and the Tianjin Internet Finance Industry Association, which are concentrated in the eastern region. According to the actual situation of the region, the self-regulatory associations will introduce corresponding systems, mainly focusing on contract specifications, information disclosure, product models, etc. Self-regulatory organizations in the central and southern, western, and northeastern regions have not issued relevant regulation.

Internet content provider - ICP filing

The ICP is "Internet Content Provider", based on the "Regulation on Internet

Information Service of the People's Republic of China" issued by the state council of China in 2000, the state implements the system of ICP license for operating internet services and the system of ICP filing system for non-operating internet information service and the institutions that fail to obtain ICP license or do not register the ICP filing cannot engage in the internet information service. According to the statistical data in wangdaizhijia1, there were 225 P2P platforms in China for ICP filing, 101 of which are in Beijing. Figure 6.3 describes the number of P2P lending platform that has registered the ICP filing in various regions.
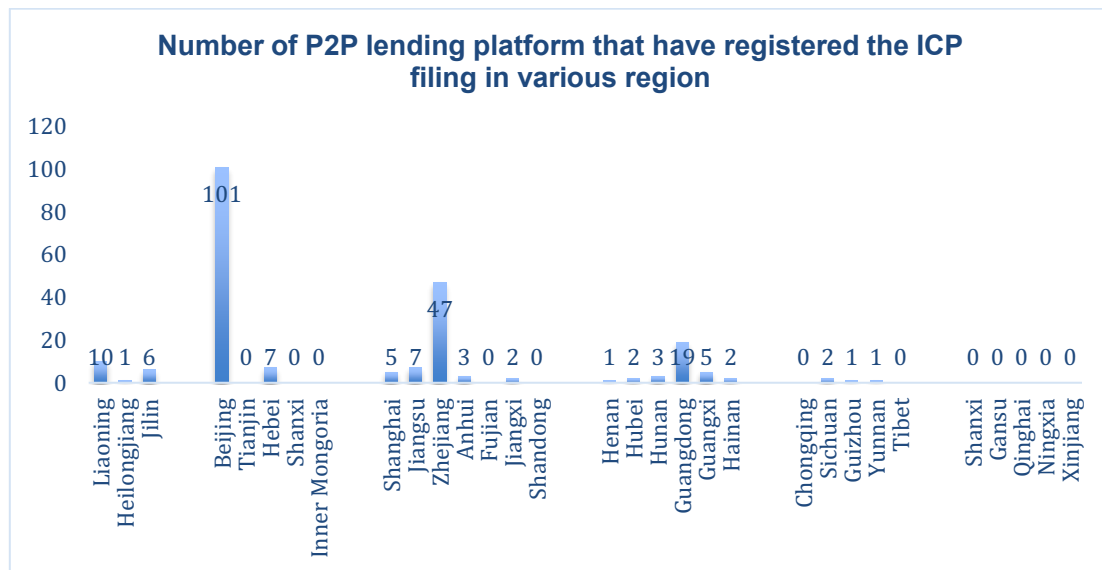

Figure 6.3: Number of P2P lending platforms that have registered the ICP filing in various region

Data source: wangdaizhijia[1]

Overall, the number of Platforms which signed the depositary agreement with the bank in northern China, eastern China, and central and southern China are more than that in the other three regions. Although the number of P2P platforms that have joined the industry self-regulatory association in Beijing (in northern China) and Guangzhou (in central and southern China) is much more than that in other provinces in China, seven provinces in the eastern region have the P2P platforms that have joined the industry self-discipline association. As can be seen from Table 8, there is no P2P platform registered the ICP filing in the northwestern region of China, only Beijing and Inner Mongolia provinces in northern China have registered, and there are 64 P2P platforms have registered in the eastern region. The phenomenon means that most of the P2P online lending platform in China has not registered the ICP filing, which indicates that the chaos in China's online lending market.

In summary, we can conclude that the provinces in the eastern, central and southern regions of China have a greater degree of supervision over the P2P platform. According to the experimental results in Chapter 5, borrowers from northern China have the highest success rate of borrowing under controlling other variables, since only Beijing in northern China has the strongest supervision due to the above three aspect of supervision. Hence, we cannot conclude that the success rate of borrowing in regions with stronger supervision is higher based on the above statistic. Therefore, we reject the hypothesis #6.

6.2 Problems in China's P2P lending supervision

6.2.1 Inadequate regulatory policy

First, China lacks a systematic legal supervision system of P2P. China's P2P lending market has developed rapidly, but the Chinese government has not issued relevant laws and regulatory documents in time, resulting in a large number of P2P platforms lack corresponding effective policy supervision. Second, China's existing laws do not clearly define the standard for the enterprise to access into the P2P lending market, and there is no legal punitive measure for illegal operation and withdrawal of P2P platforms, so it is impossible to protect the legitimate rights and interests of investors. Third, although "Interim Measures for the Administration of the Business Activities of Online Lending Information Intermediary Institutions" mentioned the closure or transformation of the P2P platform, it does not explain the specific transformation method of the P2P lending platforms and does not describe the solution of how to deal with the disputes left by the problem platforms. China's current law lacks detailed provisions on the exit mechanism of the P2P platform.

6.2.2 The imperfect credit reference system

The management of credit information includes two aspects in China: (1) on the government side, the credit reference center of the PBC is responsible for the national credit and information database, By the end of 2018, it has access to the credit information of 930 million natural persons and the credit information of more than 26 million enterprises and other legal entities; (2) on the market side: there are currently 125 corporate credit bureaus, 97 credit rating agencies, and one market-oriented personal credit institution - Baihang Credit. In order to reduce the uncertainty of operating P2P lending platform and impose sanctions on malicious escape debtors, in August 2018, the Central Bank of China and Baihang Credit have included the list of the first batch of malicious escape debts of P2P online lending institutions into the credit reference system. However, there is still a large number of personal and corporate credit

data that have not been added to the central bank's credit database. Additionally, the "Guiding Opinions on Promoting the Sound Development of Internet Finance" issued in July 2015 emphasize that the main function of the P2P platform is to provide the information exchange as the information intermediary. However, the "Regulation on the Administration of Credit Investigation Industry" issued in 2013 stipulates that only the institutions offer the credit business can collect and sort out the consumers' information from the financial credit information database, hence, the P2P platform cannot obtain the borrower's personal credit information through the center's credit system of the PBC.

6.2.3   Insufficient management of industry self-regulation associations

By the end of 2017, among the 482 members of the NIFA of China, there are 122 P2P network lending platforms, accounting for 25.3%. The current "Guidance Opinions on Promoting the Sound Development of Internet Finance" and "Interim Measures for the Administration of the Business Activities of Online Lending Information Intermediary Institutions" have not made policy recommendations for the platform to join the industry self-regulatory association, and many P2P platforms have not actively joined the industry associations. Secondly, the industry self-regulation is insufficient in the construction of organizational structure and self-regulatory risk management system, and the self-regulatory management documents lack operability. There are no specific guidelines and lack of relevant rules, which greatly weakens the effect of the self-regulatory organization management industry. Third, many problem platforms have not been managed by self-regulatory organizations when they have problems.

6.2.4   Incomplete information disclosure in P2P lending platform

The "Internet Financial - Information Disclosure - P2P Lending" issued in October 2016 stipulated 96 information disclosure indicators, including organization information, platform operation information and project information, which includes 65 mandatory disclosure indicators and 31 encouraging information disclosure indicators. However, there are still many P2P platforms whose information disclosure format is not standardized, and the information disclosure content is not reliable. According to the notice of the Internet Finance Association of China in February 2019, among the 99 lending platforms, there were 37 lending platforms disclosing the mandatory disclosure indicators and encouraging disclosure indicators, 11 platforms only disclosed mandatory disclosure indicators and the information disclosure content of 51 platforms was totally incomplete. In addition, the standard of information

disclosure in different P2P lending platforms in China is different, some platforms disclose the information of borrowers differently, the information disclosure does not form a unified indicator reporting system.

6.3 Policy recommendations to China's P2P lending supervision

6.3.1 Strengthening the construction of laws and regulations

China should build more complete legal supervision system. First, establish the minimum market access requirement for the P2P industry, such as setting a requirement of minimum registered capital and a standard of the certain internal control system. Secondly, increase the punishment for the illegal platform, and impose strict sanctions for the platforms and borrowers who are destructing the online lending market and violating the law. Thirdly, increase the implementation of third-party fund custody. As an information mediation platform providing a trading environment in the process of lending, the P2P platform should not directly manage the capital flow of the lending process. Based on the "Guidelines for the Online Lending Fund Depository Business" issued by the CBRC in February 2017, the P2P platform should establish a fund depository business, however, according to the data of the wangdaizhijia[1], by the end of 2018, only 54% of the platforms have established bank depository business. Therefore, in order to realize the transparency of the P2P platform capital flow process and effectively control the financial risk of the P2P platform, it is necessary to implement mandatory fund custody services for the P2P platform.

6.3.2 Establish a unified credit mechanism in P2P platform

The P2P lending industry should establish a credit information sharing and exchange platform, break the credit information barrier between various P2P online lending platforms for the purpose of avoiding credit risk problems caused by unclear information between P2P platforms. The Central Bank Credit Information Center shall issue specific implementation rules for the P2P platform to access the central bank's credit information system and make clear and reasonable provisions on the procedures for collecting specific credit information and confidentiality of personal credit information.

6.3.3 Improve the construction of industry self-regulatory associations

The industry self-regulatory association is a self-discipline and self-monitoring mechanism within the industry, it plays a crucial role in the development of an industry.

The members of well-developed industry associations should not be less than 70% of the entire industry, but according to China's NIFA, the number of P2P online lending platform joined the Internet Finance Association accounts for 25.3% of all the P2P online lending platform, so the Chinese government should take some measures to encourage more P2P platform to join the Internet Finance Association. For example, the regulatory authorities should stipulate that the P2P online lending platforms that meet certain conditions must join relevant industry associations legal provisions. Second, building an industry information-sharing platform is necessary to increase the transparency of the P2P industry.

6.3.4   Standardize information disclosure of P2P lending platform

The P2P lending platform should regularly publish its relevant business information to make the platform operation transparent. Secondly, we should improve the information disclosure system of internet finance, the government should make specific provisions on the business scope and fund flow of the P2P platform, and establish a standard information disclosure reporting system. Finally, the P2P platform must not only disclose relevant information on time according to regulations but also pay attention to protecting consumers' privacy when disclosing information.

7   Conclusion

Using the data from Renrendai, this paper studied the impact of regional difference in China on the success rate of borrowing and the default rate of borrowers funded via the P2P lending platform. The empirical result shows that the impact of regional difference on the success rate of borrowing in P2P lending is significant, the lenders are more likely to lend money to the borrower who is from the region with higher economic development level, more traditional financial institution and higher educational development level. But the impact of regional difference on the default rate in the P2P lending is insignificant. This paper also analyzes the regulatory differences of P2P platforms in various regions of China and find out that only the eastern China and central and southern China and Beijing which is in northern China have paid more attention to the regulation of P2P platforms.

This paper analyzes the current situation of China's P2P industry and finds that China's P2P industry supervision has the following problems: (1) Inadequate regulatory

policy; (2) Imperfect Credit Reference System; (3) Insufficient Management of Industry Self-regulation Associations; (4) Incomplete Information Disclosure in P2P Lending Platform. This paper puts forward corresponding suggestions based on the above questions：(1) Strengthening the construction of laws and regulations; (2) Establishes a Unified credit mechanism in P2P platform; (3) Improve the construction of industry self-regulatory associations; (4) Standardize information disclosure of P2P lending platform.

There are many limitations in the research: (1) Due to the limitation of data, the analysis only uses the data from one P2P platform, and the sample only covers one year, so the conclusions drawn from the above analysis have certain limitations; (2) This paper analyzes the causes of regional differences in P2P lending market only at the macro levels (economics, finance, education and supervision), it does not analyze micro level from the perspective of borrowers and investors.

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