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Financing Knowledge, Risk Attitude, and P2P Borrowing in China

(Short title: P2P Borrowing in China)

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Financing Knowledge, Risk Attitude, and P2P Borrowing in China

Abstract

The advance of Internet technology provides a convenient market platform for matching of lending and borrowing parties, but many consumers still hesitate to use online borrowing. To better understand consumer behavior in online borrowing, we use nationally representative survey data in China to explore factors affecting consumer use of one type of online borrowing, P2P borrowing. Through empirical analyses, we find that financing knowledge and risk attitude are two key factors associated with P2P borrowing. Results show that financing knowledge is directly associated with P2P borrowing, while risk attitude through an instrument variable is associated with P2P borrowing also. Then an effective way to expand the consumer P2P borrowing market in China is to enhance consumer financial literacy education.

Keywords: *Financing expertise; Financing familiarity; Financing knowledge; P2P borrowing; Risk attitude*

Introduction

Research on traditional credit market concentrates on business financing behavior. However, due to the advance of modern Internet technology, more consumers choose borrowing from Internet. By passing banks, Internet financing is a special type of credit market in which individual borrowers make microloans online without collateral or intermediation from financial institutions. P2P (person to person) lending is one of methods for Internet financing, in which individuals lend money to individual borrowers directly (Gomber et al., 2018).

In China, P2P platforms have gained popularity and market recognition in recent years. The first Internet lending platform was established in 2007. The Internet financing industry explosion began in 2013, when there was a surge in the number of online platforms. Approximately 150 platforms were set up in 2013, accounting for 50% of the total number of Internet financing platforms in China. The Internet financing sector continued to mushroom in 2014; about 900 platforms were set up in 2014. More than 2000 platforms are in operation by the mid-2016, with loans outstanding reaching 209 billion RMB. Credit Ease, a major peer-to-peer lending company, was established in 2010, enabling individuals with surplus funds to lend to others who want money. Like Lending Club in the US, Credit Ease is the biggest Internet financing platform in China (Iresearch, 2017).

In 2013, more than 200,000 people lent a total of 105.8 billion yuan on approximately 800 Internet financing lending platforms. In 2014, there were 1.16 million investors and 0.63 million borrowers involved in the Internet financing sector. Compared to 2013, this means 364% and 320% increases, respectively, for participating investors and borrowers on a yearly basis. More than 1m500 Internet financing platforms in China are currently involved in matching lenders and borrowers. Loans via

Internet financing platforms reached 149.55 billion RMB in 2017, which spiked 1.86 times of the transactional volume in 2016. But Internet financing of all types still only comprise a tiny fraction of the 65 trillion RMB loan outstanding in the formal banking system (Iresearch, 2017).

According to the white paper of the China P2P lending service industry, there are several advantages of online borrowing over traditional borrowing. Firstly, the online borrowing process is simpler than traditional borrowing, through internet for data transmission and customer filtering, consumers can get loans more conveniently. Secondly, through non manual audits, credit risk is assigned more objectively. Finally, the process of borrowing can break through time and space constraints. Though there are many advantages with P2P borrowing, not every consumer knows about it (Oileasing, 2014).

Research on consumer borrowing behavior in China is limited but increasing. So far most studies in the Chinese context focus on the description at a macro level. Although researchers describe characteristics of the credit market, systematic and theoretical explanations are limited. P2P borrowing, as an emerging consumer financing market in China, is particularly under-studied. Although P2P borrowing has greater convenience, many consumers still prefer to borrow from banks given the same interest rate. At present, no research has been carried out to examine consumer online borrowing in the Chinese context.

To fill out this research gap, this study explores factors associated with consumer use of P2P borrowing. Our research uses micro survey data to quantitatively measure consumer risk aversion. Also, we measure financing knowledge from two aspects that are financing familiarity and financing expertise (Alba and Hutchinson, 1987). Financing familiarity means the gained experience after the use of P2P borrowing, financing expertise means the knowledge before the use of P2P borrowing. Through data analyses, we find that there is a high correlation between financing familiarity and financing expertise. Then we extract two main factors through exploratory factor analysis to characterize financing knowledge. Controlling for personal characteristic variables, we find that financing knowledge affects one's risk attitude. To deal with the possible endogeneity issue, we use an instrumental variable, the number of elderly at home, to proxy risk attitude, which corrects the bias in OLS and builds the 2SLS model to estimate the potential impact of risk attitude and financing knowledge on P2P borrowing. Finally we find that both financing knowledge and risk attitude are positively associated with P2P borrowing behavior.

The results will provide not only a basis for promoting a more efficient allocation of credit resources and selecting potential customers on the P2P borrowing platform, but also a policy guidance to develop the Internet finance market and better serve consumer interests in China.

This paper is structured as follows: Next section reviews relevant research literatures and proposes hypotheses. Then, the survey data, variables, and analysis approaches are described. After that, results of empirical analyses on factors associated with the P2P borrowing are presented. The last section concludes.

Literature Review and Hypotheses

Related Theories of Technology Adoption

P2P borrowing is considered as one kind of new technologies that can be adopted by consumers. There are two theories for understanding consumers' adoption of new technologies. One theory is to examine consumer technology adoption by consumer predispositions, such as overall feelings, attitudes, perceptions and intentions towards using a given technology, the most notable research model is the technology acceptance model (TAM) (Davis, 1989). Technology acceptance model incorporates the idea that ease of use and perceived technology usefulness are critical constructs that influence individual's attitude toward using the innovative technology, which are used in previous studies (Jan and Contreras, 2011; Park et al., 2014; Wang and Sun, 2016; Jokar et al., 2017; Gomber et al., 2018). The other theory focuses on consumer characteristics linked to the time he/she takes to adopt innovation, which is called the theory of diffusion of innovation (DI), which is a conceptual framework formalized by Rogers (2003). The DI model includes five characteristics of innovation that influence consumer acceptance, which are relative advantage, compatibility, simplicity, communicability, and trialability. The DI framework is well incorporated into a present understanding of consumer new technology acceptance in previous research (Ganglmair-Wooliscroft and Wooliscroft, 2016; Hyysalo et al., 2017). In our research we followed the TAM, and tried to measure consumer's overall feelings and attitudes through risk attitude and financial knowledge.

Risk Attitude and P2P Borrowing

Risk attitude is one of the important factors that influence a wide range of personal financial decisions (Snelbecker et al., 1990). Risk attitude is an underlying factor within financial planning models and consumer decision frameworks. Fishbein and Ajzen (1975) pointed out that attitude involved individuals' behavioral beliefs and affected their terminal behaviors. According to the Theory of Reasoned Action proposed by them, people form their attitudes based on their convictions in the process of making decisions, thereby conducting corresponding actions. In the framework of traditional economics research, basic assumption is established in the mode of a rational person, which is also known as a risk-neutral person. Nevertheless, in the existing research on financing options, consumers' risk attitudes are actually not neutral. Awh and Waters (1974) divided borrowers into active users and passive users, and studied the impact of risk attitude on these two types of people with other factors controlled. Their research suggested that active users had a stronger risk preference than passive users.

Okun (1976) described a key fact of risk attitude as a person's perception of change and danger. According to Okun, all risk-taking situations necessitate the evaluation of the relative value of a given alternative and the likelihood or probability of achieving it successfully. Weber et al. (2002) conceptualized a person's attitude toward taking financial risks to include risk perception and attitude toward perceived risk. Using their framework, risk attitude is a person's standing on the continuum from risk aversion to risk seeking. Often people use risk preference to describe risk attitude. Risk preference is a person's tendency to be attracted or repelled by alternatives that he or she perceives as more risky over alternatives perceived as less risky (Weber and Milliman, 1997). Researchers conceptualize risk preference as the maximum amount of uncertainty someone is willing to accept when making a financial decision or the willingness to engage in behaviors in which the outcomes remain uncertain with the possibility of an identifiable negative outcome (Irwin, 1993). Many researchers have conducted research on risk preference involved testing and assessing individuals' perceptions and susceptibility to environmental and physical risks (Slovic, 1987; Cordell, 2001; Barseghyan et al., 2013), and evaluated through experimental economics methodologies (Bateman and Munro, 2005). Researchers argued that consumers should select choices with the highest expected value outcomes, A consumer's utility function is typically assumed to resemble a constant relative risk aversion utility function (Hanna et al., 2001). Only one study is found on online borrowing (Lin et al., 2013) that exhibited the significant positive correlation between the risk attitude and Internet financing volume through the risk aversion utility function. In this study, we test the first hypothesis

H_1 : Risk attitude is positively associated with P2P borrowing.

Financial Knowledge and P2P Borrowing

Since the 1980s, research on consumer knowledge's impact on consumer behavior has gradually emerged and received extensive attention. Existing research suggests that consumers with less financial knowledge behave quite differently from that of their counterpart. According to the study by Alba and Hutchinson (1987), consumer knowledge consists of two aspects: consumer familiarity and consumer expertise. Consumer familiarity refers to accumulated experiences and feedbacks after consumption, which can be regarded as acquired knowledge. Consumer expertise, recognized as consumers' prior experience, refers to the ability to assess the commodity before the consumption. Bernheim and Garrett (2003) stimulate individuals' savings activities and decision making competencies with people of different levels of financial literacy. Moorman et al. (2004) discovered that in the process of making personal decisions, consumers with more financial literacy differed a lot from those with less financial literacy. Loibl and Hira (2005) found that self-directed financial literacy provided positive impacts on people's financial management practices, such as making spending plans, controlling finances, and saving for goals. Consumer knowledge would influence every link in the consumer decision-making process, and affect consumer attitudes and willingness to buy at the same time, Lee et al.(2011) examined customer attitudes with Internet sites that vary with different information provided, and

found that more information yielded more positive satisfaction. Much previous research shows financial knowledge is correlated with financial behavior (Lusardi and Mitchell, 2014; Allgood and Walstad, 2016; Xiao and O'Neill, 2016). Based on the above discussion, in this study we test the second hypothesis,

H_2 : Consumers' financial knowledge is positively associated with P2P borrowing.

Other Factors Associated with P2P Borrowing

The most commonly used variables are demographic variables that are discussed in the life cycle model proposed by Ando and Modigliani (1963). Demographic variables generally refer to the basic characteristics of a person, including gender, age, marital status, if having children, life cycle stage, etc. The life cycle hypothesis assumes that rational consumers aim to maximize the utility of their whole life. The theory holds that despite of constant changes of personal income, families tend to apply financial instruments to achieve a stable consumption flow in the life cycle and the income consumption ratio is unchanged. Therefore, the life cycle hypothesis is often employed as an important basis to classify household groups. However, there is still a fierce debate among researchers on what is the precise definition of life cycle stage, except for the essential variables—age, marital status and if having children. Lee et al. (2002) found that age is related to the Internet usage, as younger persons are generally more likely to adopt. The effect of gender is barely noticeable in terms of Internet banking in general in the work of Kolodinsky et al. (2004). Previous research (Baek and Hong, 2004; Cohen, Alma, and Liran, 2007; Guiso, Sapienza, and Zingales, 2008) has discussed household borrowing decisions across different life cycles.

Social stratum is an overall measure towards social status of individuals or families based on economic conditions and educational background. Prior research showed that people with above average income and at least some high school education were more likely to raise capital via new payment method than those with below average income and less than high school education (Stavins, 2002). Debt condition is directly affecting families' credit behaviors. Karjaluo et al. (2002) discovered that there existed a strong connection between the debt and the usage of P2P borrowing. Shen (2015) gave some remarks on individual investment and borrowing decisions considering platform regulatory condition, and argued that the middle income household who had some level of debt would be more willing to borrow. These factors discussed above are included as control variables in the data analyses.

Methods

Data

Our survey questions were extracted from the one used in the 'China Survey of Consumer Finance' conducted by the Chinese Financial Center of Tsinghua University in 2011 (Liao, 2011). And the data collected from the student families as a side survey for the third China Household Finance Survey in 2015 (For more details about this panel data set, see Gan et al. , 2012).

The original data set included 1,011 household samples. In order to ensure samples' qualities, we excluded respondents under 18 years old as well as samples with incomplete answers. Finally, 989 valid household samples were used in this study, the survey was designed for household, but the data was collected with the persons who answered the questions.

Variables

The dependent variable is P2P borrowing behavior based on the survey question 'Have you used P2P loans?' where 1 refers to the one who used successfully, 2 refers to apply but not succeed, and 3 refers to not apply. It is known that the dependent variable is a dummy variable, and the normal error cannot directly explain it. We define $y_i = 3$ as the main reference, then we use $\ln \frac{\Pr(y_i = 1)}{\Pr(y_i = 3)}$ as

$\ln(\theta_1)$ and $\ln \frac{\Pr(y_i = 2)}{\Pr(y_i = 3)}$ as $\ln(\theta_2)$ to fit the multinomial logistic regressions.

Another question is designed to investigate consumers' risk attitude quantitatively labeled as *risk aversion*: "assuming that a coin is tossed; you will get 2000 yuan if it comes up heads, but you will get nothing if it comes up tails. Supposing you resell such a profit opportunity, how much would you charge it at least?" Consistent with Guiso et al. (2008), w_i represents initial wealth of respondent i , $u_i(\cdot)$ represents utility function of i and x_i represents the lowest bid of the respondent in the game. Then respondent's utility equation in this game can be expressed as follows:

$$u_i(w_i + x_i) = 0.5u_i(w_i) + 0.5u_i(w_i + 2000) = E[u_i(w_i + x_i + P_i)] \quad (1)$$

where $E(\cdot)$ represents mathematical expectation and P_i represents random income in the game. Using second-order Taylor expands (2) at $w_i + x_i$:

$$u_i(w_i + x_i) \approx u_i(w_i + x_i) + u'_i(w_i + x_i)E[P_i] + 0.5u''_i(w_i + x_i)E[P_i^2] \quad (2)$$

Respondent's absolute risk aversion which we define it as *Ara* that can be expressed as follows after simplification:

$$Ara_i(w_i + x_i) = -\frac{u''_i(w_i + x_i)}{u'_i(w_i + x_i)} = \frac{2E[P_i]}{E[P_i^2]} = \frac{2000 - 2x_i}{2000000 + x_i^2 - 2000x_i} \quad (3)$$

It is a critical and challenging problem to measure financing knowledge via questionnaires. This questionnaire aims to discover consumer knowledge level through two aspects: familiarity and expertise.

With the aspect of consumer familiarity, we designed two questions. First, because Internet financing has the function of short-term financing and may contain knowledge related to financing, one question was 'Have you ever raised enough money?'. Respondents can choose their answers among the following 3 options: 'Yes, raised enough money', 'Only raised some money', 'Did not raise

any money'. We used *fund_lit* to represent this question. In the data analyses, we assigned this variable to 1, 2, 3, respectively, corresponding to the three options.

Second, for the Internet borrowing experience, we designed the question as 'Have you ever used online products?'. Respondents can choose their answers among the following 3 options: 'I have applied for it and I made it', 'I have applied for it but I failed', 'I have never applied for it before'. We use *app_lit* to represent this question, and assign 1,2,3, respectively, corresponding to the three options.

In order to depict consumer expertise, three aspects are considered. First, to focus on consumers' industry background and higher education in finance, we use the variable *industry*. If the respondent or his/her spouse works in finance, we assigned 1, otherwise 0. With regard to higher education in finance related fields, we ask a question: 'Have you or your spouse received higher education in economics or management?' *fin_edu* represents this variable. We assigned 1 to it if the answer is yes, otherwise 0.

Second, for consumers who once applied for Internet loans, we designed three questions from different aspects to evaluate their knowledge level of the Internet financing: 'Do you shop around when selecting P2P platform?', *app_spec* represents this question, while 1 is assigned to it for those respondents whose answers are yes, otherwise 0. 'Do you know that P2P has financing fees and management fees?' and *use_spec* represents question, while 1 is assigned to it for those respondents whose answers are yes, otherwise 0. 'Do you know that there exists default risk on the P2P platform?' and *pen_spec* represents this question, while 1 is assigned to it for those respondents whose answers are yes, otherwise 0.

Following previous research, we used following factors as control variables. *Gender* represents respondent's gender, where 1 refers to male and 0 female; *marriage* represents respondent's marital status, where 0 refers to unmarried status and 1 married status; *age* represents respondent's age. To measure the family social stratum, *education* represents respondent's educational background, where 1 refers to high school or technical secondary school or lower, 2 undergraduate or post-secondary school, and 3 graduate degree; *cash* represents the amount of investment available last year; *income* represents the amount of income in the whole family last year. All the variables are summarized in Table 1.

Results

Descriptive Statistics

The distribution of demographic variables is shown in Table 2, and the distribution of social stratum variables is shown in Table 3. The distribution of *ara* which means the absolute risk aversion in each sample is shown in Figure 1. The original distribution is shown in the right part of Figure 1. We changed the interval so that the cumulative probability of the whole sample distribution in each interval is approximately consistent with the normal distribution. The continuous variable is divided into 5 groups according to their distributions, in which [-1,-0.8] is denoted by risk aversion and assigned 1; (-0.8,-0.2] is denoted by slight risk aversion and assigned 2; (-0.2,0.2] is denoted by risk neutrality and

assigned 3; (0.2,0.6] is denoted by slight risk preference and assigned 4, and (0.6,1] is denoted by risk preference and assigned 5.

We measured consumer financial knowledge from two different perspectives discussed before, the distributions of financial knowledge variables are shown in Table 4. We also find that these variables are highly correlated and their correlation coefficient matrix is shown in Table 5.

Risk Attitude and P2P borrowing

First of all, we examined the relationship between risk attitude and P2P borrowing. We conducted one-way ANOVA, the results show that the average risk preference score of consumers who apply the P2P borrowing is 3.33, while the average score is 2.82 for the consumers who never apply the P2P borrowing (the table is not presented but available upon requests). Consumers who have ever applied Internet financing have higher degrees of risk preference. We also find the positive correlation between the risk attitude and P2P borrowing through the regression equation (4) and the result is shown in Table 6.

$$\log(\theta) = \beta_0 + \beta_1 \text{risk attitude}_i + \varepsilon_i \quad (4)$$

Where θ is the ratio of P2P borrowing successfully, β_1 is the slope of the regression equation, β_0 is the intercept of the regression equation, and ε is the residual term. From Table 6, we find that risk attitude is positively associated with P2P borrowing.

Financing Knowledge and P2P borrowing

Financing knowledge variables are highly correlated in this research, as we can see from the preliminary data analyses. In previous research, when several variables are relevant to financial knowledge, factor analysis is used to reduce the number of variables (Chu et al., 2017). Following this approach, we conducted exploratory factor analysis. The results are shown in Table 7.

From Table 7, we find that the loading scores of two factors exceed 85%, which indicates that 85% of information in the original seven variables can be replaced by merely two factors, as is described in Figure 2. We made a loading chart in order to further study the composition of these two factors, which is shown in Figure 3.

It can be seen from Figure 3 that Factor 1 is mainly composed of variables in connection with the P2P borrowing knowledge, while Factor 2 is mainly composed of variables related to financial background. Therefore, we respectively name them as the familiarity factor (f1) and expertise factor (f2). They were used in the subsequent analysis.

To go one step further, we investigated the relationship between the two factors and P2P borrowing. A regression equation (5) is established. Its results are shown in Table 8.

$$\log(\theta) = \beta_0 + \beta_1 f_1 + \beta_2 f_2 + \varepsilon \quad (5)$$

Where θ is the ratio of P2P borrowing successfully, β_1, β_2 are the slopes of the regression equation, which indicate effects of independent variables on the dependent variable, β_0 is the intercept of the regression equation, and ε is the residual term.

In Table 8, it is apparent that β_1 and β_2 are significantly greater than 0 at the 95% confidence level. Consequently, we reject the null hypothesis and the result suggests that there are positive correlations between the two factors and P2P borrowing. In other words, people with more financing familiarity or financial expertise are more willing to use P2P borrowing.

Risk Attitude, Financing Knowledge, and P2P borrowing

The above analyses indicate that both risk attitude and financing knowledge have correlations with P2P borrowing. Meanwhile, previous research suggests that demographic characteristics, social stratum, and household financial conditions also influence the P2P borrowing behavior.

Therefore, controlling for these conditions, we further examined the relationship between risk attitude, financing knowledge, and P2P borrowing. In this case, the model is built as equation (6) and the results are shown in Table 9.

$$\ln(\theta) = \beta_1 \text{riskatt} + \beta_2 f_1 + \beta_3 f_2 + \beta_4 \text{age} + \beta_5 \text{gender} + \beta_6 \text{marriage} + \beta_7 \text{education} + \beta_8 \text{income} + \beta_9 \text{cash} + \varepsilon \quad (6)$$

Where θ means the ratio of P2P borrowing successfully, $\beta_1, \beta_2, \dots, \beta_9$ are slopes of the regression equation, which indicate effects of independent variables on the dependent variable, β_0 means the intercept of the regression equation, and ε means the residual term.

Among various factors, only risk attitude and financing knowledge are associated with P2P borrowing, while other factors do not show associations at the 95% confidence level. The potential impact of consumers' financing knowledge on the P2P borrowing are consistent with the result in the previous section, which indicates that consumers with more financial knowledge are more likely to use P2P borrowing. However, the potential impact of consumers' risk attitude here is different from that in the previous section. Results in Table 9 show that consumers with risk preference will not use P2P borrowing, and with the increase in risk preference the use of P2P borrowing is going down, which is inconsistent with our hypothesis.

Therefore, we conducted further analyses. We first examined the relationship between risk attitude and financing knowledge, and found that there was a high correlation between them through t-tests. The p values of the means in paired t test were listed in Table 10. The results show that people with different levels of financial knowledge have different risk attitudes at the 95% confidence level. For example, the mean of financing familiarity in risk attitude group 1 is -1.9872, and the mean of financing familiarity in risk attitude group 2 is -1.5782, with t-test of these two means, the p value of the difference is 0.4606 which is not statistically significant.

For further investigations, we explored financial familiarity and financial expertise between risk attitude in Figure 4 and Figure 5. From Figure 4, we find that most consumers with more financial familiarity are more likely to be risk tolerant, in which the mean values of financial familiarity are noticeably different between different risk attitude groups, the group 5 has the highest financial familiarity and the group 1 has the lowest financial familiarity. The findings show that risk attitude has a positive relationship with financial familiarity. The relational patterns of risk attitude and financial expertise are nearly the same which is shown in Figure 5.

Instrumental Variable for Risk Attitude

To address the issue of possible endogeneity, we used the *number of elderly* at home as the instrumental variable for risk attitude. We believe that due to the need of supporting the elderly, consumers' life pressure will increase with the number of elderly, and it will make them more risk averse. We used the instrumental variable to estimate the 2SLS.

The basic model is constructed as equation (7) below:

$$\ln(\theta_i) = \beta_1 riskatt + \beta_2 f_1 + \beta_3 f_2 + \varepsilon \quad (7)$$

Equation (7) is also known as the structural equation, where the dependent variable is the probability of using P2P borrowing, *risk_att* is an endogenous variable. With the correlation test, there can be seen that $Cov(risk_att, num) \neq 0$, $Cov(f_1, num) = 0$ and $Cov(f_2, num) = 0$, the result is shown as Table 11.

The result in Table 11 shows that the number of elderly is a good instrumental variable for risk attitude. Take the instrumental variable into account, we use equation (8) as the first stage equation.

$$\ln(\theta) = \alpha_1 num + \alpha_2 f_1 + \alpha_3 f_2 + \varepsilon \quad (8)$$

With the coefficient estimation of α_1 , α_2 , α_3 , we estimates of y using equation (9).

$$\ln(\tilde{\theta}) = \alpha_1 num + \alpha_2 f_1 + \alpha_3 f_2 \quad (9)$$

Let $y = \log(\theta)$, then let \tilde{y} on behalf of the results estimated by equation (9), we get the model equation (10) as the second stage equation.

$$y = \gamma_1 \tilde{y} + \varepsilon \quad (10)$$

The results of 2SLS and OLS regression, which is estimated by equation (10) and (7), are shown in Table 12. The financing knowledge (f_1 and f_2) variables have significant positive effects on P2P borrowing at the 1% significance level. *Risk_att* that has been replaced by number of elderly in 2SLS has the positive effect of P2P borrowing through the result of 2SLS while it shows a negative effect in the result of OLS. Through the Hausman test, the p value is 1.51% which is less than 5%, then it can be said that there is a systematic difference between the 2SLS and OLS estimation model, and from the discussion above, we know that the bias comes from the endogeneity of these variables, so we can conclude that the 2SLS estimation is more effective than OLS.

The residual of 2SLS is shown in Figure 6, in which we mark the raw data with dots, and underline the data intervals estimated by the model (10) using line segments. In addition to the red data, the residuals of the remaining data are close to zero, and the confidence interval of the residuals contains zero. The red line means that the estimation does not contain zero point, so it can be inferred that these points have some bias in the estimation. But generally speaking, the estimation of the 2SLS model is acceptable.

To sum up, the results show that there is a significant correlation between financing knowledge and risk attitude, and they both have positive associations with P2P borrowing behavior. The results suggest that through 1% increase in financing familiarity, the probability of using P2P borrowing will increase nearly 17.84%, through 1% increase in financing expertise, the probability of using P2P borrowing will increase nearly 26.8%, and if a consumer who is more risk tolerant than others by 1%, she or he will be more likely to use P2P borrowing than others by 6%.

Conclusion

China is a huge potential market for P2P borrowing. P2P borrowing can be more effectively than traditional borrowing which matches the fund gap between supply and demand sides. This study explored factors associated with consumer use of P2P borrowing.

With the survey data, we find that two main factors for P2P borrowing are risk attitude and financing knowledge. Firstly, by quantitatively measuring the consumer risk attitude, we divide respondents into five groups. And then with a logistic regression, we find that consumers with higher risk preference are more willing to use P2P borrowing.

Secondly, we examine consumer financing knowledge level through two aspects: familiarity and expertise. Through the correlation analysis between seven variables, we find that variables are related to each other, which cannot be modeled by linear regression, so that we have conducted factor analyses with these variables, and extracted two main factors. The results show that consumers are more likely to use P2P borrowing when they have more financing knowledge.

The results are interesting by controlling both risk attitudes and financial knowledge at the same model, in which risk attitude has a negative effect on P2P borrowing. Through further exploration, we find that there are correlations between risk attitude and financing knowledge, but with these data we cannot distinguish the causal relationship between the two variables. Using the 2SLS model, we choose the number of elderly as the instrumental variable for risk attitude, and obtain the consistent result that both risk attitude and financing knowledge are positively associated with P2P borrowing.

Based on the findings of this study, if we want to further expand the P2P borrowing market in China, we can use two approaches. One is to identify people who are risk tolerant, and the other is to improve financial knowledge of consumers. Moreover, it can be concluded from this research that currently most consumers are still unfamiliar with P2P borrowing, which greatly restricts the development of P2P borrowing in China. Accordingly, how to enable consumers to have a better

comprehension of P2P borrowing is not only an important way for the development of Internet finance, but also an effective method to expand the credit market and enhance consumer interests in China.

References

- 01leasing. (2014). white paper of China P2P lending service industry. Retrieved from: <http://www.01caijing.com/channel/1006.htm>.
- Alba, J. W., & Hutchinson, J. W. (1987). Dimensions of consumer expertise. *Journal of Consumer Research*, 13(4), 411-454.
- Allgood, S., & Walstad, W. B. (2016). The effects of perceived and actual financial literacy on financial behaviors. *Economic Inquiry*, 54(1), 675–697.
- Ando A., & Modigliani, F. (1963). The life cycle hypothesis of saving: aggregate implications and tests. *American Economic Review*. 53, 55-84.
- Awh R. Y., & Waters D.(1974). A discriminant analysis of Economic, demographic, and attitudinal characteristics of bank charge card holders : A case study. *Journal of Finance*, 29(3), 973-980.
- Baek E., & Hong G. S.(2004). Effects of family life cycle stages on consumer debts. *Journal of Family and Economic*,25, 359-385.
- Barseghyan, Levon, Francesca Molinari, et al. (2013). Are risk preferences stable across contexts? Evidence from insurance data. *The American Economic Review*, 101(2), 591-631.
- Bateman I., & Munro A.(2005). An experiment on risky choice amongst households. *The Economic Journal*, 115, 176-189
- Bernheim B. D., & Garrett D. M. (2003). The effects of financial education in the workplace evidence from a survey of households. *Journal of Public Economics*, 87,1487-1519.
- Chu, Z., Wang, Z., Xiao, J. J., & Zhang, W. (2017). Financial literacy, portfolio choice, and financial well-being. *Social Indicators Research*, 132(2), 799-820.
- Cohen, Alma, & Liran (2007). Estimating risk preferences from deductible choice. *The American Economic Review*, 97(3), 745-788.
- Cordell D. M.(2001). Risk PACK: How to evaluate risk tolerance. *Journal of Financial Planning*, 14, 36-40.
- Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340. Fishbein, Martin, & Ajzen (1975). *Belief, Attitude, Intention and behavior : An introduction to theory and research*. MA: Addison Wesley Publishing Company.
- Gan, L., Yin, Z., Jia, N., et al. (2012). *Data you need to know about China: Research report of China household finance survey*. New York: Springer.
- Ganglmair-Wooliscroft, A., & Wooliscroft, B. (2016). Diffusion of innovation: The case of ethical tourism behavior. *Journal of Business Research*, 69(8), 2711-2720.
- Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services. *Journal of Management Information Systems*, 35(1), 220-265.
- Guiso L., Sapienza P., & Zingales L.(2008).Risk aversion, wealth and background risk. *Journal of the*

- European Economic Association, 6(6), 1109-1150.
- Hanna S. D., Gutter M. S., & Fan J. X.(2001). A measure of risk tolerance based on economic theory. *Financial Counseling and Planning*, 12(2), 53-60.
- Hyysalo, S., Johnson, M., & Juntunen, J. K. (2017). The diffusion of consumer innovation in sustainable energy technologies. *Journal of Cleaner Production*, 162, S70-S82.
- Iresearch. (2017). Research report of the Chinese online borrowing industry. Retrieved from:<http://www.iresearch.com.cn>.
- Jan, A. U., & Contreras, V. (2011). Technology acceptance model for the use of information technology in universities. *Computers in Human Behavior*, 27(2), 845-851.
- Jokar, N. K., Noorhosseini, S. A., Allahyari, M. S., & Damalas, C. A. (2017). Consumers' acceptance of medicinal herbs: An application of the technology acceptance model (TAM). *Journal of Ethnopharmacology*, 207, 203-210.
- Karjaluo H., Mattila M., & Pentto T. (2002). Factors underlying attitude formation towards online banking in Finland. *International Journal of Banking Marketing*, 20(6), 261-272.
- Kolodinsky J. M., Hogarth J. M., & Hilgert M. A. (2004). The adoption of electronic banking technologies by US consumers. *International Journal of Banking Marketing*, 22(4), 238-249.
- Lee E., Lee J., & Schumann D. W. (2002). The influence of communication source and mode on consumer adoption of technological innovations. *Journal of Consumer Affairs*, 36(1), 1-27.
- Lee, H. H., Damhorst, M. L., Campbell, J. R., Loker, S., & Parsons, J. L. (2011). Consumer satisfaction with a mass customized Internet apparel shopping site. *International Journal of Consumer Studies*, 35(3), 316–329.
- Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1), 5-44.
- Irwin C. E. (1993). Adolescence and risk taking: How are they related? In N. J. Bell & R. W. Bell, *Adolescent risk taking*. Newbury Park, CA: Sage.
- Liao, L. (2011). *Report on China consumer finance research*. Beijing: Economic Science Press.
- Lin, M., Prabhala, N. R., & Viswanathan, S. (2013). Judging borrowers by the company they keep: Friendship networks and information asymmetry in online peer-to-peer lending. *Management Science*, 59(1), 17–35.
- Loibl C., & Hira T. K. (2005). Self-directed financial learning and financial satisfaction. *Financial Counseling and Planning*, 16(1),11-21.
- Moorman C., Diehl K., Brinberg D., et al. (2004). Subjective knowledge, search location, and consumer choice. *Consumer Research*, 31, 673-680.
- Okun M. A. (1976). Adult age and cautiousness in decision. *Human Development*, 19, 220-233.
- Park, N., Rhoads, M., Hou, J., & Lee, K. M. (2014). Understanding the acceptance of teleconferencing systems among employees: An extension of the technology acceptance model. *Computers in Human Behavior*, 39, 118-127.

- Rogers, E. M. (2003). Diffusion of innovation. Lap Lambert Academic Publishing, 17(1), 62–64.
- Slovic P., (1987). The perception of risk. *Science*, 236, 280-285.
- Snelbecker G. E., Roszkowski M. J., & Cutler N. E. (1990). Investors' risk tolerance and return aspirations and financial advisors' interpretations: A conceptual model and exploratory data. *The Journal of Behavioral Economics*, 19, 377-393.
- Stavins J. (2002). Effect of consumer characteristics on the use of payment instruments. *New England Economic Review*, 3, 19-31.
- Wang, Q., & Sun, X. (2016). Investigating gameplay intention of the elderly using an Extended Technology Acceptance Model (ETAM). *Technological Forecasting and Social Change*, 107, 59-68.
- Weber E. U., & Milliman R. A. (1997). Perceived risk attitudes: Relating risk perceptions to risky choice. *Management Science*, 43, 123-144.
- Weber E. U., Blais A. R., & Betz N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making*, 15, 263-290.
- Shen, W. (2015). Internet lending in China: Status quo, potential risks and regulatory options. *Computer Law and Security Review*, 31(6), 793-809.
- Xiao, J. J., & O'Neill, B. (2016). Consumer financial education and financial capability. *International Journal of Consumer Studies*, 40(6), 712-721.

Table 1 The Summary Of Independent Variables

Class	Variables	Question	Type
demographic	gender	1A	binary variable
	marriage	1B	discrete variable
	age	1C	continuous variable
	education	1G	discrete variable
	cash	2H	continuous variable
	income	2I	continuous variable
risk attitude	ara	2C&2D	continuous variable
financial literacy	fund_lit	3K	discrete variable
	app_lit	3L	discrete variable
	industry	1F	binary variable
	fin_edu	2G	binary variable
	app_spec	3N	binary variable
	use_spec	3O	binary variable
	pen_spec	3P	binary variable

Table 2 The Distribution Of Demographic Variables

Variables	Class	Frequency	Percentage	Total
gender	Male	474	47.92	989
	Female	515	52.08	
marriage	Unmarried	331	33.47	989
	Married	658	66.52	
Variables	Mean	Standard Deviation	Min	Max
age	35.72	11.09	18	83

Table 3 The Distribution Of Social Stratum Variables

Variables	Class	Frequency	Percentage	Total
education	high school and below	287	29.02	
	undergraduate or college	479	48.43	
	graduate	223	22.55	
Variables	Mean	Standard Deviation	Min	Max
income (thousand yuan)	10.25	57.29	1	201
cash(yuan)	558013.44	119639.26	17	186283

Table 4 The Distribution Of Financing Knowledge Variables (N=989)

Variables	Class	Frequency	Percentage
fund_lit	yes, raised enough money	183	18.50
	only raised some money	239	24.17
	not raise any money	567	57.33
app_lit	I have applied for it and I made it	165	16.68
	I have applied for it but I failed	73	7.38
	I have never applied for it before	751	75.94
industry	not work in finance industry	771	77.96
	work in finance industry	218	22.04
fin_edu	not have high education in finance	641	64.81
	have high education in finance	348	35.19
app_spec	yes	797	80.59
	no	192	19.41
use_spec	yes	905	91.51
	no	84	8.49
pen_spec	yes	623	62.93
	no	366	37.07

Table 5 The Correlation Coefficient Matrix Of Financing Knowledge

R^2	fund_lit	app_lit	ind	fin_edu	app_spec	use_spec	pen_spec
fund_lit	1						
app_lit	-0.202	1					
industry	-0.103	0.991*	1				
fin_edu	-0.051	0.755*	0.276	1			
app_spec	-0.045	0.118	0.064	0.792*	1		
use_spec	-0.291	0.081	0.076	0.414	0.150	1	
pen_spec	-0.302	0.075	0.069	0.652*	0.133	0.502*	1

Note: * indicates that the correlation coefficient is more than 50%

Table 6 The Result Of P2P borrowing With Risk Attitude

Internet financing	Coef.	Std. Err.	P	[Lower Limit	Upper Limit]
risk attitude	0.0868	0.1054	0.0023	0.0762	0.0975
intercept	0.2661	0.1180	0.1144	0.2307	0.3014

Note: * indicates that the p-value is less than 10%, ** indicates that the p-value is less than 5%, *** indicates that the p-value is less than 1%.

Table 7 The Result Of Factor Analysis

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	1.9075	0.6473	0.6725	0.6725
Factor2	1.2603	0.2796	0.1800	0.8525
Factor3	0.9807	0.0220	0.0501	0.9026
Factor4	0.9587	0.2397	0.0470	0.9496
Factor5	0.7190	0.0420	0.0328	0.9824
Factor6	0.6700	0.1803	0.0167	0.9991
Factor7	0.4967	.	0.0009	1

LR test: independent vs. saturated: $\chi^2(21) = 1383.39$ Prob> $\chi^2 = 0.0000$

Factor loadings (pattern matrix) and unique variances			
Variable	Factor1	Factor2	Uniqueness
app_lit	-0.6309	0.1089	0.5901
fund_lit	0.3687	0.2479	0.8026
fin_ind	0.3293	0.6689	0.4442
fin_edu	0.2488	0.7202	0.4194
app_spec	0.3522	0.1310	0.8588
use_spec	0.7374	-0.3040	0.3639
pen_spec	0.7318	-0.3336	0.3532

Table 8 The Regression Of Financing Knowledge Factors

Internet financing	Coef.	Std. Err.	P	[Lower Limit	Upper Limit]
f1	0.1749***	0.2046	0.0006	0.1640	0.1859
f2	0.4398***	0.1152	0.0021	0.3288	0.6108
intercept	11.0885	5.0732	0.1237	6.0795	15.0976

Note: * indicates that the p-value is less than 10%, ** indicates that the p-value is less than 5%, *** indicates that the p-value is less than 1%.

Table 9 The Multinomial Logit Regression Of Risk Attitude, Financing Knowledge
And P2P borrowing

P2P borrowing	Coef.	Std. Err.	P	Coef.	Std. Err.	P
	Apply and get succeed			Apply but not succeed		
riskatt	-0.1853**	0.0850	0.0294	-0.1343**	0.1102	0.0312
f1	1.6482***	0.0958	0.0012	1.5862***	0.1033	0.0078
f2	1.4452***	0.1963	0.0024	1.5212***	0.1427	0.0067
age	0.0117	0.0126	0.3491	0.4237	0.8126	0.2134
male	0.1066	0.2114	0.3142	0.1927	0.3214	0.2749
marriage	-0.3178	0.2352	0.1775	-0.1724	0.1703	0.1276
high school and below	0.1724	0.1703	0.3118	-0.9456*	0.6311	0.0925
undergraduate	0.2683	0.2466	0.1667	-0.7801	0.3218	0.1328
income	-0.0001	0.0018	0.3862	0.4127*	0.8491	0.0872
cash	-0.0015	0.0028	0.3963	0.5621*	0.9822	0.0731
intercept	-4.4127	0.8491	0.3748	-0.1853*	0.0850	0.0847
Observations	189			43		
Adjust R^2	0.3213			0.2542		

Note: * indicates that the p-value is less than 10%, ** indicates that the p-value is less than 5%, *** indicates that the p-value is less than 1%.

Table 10 T Test Of The Two Main Financial Knowledge Factors Between Different Risk Attitude

means of	riskatt=1	riskatt=2	riskatt=3	riskatt=4	riskatt=5
financing familiarity	-1.9872	-1.5782	6.0113	6.0976	7.1248
riskatt=1		0.4606	0.06317*	0.0232**	0.0714*
riskatt=2			0.0812*	0.0071***	0.0415**
riskatt=3				0.1277	0.0808*
riskatt=4					0.0186**
riskatt=5					

means of	riskatt=1	riskatt=2	riskatt=3	riskatt=4	riskatt=5
financing expertise	4.8261	4.9211	5.1624	5.1178	5.3262
riskatt=1		0.1337	0.0988*	0.0748*	0.0674*
riskatt=2			0.2768	0.1487	0.0493**
riskatt=3				0.1911	0.1528
riskatt=4					0.4606
riskatt=5					

Note: * indicates that the p-value is less than 10%, ** indicates that the p-value is less than 5%, *** indicates that the p-value is less than 1%.

Table 11 The Correlation Coefficient Matrix Of Elderly Number

Risk_att	Coef.	P> t	[Lower Limit	Upper Limit]
number	-0.0245***	0.0031	-0.0524	0.1034
intercept	0.2007**	0.0390	0.1335	0.2665

f1	Coef.	P> t	[Lower Limit	Upper Limit]
number	0.1057	0.2331	-0.0282	0.2152
intercept	0.3920**	0.0431	-0.2181	0.7665

f2	Coef.	P> t	[Lower Limit	Upper Limit]
number	-0.0283	0.2314	-0.1614	0.8431
intercept	0.4241	0.3197	0.1925	0.9617

Note: * indicates that the p-value is less than 10%, ** indicates that the p-value is less than 5%, *** indicates that the p-value is less than 1%.

Table 12 The Results Of 2SLS And OLS

Independent variable	2SLS	OLS
	Coefficient (t value)	Coefficient (t value)
num of elderly	0.0631** (2.462)	
risk_attitude		-0.1982** (-1.6372)
financing familiarity	0.1784*** (6.1625)	0.1779*** (5.1272)
financing expertise	0.2680*** (8.6634)	0.2699*** (7.2453)
intercept	-0.4638*** (-6.2576)	-0.4632*** (-11.4862)
Adjust R^2	0.3875	0.3253

Note: * indicates that the p-value is less than 10%, ** indicates that the p-value is less than 5%, *** indicates that the p-value is less than 1%, and T values are in parentheses.

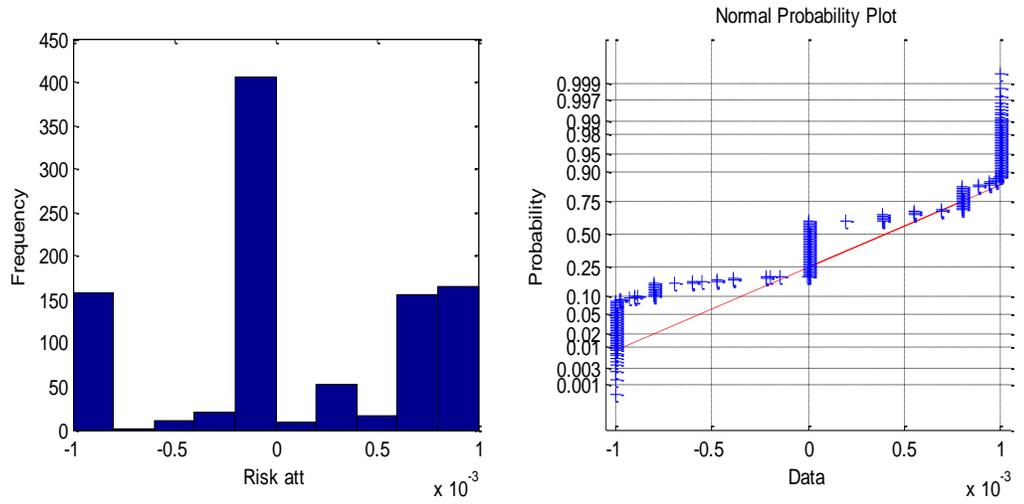


Figure 1 The Distribution Of Risk Attitude

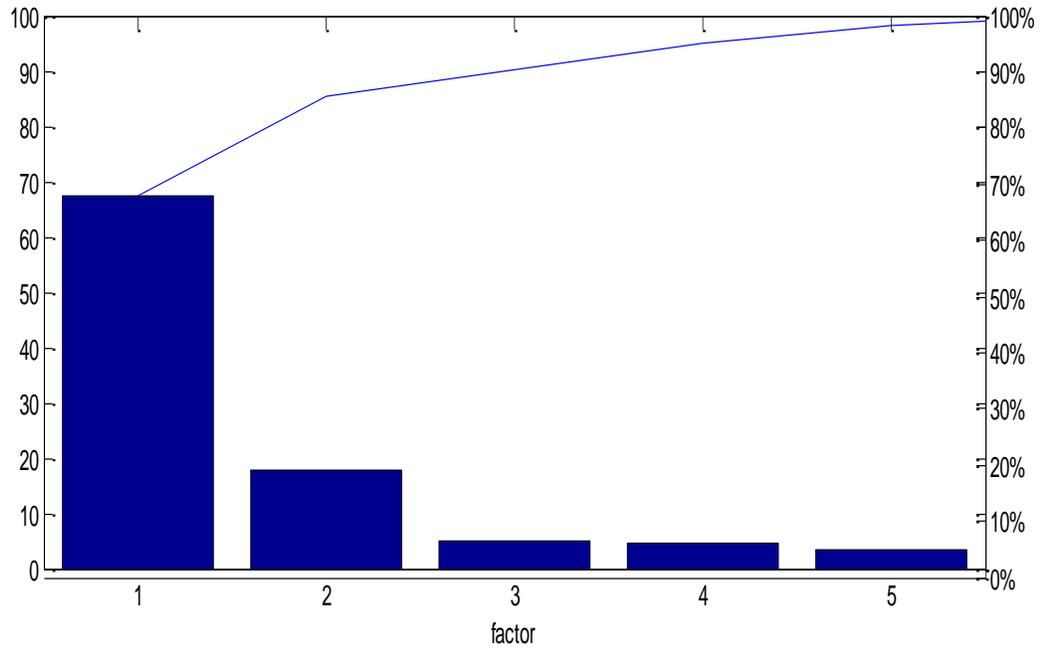


Figure 2 The Loading Of Factors

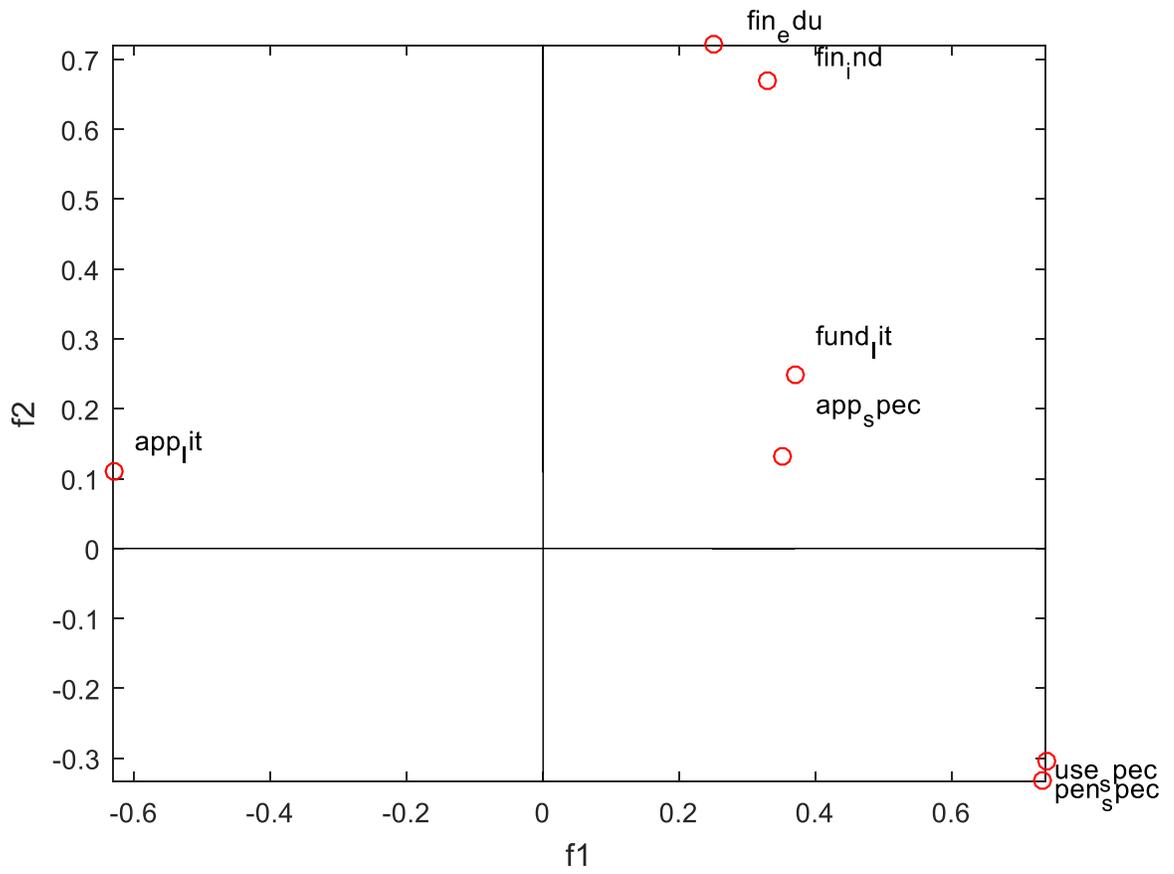


Figure 3 The Composition Of Two Main Factors

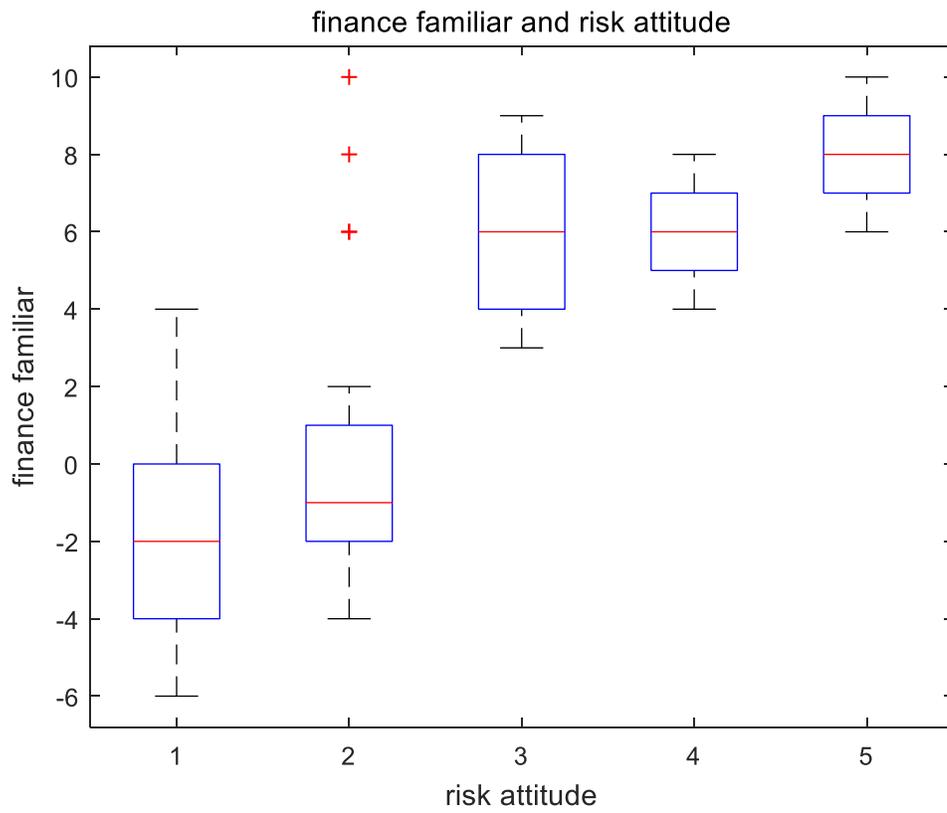


Figure 4 The Risk Attitude by Financing Familiarity

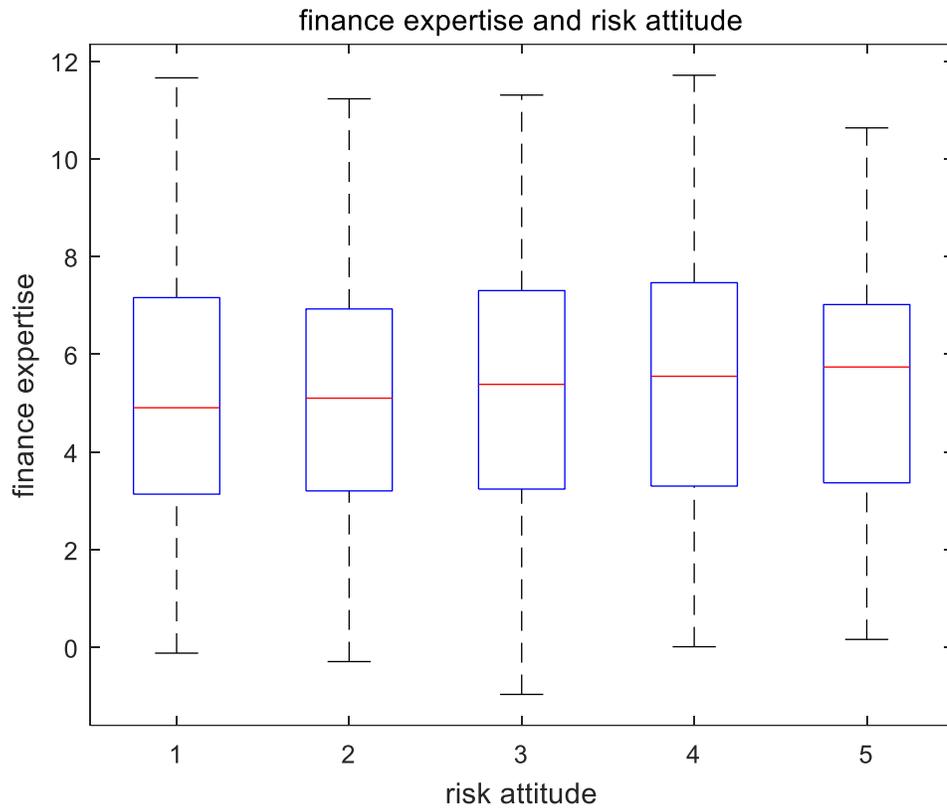


Figure 5 The Risk Attitude by Financing Expertise

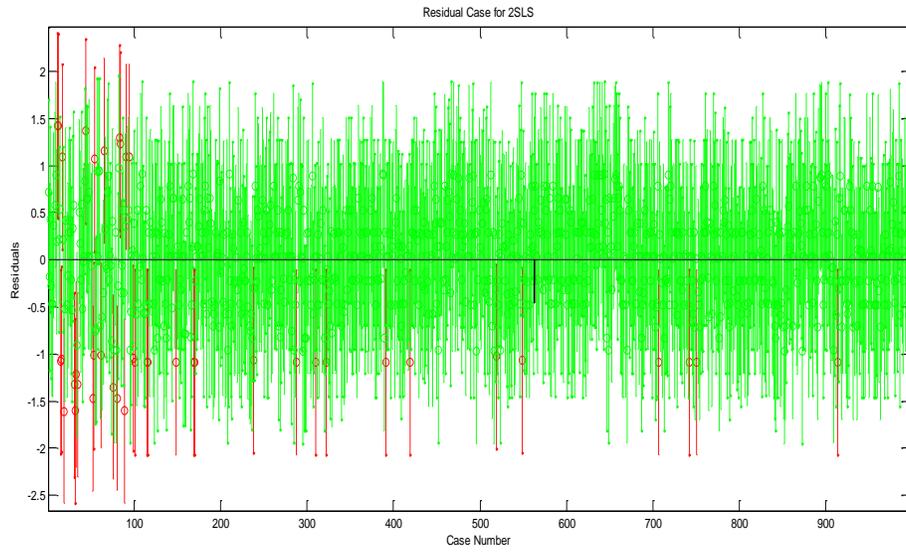


Figure 6 The Residual Of 2SLS