Internet Usage and Household Investment on Risky Financial Assets

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Abstract: Using panel data from the China Family Panel Studies for 2010, 2014 and 2016, this paper uses a two-part model, with the first part using a fixed-effects panel logit model and the second part using a linear logit fixed-effects model to study the impact of Internet usage on Chinese households' participation in risky financial markets and the intensity of investment in risky assets after participation. The results find that Internet usage can promote household participation in the risky finance market and increase household investment in risky assets. Therefore, accelerating Internet usage can promote Chinese households' participation in the risk finance market.

Keywords: Internet usage; Risky financial investment; Two-part model

1 Introduction

The global Internet has developed rapidly since the 1990s and has become an important medium for promoting economic development and social progress in today's world. Although China's Internet development started later than that of the international Internet, it has also developed rapidly since entering the new century. On August 20, 2018, the China Internet Network Information Center (CNNIC) released the 42nd Statistical Report on the Development Status of the Internet in China in Beijing. As of June 30, 2018, the number of Internet users in China reached 802 million, with an Internet penetration rate of 57.7%. Since 2013, the Internet grafted financial model represented by mobile payment, wealth management, balance, P2P, etc. has entered the public's vision, providing more diversified investment options for the general public. Internet finance has become a new financial industry, which has a certain impact and influence on the traditional financial industry.

Markowitz (1952) published a paper entitled "Portfolio Selection", which marked the beginning of modern portfolio theory. Later, based on Markowitz, scholars developed the "two-fund separation theorem" (Tobin, 1958), the capital asset pricing model (CAPM) (Sharpe, 1964), and the inter-period asset pricing model (Samuelson, 1969. (Merton, 1969). These models have investigated how households can reduce risk and thus maximize utility through different portfolios of investment assets under perfect market conditions. Under more stringent assumptions, classical theory suggests that the optimal weight of risky assets held is related only to investors' attitudes toward risk (Sharpe, 1964). As household portfolio survey statistics accumulate, empirical results show that the real-life household financial market participation rate is significantly lower than that predicted by the theoretical model, and that there is "limited participation" in risky asset markets (Guiso and Paiella, 2008). Explaining the phenomenon of "limited participation" is one of the most active topics in household finance (Sara et al., 2018).

The Internet is the most important means of disseminating information in today's society, and not only is it efficient and less costly to transmit information, it has a great impact on the way we process information (Glaser and Klos, 2013). Barber and Odean (2002) found that young, high-income males are more likely to use Internet trading to participate in financial markets and prefer to invest in high-risk, high-growth stocks. And securities firms reduce transaction costs through online trading, thus greatly facilitating

household participation in financial markets (Fujiki et al., 2012). Bogan (2008) directly investigates the impact of Internet use on household financial market participation and finds that households using the Internet are significantly more likely to invest in the stock market than those not using the Internet, and shows that Internet use can reduce transaction costs. At the same time households can be exposed to more finance-related news by using the Internet, thus reducing the cost of information gathering and further increasing household financial market participation (Bonaparte and Kumar, 2013). Glaser and Klos (2013) found an interaction effect between Internet and financial literacy, compared to illiterate people. Literate people have more "absorptive capacity" to process and benefit from all kinds of information on the Internet. Zhou Guangsu and Liang Qi (2018) study the impact of Internet use on household venture capital investment from the perspective of market frictions. The Internet can not only reduce the cost of frictions, but also serve as an information channel that can replace traditional social interactions, thus influencing household financial market participation (Guo and Liang, 2014; Liang and Guo, 2015). And the Internet has the same social multiplier effect as traditional social interactions, and the facilitative effect of Internet use on household financial market participation is more pronounced in areas with high Internet penetration and high participation rates in securities and equity investment (Liu Hong and Ma Wenhan, 2017; Sara et al.,2018).

The above literature shows that there is a paucity of literature on Internet usage and household financial market participation as well as asset portfolio choice in China. This paper explores the impact of Internet usage on household risky financial market participation and risky asset investment intensity using three panels of data from the CFPS in 2010, 2014, and 2016, and innovates in the following ways: first, it explores the impact of Internet usage on household financial market participation and risky asset investment intensity using the latest nationally representative CFPS household microdata participation and the effects of household asset choice. Second, using panel data, the fixed effects of household asset choice decisions are considered. Two separate models are also used to examine household financial market participation and investment depth, respectively, to make the estimates more convincing.

2 Data, models and variables

2.1 Data and modelling

The data used in this paper all come from the China Family Panel Studies(CFPS), a biennial tracking survey funded by the "985" project of Peking University and implemented by the Chinese Center for Social Science Survey (ISSS) of Peking University. The final sample of this paper contains data from 6028 households in three rounds of the survey, after excluding the samples with missing relevant variables.

The first part of this paper adopts a fixed-effects panel logit model, where there is a latent variable y^*, which takes the value of 1 when $y^*>0$ and 0 otherwise. The panel Logit model of fixed effect is:

$$y_{it}^* = \beta_0 + \beta_1 Internet_{it} + \beta_2 X_{it} + \mu_i + \lambda_t + e_{it}$$

$$P(y_{it} = 1) = P(y_{it}^* > 0) = P(\beta_0 + \beta_1 Internet_{it} + \beta_2 X_{it} + \mu_i + \lambda_t + e_{it} > 0)$$

Where y_{it} is the dummy variable of whether household i participates in the risky financial market in year t, equal to 1 means it participates, equal to 0 means it does not participate; $Internet_{it}$ is the dummy variable of household Internet usage that we are mainly concerned with, equal to 1 means it uses the Internet, equal to 0 means it does not use it; X_{it} is the control variable at the household and household head level; μ_i is the individual heterogeneity intercept term that does not change over time; λ_t is the time heterogeneity dummy variable that does not change over time; and e_{it} is the error term.

The second section uses a log-linear fixed effects model to further examine the impact of Internet use on the intensity of venture finance investment, as follows.

If $y_{it}^* > 0$, then $\ln(riskfinance)_{it} = \alpha_0 + \alpha_1 Internet_{it} + \alpha_2 X_{it} + \mu_i + \lambda_t + e_{it}$

In particular, $\ln(riskfinance)_{it}$ represents the logarithm of household i's investment in risk finance in year t; $Internet_{it}$ is a dummy variable for Internet usage; X_it, λ_t, and e_it have the same meaning as in the panel logit model.

2.2 Introduction of variables

In order to study the effect of Internet usage on household risk finance market participation and the depth of investment, the first level of the explained variable in this paper measures whether households participate in the risk finance market and is a binary dummy variable, where 1 indicates participation and 0 indicates non-participation. The second level of the explanatory variable measures the intensity of household risk finance investment, expressed as the logarithm of the amount of risk finance investment, which, as can be seen in Table 1, has increased over the years.

The main explanatory variable of interest in this paper is internet usage. In the 2016 CFPS questionnaire about Internet usage there are two indicators: 1. whether computer access to the Internet. 2. whether mobile access to the Internet. Therefore, in 2016, this paper uses the concatenation of whether or not computer Internet access and mobile Internet access to indicate Internet use as a binary dummy variable, where 1 indicates use of computer Internet access or mobile Internet access and 0 indicates use of neither. Table 1 shows that the proportion of the sample using the Internet in 2010 was 10.2%, in 2014 this proportion was

20.7% and in 2016 this proportion was 31.1%. It can be seen that the proportion of Internet use in the home is increasing year by year.

3 Estimated results

3.1 Internet usage and depth of venture finance market participation and investment

We first explore the impact of Internet usage on household risk financial market participation. Hausmann tests indicate that estimates can be made using FE-logit models as well as FE-OLS models. The estimation results in columns (1)-(3) of Table 2 are the first part of a two-part model that uses a mixed regression model, a panel logit model with random effects, and a panel logit model with fixed effects to estimate the impact of Internet usage on household participation in risky financial markets. Column (3) of which reports the main regression results. We find that the estimated coefficients are significantly positive and consistent with the sign of the coefficients in columns (1) and (2), suggesting that Internet usage significantly increases household participation in risky financial markets. Economy included above, on average, if a household uses the Internet, it is 14.273% more likely that the

Table 1. Descriptive statistics of variables

Variable name	2010			2014			2016		
	Observations	Mean value	Standard deviation	Observations	Mean value	Standard deviation	Observations	Mean value	Standard deviation
Risk finance market participation	6028	0.055	0.228	6028	0.056	0.229	6028	0.060	0.231
ln (venture capital investments)	314	9.901	1.993	325	10.650	1.613	332	11.002	1.564
Internet usage	6028	0.102	0.302	6028	0.207	0.405	6028	0.311	0.463

Table 2. The impact of Internet usage on venture finance market participation and investment depth (two-part model)

Variable name	(1)	(2)	(3)	(4)	(5)	(6)
	Risk finance market participation			Logarithm of venture capital investments		
	logit	RE-logit	FE-logit	OLS	RE-OLS	FE-OLS
Internet usage	1.559*** (0.103)	1.800*** (0.150)	0.614*** (0.179)	0.291* (0.149)	0.293** (0.143)	0.023 (0.235)
Control variables	hold	hold	hold	hold	hold	hold
Vintage	hold	hold	hold	hold	hold	hold
Hausmann test			348.670			25.600
P-value			0.000			0.042
Observed value	18084	18084	18084	971	971	971

Note: *, **, and *** are significant at the 10%, 5%, and 1% levels, respectively, with standard errors for heteroskedasticity in parentheses. Control variables include: age, gender, marital status, health level, education level, place of residence, presence of real estate, household size, total household income, and household social interaction of the head of household. The logit regression results are reported.

household will participate in the risky financial market. The depth of venture capital investment varies for each household participating in the venture capital market, so we then apply a log-linear model to estimate the impact of Internet usage on the amount of household venture capital investment, which is the second part of the two models. The explanatory variables in columns (4), (5) and (6) of Table 2 are all logarithms of venture capital investment, which are estimated using pooled-OLS, RE-OLS and FE-OLS models, respectively. The results show that the estimated coefficients in columns (4)-(5) of Table 2 are significantly positive, indicating that the use of the Internet significantly increases the depth of household risky financial investment. After controlling for effects that do not vary over time at the household level, the coefficient in (6) of Table 2 remains positive, but not significant.

4 Conclusions and recommendations

This paper uses panel data from the CFPS for 2010, 2014, and 2016, and uses a two-part model, the first of which uses a fixed effects panel logit model to eliminate individual and time effects and finds that Internet usage has a significant impact on Chinese household risk finance market participation and can increase Chinese household risk finance market participation by 14.3 percentage points. The second part uses a random effects OLS model to find that Internet use can significantly increase the depth of household risk finance investment after household participation in the risk finance market.

With the development and gradual popularization of 5G technology recently, I believe that the development of the Internet will be further enhanced in the future. Therefore, we should take advantage of the rapid development of Internet technology to speed up the construction and improvement of the financial market mechanism, overcome market friction, so that more families to participate in risk financial investment. Especially for families in rural areas, with the improvement of living standards and income increase, now rural families have the ability and desire to risk financial investment to manage their finances, and with the development of communication technology and the popularization of mobile Internet access for smart phones, the emergence of Internet financial products such as Alipay Balance, Alipay Yulibao, WeChat Wealth Management, etc. greatly for rural families to participate in the risk financial market. provide an opportunity, we should seize this opportunity to gradually improve the financial mechanism to promote more families to participate in risk financial investment.

However, this process will inevitably bring negative impacts, such as online financial fraud, "P2P loans" and so on, so family investors should still be cautious when using the Internet for family asset selection to carry out family risk financial investment, always be alert to the risks to avoid falling into a scam.

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