APPLIED FINANCE LETTERS

VOLUME 13, 2024

IMPACTS OF RISK PREFERENCE AND SOCIAL INSURANCE ON HOUSEHOLD FINANCIAL MARKET PARTICIPATION IN CHINA: ARE THERE DIFFERENCES BETWEEN URBAN AND RURAL RESIDENTS?

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Abstract

This letter examines the impact of risk preference and social insurance on household financial market participation and diversification using the 2017 and 2019 China Household Finance Survey. A multi-value treatment model addresses the selection bias between risk preference and household financial investment, considering the moderation role of social insurance in between. Overall, our results show that high-risk takers are more likely to participate in the financial market and diversify their portfolios than low-risk takers. Focusing on rural and urban differentials, we find marked differences in the impacts of risk preference and social insurance on household financial investment. Having social insurance may widen the difference in investment decisions between high- and low-risk takers in urban areas; the latter group tends not to participate in or diversify when socially insured. In contrast, having social insurance encourages low- and intermediate-risk preferred rural households to participate in the financial market and diversify their financial portfolios. Our work highlights the different consequences of social insurance on investment incentives for rural and urban households. Whilst there are obvious benefits of having social insurance for rural households via risk-sharing, there is an undesired consequence of incentive distortion of urban households.

Keywords: risk preference, financial market participation, diversification, social insurance, multi-value treatment model, rural and urban households

1. Introduction

One basic question raised in household finance research is how households allocate their assets among categories such as bonds, shares, and funds (Campbell, 2006). Many people do not hold stocks (Badarinza et al., 2016; Haliassos and Bertaut, 1995; Mankiw and Zeldes, 1991): there is 24% direct equity market participation in the U.S. and the U.K., 22% in Canada, 27% in the Netherlands and Germany, and 38% in Australia. A body of literature has explored the effect of household preference, risk-based factors, the cost of participation, and peer effects on stock market participation (Gomes et al., 2021). An important household asset class that has received less attention is insurance products. Social insurance as a tool for risk mitigation is commonly known as government-sponsored programs providing benefits and services in response to contingencies such as ageing, sickness, unemployment, maternity, and work injury. Its implementation and consequent

impact vary across countries, influenced by factors like historical development (Esping-Andersen, 1990), economic structure (Barr, 2001), and socio-political contexts (Pierson, 1996).

The accessibility and coverage of social insurance may affect household financial behaviours. Social insurance affects income redistribution because benefits are paid to those who suffered negatively due to the event that triggered the payment of benefits (Chen et al., 2022). With this additional risk-free asset class, we shall see households having social insurance would increase their risk-taking. However, the risk protection benefits come at a cost known as the moral hazard. Moral hazard has been shown to distort the incentives of households, leading to early retirement, low savings, and excessive medical care consumption (Feldstein, 2005). From this perspective, socially insured households may reduce risk-taking.

China, as the largest emerging economy, offers a good context for this study, due to its evolving nature and urban-rural disparity in accessibility to social insurance. The inception of China's contemporary social insurance scheme can be traced back to the 1990s. This period witnessed the gradual evolution of what is now commonly referred to as the "Five Insurances Scheme", including pension insurance, medical insurance, unemployment insurance, work-related injury insurance, and maternity insurance (Gao et al., 2019). Note that these components were introduced at varying points, mainly in the late 1990s. The focus was predominantly on urban residents and those who worked in state-owned enterprises as they occurred in conjunction with urban and state-owned enterprise economic reforms (i.e., pension from government and public institutions). Thus, it only covers 23% of the urban population by 2000 (Gao et al., 2019). Then, the cohesive system began to form in good shape in the early 2000s under the framework targeting all urban residents, namely basic pension insurance for urban employees and social insurance for urban residents. After 2004, the primary objective shifted towards expanding coverage to include rural residents and employees in the private sector (Gao et al., 2019). This expansion was implemented under principles emphasizing socialization, basic coverage, and broad inclusivity (i.e., the new social insurance for rural residents). The coverage of social insurance in rural areas has a significant expansion in the last 15 years: the government has heavily subsidized the rural residents toward contributions, hoping to establish a unified system for urban and rural residents (Gao et al., 2019; Lei et al., 2013; Rickne, 2013). By 2016, basic pension insurance and basic medical insurance extended to nearly 90% of China's population (Gao et al., 2019). Hence, till now, most rural residents are covered by basic pension insurance and basic medical insurance, compared to their urban peers most of whom have access to all “Five” social insurance categories.

Given China’s evolving social insurance development and its urban-rural disparities, a question arises: how do those dynamics influence household financial behaviours? It is unclear whether the effects of risk-based factors on financial market participation differ between urban and rural households and how social insurance could moderate the differences.

This letter is the first attempt to empirically examine how social insurance alters the risk preference on household investment decisions, focusing on rural and urban differentials. We tackle three related issues using the 2017 and 2019 China Household Finance Survey. We first correct the self-selection bias using a multi-valued treatment effect model to estimate financial market participation and diversification. Risk-averse individuals, who are less likely to search for relevant investment information, may choose to participate less than high-risk takers and be incorrectly deemed as undiversified when it is only the risk preference that differs (Weber and Milliman, 1997). An individual’s risk preference does not change in the short term, but it may change with one’s financial risk tolerance which can be improved by one’s achievement in financial success or increased certainty of one’s financial situation (Grable, 2000; Van de Venter et al., 2012). Hence, we further explore how social insurance changes household financial participation and diversification decisions depending on the risk preferences they hold. Last, we conduct a heterogeneity examination to deal with rural and urban differences in financial participation and diversification.

2. Data

Data were sourced from the 2017 and 2019 China Household Finance Survey (CHSF)[1]. The CHFS is a nationwide household survey covering 1360 communities and villages in 29 provinces in China; 9,214 households were excluded because of incomplete information, producing a final sample of 36,153 households.

The outcome variables ($Y_{1,2}$) are financial investment decisions[2]. Y_1 represents households' finance participation, equalling one if a household invested in any risky financial assets such as stocks, bonds, funds, derivatives, financial products, gold, and non-RMB assets, and zero otherwise. Y_2 measures households' financial diversification, taking the value n if the household invested in n risky financial assets.

The treatment is the risk attitude of the household head, based on the survey question: if you have a fund for investment, which investment project would you most like to choose? Respondents are considered high-risk takers when they choose high-risk and high-return projects or projects with slightly high-risk and slightly high-return. Respondents are intermediate-risk takers if they choose projects with average risk and returns. Those selecting the option 'not willing to take any risks' were the low-risk preference group. Tables 1 and 2 provide variable definitions and descriptive statistics. In our sample, 48.2% of respondents invested in one or more risky financial asset classes. Nearly three-quarters of households (74.7%) were in the low-risk preference group, followed by 17.5% in the intermediate-risk preference group, and only 7.7% were in the high-risk group. The average total household income and assets were 78,370 RMB (11,342 USD) and 830,552 RMB (120,196 USD), respectively; 79.5% of household heads had social insurance.

Table 1: Variable Definitions

Variable	Description
Participation	Is a dummy variable to show the financial participation of households. The variable equals 1 if a household has any investment in stocks, funds, financial products, bonds, derivatives, gold (excluding jewellery), and non-RMB assets, other financial assets, or lend-out money, and zero otherwise.
Diversification	This measures the diversification of household financial investments. If households have n financial asset classes, then the value is n. There are the following financial asset classes: stocks, funds, financial products, bonds, derivatives, gold (excluding jewellery), and non-RMB assets, other financial assets, and lend-out money. If households do not participate in any financial investment, then the variable value is zero.
Treatment	Households are divided into three categories according to their risk attitude. A value of 1 represents high-risk preference, 2 represents intermediate-risk preference, and 3 represents low-risk preference.
Total_income	Amount of annual household income. It consists of income from wages and salary, net profit from agricultural and business activities, income from all forms of property, and transfer income.
Total asset	Amount of total household assets. It consists of financial assets and non-financial assets (e.g., a house).
Rural	This is a dummy variable equal to 1 when the household is in a rural area and zero otherwise.
Age	Age of the head of the household in years.
Gender	The gender of the head of the household is equal to 1 if male and zero otherwise.

[1] We have noticed that there are 5 available waves of the survey. However, the key variables, i.e., risk preference, financial participation and diversification, and social insurance are only consistently available in the two waves chosen in the study (2017 and 2019 surveys). Hence, we are not allowed to include more waves due to data availability.

[2] House ownership and social pension insurance participation were not included as financial investments for both participation and diversification measures.

Education	Education level of the head of household. It is a categorical variable: no schooling at all (=1), primary school (=2), junior high (=3), high school (=4), technical secondary school (=5), junior college (=6), bachelor's degree (=7), master's degree (=8), doctorate (=9).
Married	Marital status, which equals 1 if married and zero otherwise.
Social insurance	This is a dummy variable equal to 1 if the household has any of the following social insurances: pension from a government or public institution; basic pension insurance for urban employees; new social insurance for rural residents; social insurance for urban residents; social insurance for urban and rural residents, and zero otherwise. Note that the above social insurance systems may differ due to the different types of insurance included in each system. For example, for most urban insurers, their social insurances cover the "Five Insurances Scheme", including pension insurance, medical insurance, unemployment insurance, work-related injury insurance, and maternity insurance, whilst their rural peers under the framework of "new rural social insurance for rural residents" only get the basic coverage of pension and medical insurance.
Hukou (household registration)	A household registration record that officially identifies a person as a resident of an area. It is a categorical variable with four types: agricultural, non-agricultural, unified hukou, and other. The number of observations in the category "others" is 26, which are excluded from the sample. Three types of hukou are included in this study.
Health	Compared with peers, the condition of the head of household: very good (=1), good (=2), ordinary (=3), bad (=4), and very bad (=5).
Year	This is a dummy variable equal to 1 if the observation is from the 2019 survey and equal to 0 if the observation is from 2017.

Table 2: Descriptive Statistics of the Variables

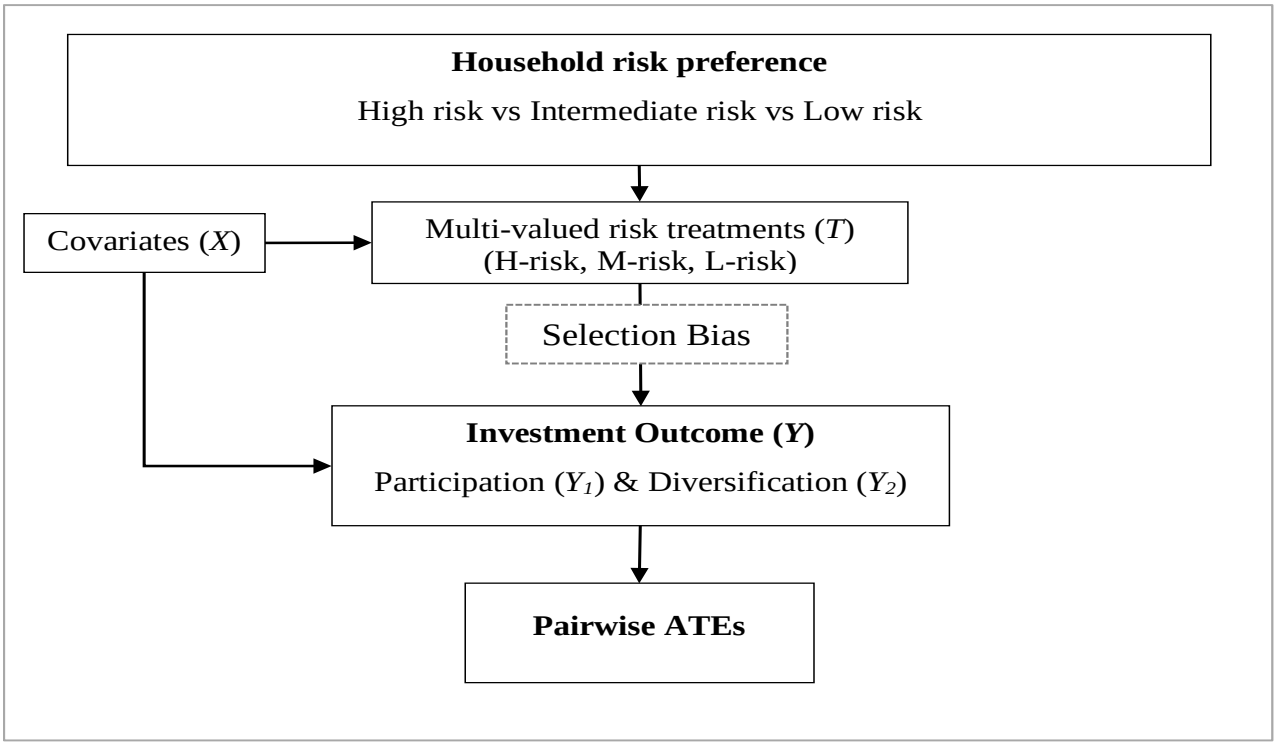
Variable	Mean	Std. Dev.	Minimum	Maximum	Observations
Outcome Y					
Participation	0.482	0.500	0.000	1.000	36,153
Diversification	1.390	0.840	1.000	7.000	19,297
Treatment T					36,153
H-risk treatment	0.077	0.267	0.000	1.000	2,820
M-risk treatment	0.175	0.380	0.000	1.000	6,327
L-risk treatment	0.747	0.435	0.000	1.000	27,007
Covariate X					
total income (1,000 RMB)	78.370	90.786	-990.965	999454.000	36,153
total asset (1,000 RMB)	830.552	1005.143	1.000	4999.110	36,153
rural	0.299	0.458	0.000	1.000	36,153
age	56.690	15.015	21.000	99.000	36,153
gender	0.519	0.500	0.000	1.000	36,153
education	3.566	1.712	1.000	9.000	36,153
married	0.929	0.257	0.000	1.000	36,153
social insurance	0.795	0.404	0.000	1.000	36,153
hukou:					36,153
1. agriculture	0.513	0.500	0.000	1.000	18,559
2. non-agriculture	0.339	0.473	0.000	1.000	12,268
3. unified	0.147	0.354	0.000	1.000	5,326
health	2.640	0.991	1.000	5.000	36,153
year	0.632	0.686	0.000	1.000	36153

3. Methods

3.1 Conceptual Analysis Framework

Individuals' preferences affect investing decisions like stock ownership (Ert and Haruvy (2017)). Note that risk preference is not merely an exogenous trait that individuals are born with; rather, it evolves based on several factors including cognitive ability (Dohmen et al., 2010), household endowment (Guiso & Paiella, 2008), and past macroeconomic experiences (Malmendier & Nagel, 2011). This dynamic nature of risk preference makes it endogenous to the investment decision-making process. Individuals with a low-risk preference might avoid the stock market altogether, not because of the inherent risks of the market, but due to their negative past macroeconomic experiences (Malmendier & Nagel, 2011). This self-selection can bias the observed relationship between risk preference and investment. Hence, different from previous studies (e.g., Yang et al. (2019)) that included it as an exogenous variable, this study addressed the self-selection bias by a multi-valued treatment effects model shown in Figure 1.

Figure 1: Conceptual analysis framework of the study



Here, households were grouped by their risk preference for financial assets: high-risk (H-risk), intermediate-risk (M-risk), and low-risk (L-risk). For i^{th} household $(i = 1, 2, \ldots, n)$, there is an observed vector $F_i = (T_i, X_i, Y_i)'$, where T_i is the treatment status; $Y_i = (Y_{1i}, Y_{2i})$ represents the outcome variables, with Y_{1i} denoting whether, or not, to participate in the financial market and Y_{2i} denoting the number of financial assets invested; and X_i is the vector of observed covariates (e.g., characteristics of household heads) to be used in the treatment-outcome process (Cuong, 2013). Details of differences across risk groups are included in the online Appendix.

3.2 Empirical Specifications

We use a "doubly robust" approach (IPTW) to estimate the pairwise average treatment effect (ATEs) through a weighted linear regression model with the weighting drawn from the multi-valued treatment process (Boonstra et al., 2014; McCaffrey et al., 2013). The ATEs of risk preference on participation are estimated through:

$$\log\left(\frac{\text{Prob}(Y_{1i}=1)}{\text{Prob}(Y_{1i}=0)}\right) = \alpha_i + \delta_1 T_2 + \delta_2 T_3 + X_i\beta + \varepsilon_i, \quad (1)$$

where δ_1 and δ_2 represent the IPTW estimator used to estimate the ATE between the M- and H-risk group and between the L- and H-risk group, respectively; the H-risk group is the baseline. For the diversification model, we assume the number of financial assets, y_i, is drawn from a Poisson population with the parameter λ_i:

$$Prob(Y_2 = y_i|X_i) = \frac{exp(-\lambda_i)\lambda_i^{y_i}}{y_i!}, y_i = 0,1,2,\ldots m. \quad (2)$$

The Poisson regression model estimates the ATEs of risk preference on diversification:

$$ln\,\varpi_i = \alpha_i + \gamma_1 T_2 + \gamma_2 T_3 + X_i\mu + \varepsilon_i, \quad (3)$$

where γ_1 and γ_2 represent the ATE between the M- and H-risk group and between the L- and H-risk group, respectively.

As stated in the conceptual framework, we tend to explore if social insurance could moderate the risk preference effect on household investment decisions. Hence, we add a variable, social insurance, and its interactions with risk treatments T_2 and T_3 to Equation (1) and Equation (3) to test for the moderation role of social insurance on risk preference effect on financial participation and diversification.

4. Results and Discussion

4.1 Results of the risk preference and social insurance on investment participation and diversification

Table 3 reports regression results from Equations (1) and (3). Low-risk households are 0.571 times less likely to invest than high-risk households. This is consistent with studies by Guiso et al. (2008) and Yang et al. (2019). We found no significant differences between High- and intermediate-risk households in the participation tendency. Similar to financial market participation, risk preference affects diversification. Low-risk takers are 0.732 times less likely to diversify a portfolio than high-risk takers, but

the effect is not significant between the high- and intermediate-risk groups. These results indicate that household investment decisions on financial assets differ only between the two extremely different risk preference groups. The high-risk group intends to invest and invest in multiple asset classes to diversify risk. In contrast, the low-risk group prefers low-risk assets, therefore they are less likely to invest in high-risk assets and don't need to diversify.

Table 3: The Effects of Risk Preferences on Financial Market Participation and Diversification

Variable	Model			
	Participation		Diversification	
	Odds Ratio	standard error	IRRs	standard error
(1)	(2)	(3)	(4)	(5)
ATE ($\hat{\delta}_1$)	1.011	-0.028		
ATE ($\hat{\delta}_2$)	0.571***	-0.016		
ATE ($\hat{\gamma}_1$)			0.989	-0.063
ATE ($\hat{\gamma}_2$)			0.732***	-0.027
total income	1.000***	0.000002	1.000***	0.000001
total asset	1.000***	0.000002	1.000***	0.000001
rural	0.541***	-0.011	0.754***	-0.082
age	0.961***	-0.001	0.977***	-0.002
gender	0.993	-0.024	0.976	-0.083
education	1.180***	-0.007	1.092***	-0.010
married	1.967***	-0.004	1.334***	-0.065
hukou (non-agriculture)	1.100***	-0.025	1.240**	-0.091
hukou (unified)	1.152	-0.096	1.198	-0.093
health	0.844***	-0.008	0.901***	-0.028
year	4.665***	0.018	1.896***	0.052
constant	5.381***	-0.073	1.011	-0.238
Observations	36,153		36,153	
Log Likelihood	-34,319.46		-263,357.51	
Akaike Inf. Crit.	3,195.65		462,481.76	

Note: For ease of interpretation, we exponentiated the coefficient estimates of the participation (binary logit regression) and diversification model (Poisson count regression) to derive odds ratio and incidence rate ratio (IRR); *p<0.1; **p<0.05; ***p<0.01.

We further explore how social insurance changes the investment incentives of insured households and present the results in Table 4. We found that having social insurance may lead high-risk households to be 1.103 times more likely to invest than those not having one. The interaction effect affects low-risk households undesirably. Low-risk households with social insurance are less likely to invest (diversify) than high-risk households with a factor of 0.941 (0.785). The results indicate that having social insurance may encourage high-risk households to invest (Yang et al., 2019) but discourage low-risk households from investing or diversifying as they feel adequate financial security is provided by social insurance (Feldstein, 2005).

Table 4: Social insurance Effect on the relationship between Risk preference and Financial Market participation and Diversification

Variable	Model 2			
	Participation		Diversification	
	Odds Ratio	standard error	IRRs	standard error
(1)	(2)	(3)	(4)	(5)
ATE ($\hat{\delta}_1$)	0.991	-0.032		
ATE ($\hat{\delta}_2$)	0.789***	-0.021		
ATE ($\hat{\gamma}_1$)			0.951	-0.146
ATE ($\hat{\gamma}_2$)			0.841**	-0.084
Social insurance	1.103***	-0.019	1.242	-0.106
$\hat{\delta}_1$*Social insurance	1.098	-0.062		
$\hat{\delta}_2$* Social insurance	0.941**	-0.015		
$\hat{\gamma}_1$*Social insurance			1.107	-0.218
$\hat{\gamma}_2$* Social insurance			0.785**	-0.097
Control variables	Yes		Yes	
Observations	36,153		36,153	
Log Likelihood	-42,483.89		-186,472.03	
Akaike Inf. Crit.	68,933.00		429,307.04	

Note: Control variables are the same as in Table 1. For ease of interpretation, we exponentiated the coefficient estimates of the participation (binary logit regression) and diversification model (Poisson count regression) to derive odds ratio and incidence rate ratio (IRR); *p<0.1; **p<0.05; ***p<0.01.

4.2 Heterogeneity examination: rural versus urban households

We observed marked differences in the effect of risk preference and social insurance on financial market participation and diversification of rural (shown in Model (rural)) and urban households (shown in Model (urban)). As shown in Table 5 (columns 2 and 4), low- and intermediate-risk takers are less likely to invest (diversify) than high-risk takers living in rural areas when there is no social insurance in place; Having social insurance moderated their risk preferences: it helps reduce the differences in both participation and diversification between low- and high-risk preferred households and intermediate- and high- risk preferred households, according to the results of interaction effects. It shows that social insurance has a significant impact on ensuring financial security and motivating rural households to invest and diversify their financial portfolios. Social insurance provides benefits to rural households via risk-sharing, thus encouraging their participation in the financial market and diversification of investment (Meng et al., 2015). For urban households, the results in Table 5 (columns 6 and 8) show that risk preferences only affect low- and high-risk preferred groups when households are not socially insured: low-risk preferred households are less likely to invest and diversify than the high-risk group. We find having social insurance may discourage low- and intermediate-risk preferred households from participating in and diversifying, based on the interactions between risk treatment and social insurance.

The results of previous social insurance studies show that the advantages of social insurance policies vary among targeted groups based on, for example, income and demographic variables. The findings of the rural-urban differences in our study are consistent with the findings of Chen et al.

(2022). We further show social insurance could also have unfavourable effects on incentives for insured low-risk urban takers, lowering their incentives to invest.

Table 5. The Effects of Risk Preferences and Social Insurance on Financial Market Participation and Diversification for the Rural and Urban Sample

Variable	Model (Rural)				Model (Urban)			
	Participation		Diversification		Participation		Diversification	
	Odds Ratio	Standard error	IRRs	Standard error	Odds Ratio	Standard error	IRRs	Standard error
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ATE ($\hat{\delta}_1$)	0.896***	0.042			0.978	0.029		
ATE ($\hat{\delta}_2$)	0.839***	0.042			0.773***	0.028		
ATE ($\hat{\gamma}_1$)			0.855***	0.043			0.003	0.023
ATE ($\hat{\gamma}_2$)			0.815***	0.043			0.802***	0.024
Social insurance	0.996	0.034	1.006	0.034	1.181***	0.024	1.202***	0.018
$\hat{\delta}_1$*Social insurance	1.098***	0.048			0.918***	0.033		
$\hat{\delta}_2$* Social insurance	1.099***	0.048			0.840***	0.039		
$\hat{\gamma}_1$*Social insurance			1.067	0.049			0.986***	0.026
$\hat{\gamma}_2$* Social insurance			1.189***	0.049			0.849***	0.030
Control variables	Yes		Yes		Yes		Yes	
Observations	10809				25344			
Log Likelihood	-7788.35		-24003.69		-36693.11		-77800.41	
Akaike Inf. Crit.	30708		48041		73420		155635	

Note: Control variables are the same as in Table 1. For ease of interpretation, we exponentiated the coefficient estimates of the participation (binary logit regression) and diversification model (Poisson count regression) to derive odds ratio and incidence rate ratio (IRR); *p<0.1; **p<0.05; ***p<0.01.

5. Conclusion

This is the first study to investigate the endogenous effect of household risk preference on financial market participation and diversification. We found that high-risk families are more likely to participate in and diversify investments. When a risk-free asset (social insurance) is introduced to a household's portfolio, it has a positive effect on high-risk households but distorts incentives to low-risk households in the urban area, leading to non-participation and under-diversification. In contrast, having social insurance may provide financial security and encourage low-risk takers to participate in the financial market and diversify investment for rural households. Our finding of the incentive role of social insurance on finance investment of rural households highlights the benefits of social insurance policy in the rural area, whilst the unintended consequence of social insurance also calls for more financial literacy education for the general public.

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Appendix

Appendix Table 1: Univariate Analysis by Risk Treatment Groups

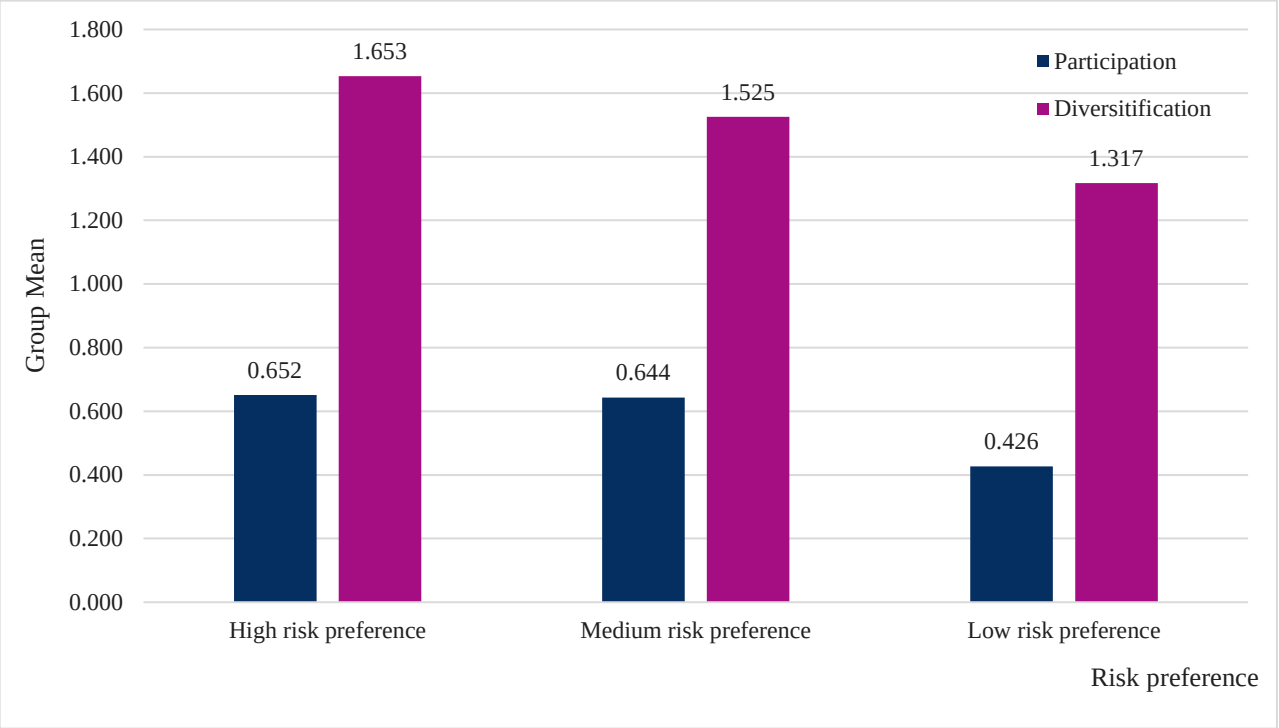
Variable	Mean			Mean difference		
	H-risk group	M-risk group	L-risk group	H vs. M	H vs. L	M vs. L
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Outcome Y						
Participation	0.652	0.644	0.426	0.008	0.225***	0.217***
Diversification	1.653	1.525	1.317	0.128	0.208***	0.336***
Covariate X						
total income (1,000 RMB)	105.740	101.978	69.996	3.762	35.744***	31.982***
total asset (1,000 RMB)	1095.784	1039.543	754.045	56.241**	341.739***	285.498***
rural	0.211	0.213	0.328	-0.002	-0.117***	-0.115***
age	48.060	48.25	59.63	-0.19**	-11.57***	-11.38***
gender	0.628	0.508	0.510	0.1204***	0.118***	-0.003
education	4.478	4.346	3.289	0.132***	1.189***	1.057***
married	0.809	0.846	0.961	-0.037***	-0.151***	-0.114***
social insurance	0.728	0.750	0.813	-0.023	-0.085***	-0.062***
hukou:						
1.agriculture	0.439	0.461	0.533	-0.022*	-0.094***	-0.072***
2.non-agriculture	0.392	0.383	0.323	0.008	0.068***	0.060***
3.unified	0.170	0.157	0.143	0.013	0.027***	0.0136***
health	2.402	2.399	2.722	0.003	-0.32***	-0.323***

Note: ***p < 0.01; **p < 0.05; *p < 0.1 for Welch two sample t-test of mean differences in two treatment groups.

We used a t-test (for continuous variables) and a chi-square test (for dummies) to test the significance of the mean differences between the three treatment groups (see Appendix Table 3). The results

show that differences in the means of most variables are significant between pairwise groups. For the outcome variables, households in high-risk group have the highest proportion of market participation and invest in more types of financial assets, followed by the intermediate-risk group and the low-risk group. Differences in the means of the outcome variables are significant between the high-risk and low-risk group and between the intermediate-risk and low-risk group. No significant mean difference is observed between the high-risk and intermediate-risk group. Regardless of participation or diversification, the mean difference is larger between the high-risk and low-risk groups than between high-risk and intermediate-risk groups (see Appendix Figure 1).

Appendix Figures 1: A Comparison of Group Means of Participation and Diversification across Risk Treatment Groups



As shown in the above figure, for the outcome variables, households in the high-risk group have the highest proportion of market participation and invest in more types of financial assets, followed by the intermediate-risk group and the low-risk group. That is, regardless of participation or diversification, the mean difference is larger between the high-risk and low-risk groups than between high-risk and intermediate-risk groups.