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Household Debt and Risk Tolerance: Evidence from China

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Abstract

This paper examines the relationship between the head of household's risk tolerance and household debt in China for a sample of 49,621 households drawn from the China Household Finance Survey, 2011, 2013, 2015 and 2017. The effect of risk tolerance on both the decision to hold and the amount of total household debt, housing debt and non-housing debt held is analysed. The key findings indicate that risk tolerance is positively associated with household debt and non-housing debt. In addition, differences are found in the effect of risk tolerance on household debt across rural and urban households. For example, there exists a positive relationship between risk tolerance and the probability of holding housing debt for rural households while such a relationship is not found for urban households. In addition, the effect of risk tolerance on household debt is larger for rural households.

JEL Codes: D12, D14, G51

Keywords: China; Household debt; Risk Tolerance

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1. Introduction

Over the last two decades, there has been a significant increase in the level of household debt in China with an increase from around $517.7 billion in 2007 to around $7,200 billion in 2019.[1,2] Moreover, the gross domestic product (GDP) in China was $3,550 billion in 2007 and has increased to $14,280 billion in 2019.[3] This means that the proportion of household debt to GDP in China has increased from 14.58% to 50.42% over this period. In contrast, in the U.S., the level of household debt was around $12,000 billion in 2007 and has increased to $13,544 billion in 2019, i.e. a much lower growth rate of 12.87% over this period.[4] In addition, GDP in the U.S. has increased from $14,452 billion in 2007 to $21,433 billion in 2019, which indicates that the proportion of household debt to GDP has actually decreased from 83.03% to 63.19% over this period.[5] Although the ratio of debt to GDP in the U.S. is still higher than in China, why Chinese households have started to increase debt holding is important to explore. In some developed countries, the level of household debt has actually fallen over the last two decades. For example, the level of household debt in the U.K. reached an all-time high of $3,226.6 billion in 2008 and then decreased to $2,482.5 billion in 2019.[6] Although such figures have led to policy-makers being concerned about financial vulnerability and risk at the household level, i.e. households may become bankrupt when indebted, there remains a shortage of academic research into the determinants of debt at the household level in China.

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[1] Total household debt is defined as all liabilities of households that require payments of interest or principal by households to the creditors at a fixed date in the future. Debt is calculated as the sum of the following liability categories: loans (primarily mortgage loans and consumer credit) and other accounts payable. The definition of total household debt is the same for China, the U.S. and the U.K. Data source: https://www.ceicdata.com/en/indicator/china/household-debt.

[2] Figures for 2019 were used as they pre-date the Covid 19 pandemic.

[3] Data source: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=CN.

[4] Data source: https://www.ceicdata.com/en/indicator/united-states/household-debt.

[5] Data source: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=US.

[6] Data source: https://www.ceicdata.com/en/indicator/united-kingdom/household-debt.

Debt is potentially an issue for Chinese households due to the extreme poverty in the last century and the traditional culture, which may lead to huge mental pressure and strain.[7] In addition, debt itself is likely to lower individuals' happiness in China (Liu et al., 2020). This may be why China has the highest household savings rate in the world from 2010 to 2012 (OECD, 2015). As stated by Brown et al. (2005), a rise in household debt enables households to better smooth consumption and income to accommodate their various needs at different stages in the life cycle, however it may also place economic and psychological pressure on households. In addition, a higher level of household debt may not only affect the resilience of the economy to future shocks but it may also reinforce the existing distribution of wealth, making social and geographic mobility more difficult (Lowe, 2017).

The recent increase in household debt in China noted above may be due to the fact that house prices, living costs and expenditure on children's education have increased significantly over the last decade. However, there are only a small number of empirical studies on household debt in China. For example, Cull et al. (2019) explore the influence of political connections, the social network and household demographic characteristics on formal and informal credit usage using the 2013 China Household Finance Survey (CHFS). The findings suggest that both political connections and social networks are positively associated with formal loans. Thus, the importance of understanding what affects household debt levels is a key area for research.

[7] Thrift is regarded as a traditional virtue promoted by Confucian ideology in China where children are always educated to be thrifty (Hofstede et al., 2005). Such a traditional culture may be one reason why Chinese households prefer savings, which also leads Chinese households to be more debt-averse compared to the west (Wang et al., 2001).

In this paper, the focus lies on one particular determinant of debt holding and accumulation at the household level, namely risk tolerance, which has been empirically identified as an important influence on household debt in the U.S. (Brown et al., 2013). However, the association between risk tolerance and household debt has been largely ignored in the existing literature on China. The reason why risk tolerance has attracted limited attention in empirical studies on Chinese households may result from the lack of available data and the limited number of studies on household debt at the household and individual level for China more generally. Given that debt repayments are usually financed from household income, it is apparent that if there exists uncertainty in household income (due to, for example, redundancy, unemployment, or changes in real wages), then the household head's risk tolerance will potentially influence household debt holding, given the distribution of future income and interest rates (Brown et al., 2013). It appears intuitive to predict that the more risk-tolerant an individual is, the higher is the probability that they will hold debt and the higher is the amount of debt held.

Home ownership is generally financed by mortgage debt, especially as households usually acquire this major asset early in their life cycle. Therefore, when house prices rise, households who own a house may expect that their higher wealth allows for greater lifetime consumption, more borrowing and spending (Turk, 2015). In China, house prices have been experiencing geometric growth over the past decade, which arguably has led to a substantial increase in the level of residential housing mortgage debt from around $410 billion in 2007 to around $3,900 billion in 2018 (The People's Bank of China).[8] Thus, total household debt is split into housing

[8] Data source: https://www.ceicdata.com/en/china/loan-consumer-loan/cn-consumer-loan-residential-housing-mortgage-loan.

debt and non-housing debt in order to ascertain whether the relationship between debt and risk tolerance differs by type of debt.[9]

In addition, households are split by urban and rural region of residence because rural and urban residents differ on a number of characteristics, which may affect the source of their loans. For example, rural households tend to have a larger family size and larger social networks in terms of the number of siblings (Cull et al., 2019). Moreover, the opportunity to access bank loans differs between rural and urban areas because urban households have more access to formal loans (see Turvey et al., 2010). Therefore, a key concern for policy makers in China is rural households' access to and costs of finance.

The findings, which are robust to a range of econometric specifications, support a positive relationship between household debt and risk tolerance. Therefore, this paper contributes to the literature on China by identifying an important determinant of taking on debt, which has surprisingly attracted very little attention in the relatively small yet growing literature on household debt in China.

2. Background

In this section, the relevant literature on the U.S. and other developed countries is briefly discussed and then the focus is on China. Over the last two decades, there has been an extensive number of empirical studies on debt, mainly examining the determinants of holding debt at the household level in developed countries. For example, Han and Li (2011), using the U.S. Survey

[9] Housing debt includes mortgages from banks and loans from friends or relatives for housing-purchasing/housing-renovation and non-housing debt includes agricultural/business debt, vehicle-purchasing debt, education debt, credit card debt and other debt.

of Consumer Finances (SCF), find that bankruptcy filing is negatively associated with the probability of having a credit card loan or first-lien home mortgage. Related issues explored in the household finance literature concern attitudes towards risk. For example, Brown et al. (2013) investigate the association between household debt and attitudes towards risk based on a household-level panel dataset from the U.S. Panel Study of Income Dynamics (PSID). They find that risk tolerance is inversely associated with household unsecured, secured and total debt. In addition, Georgarakos et al. (2014) find that social interaction measured by average peer income is positively associated with the probability of having a collateralized or uncollateralized loan.[10]

Over the last two decades, there has been a significant increase in the proportion of household debt to GDP in China. However, there is a relatively small literature exploring household debt in China as compared to developed countries. Fan et al. (2017) find that the social network is positively associated with the amount of informal borrowing for house-purchase using the second wave (2013) of the CHFS.[11] Cull et al. (2019) analyse the influence of political connections, social network and household demographic characteristics on formal and informal credit use using the 2013 CHFS. The findings indicate that households are more likely to have a bank loan if anyone in the household is a Communist Party member and that the number of siblings is positively associated with the probability of having loans, bank loans, and non-bank loans. Moreover, the household has a higher probability of having loans from banks or other sources if the household lives in a rural area.

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[10] Similarly, Altundere (2014) finds a positive relationship between household social interaction and household mortgage and non-mortgage debt in Europe. More recently, Cloyne et al. (2019) find a positive relationship between house price growth and equity extraction.

[11] Social network is measured by three variables, namely: (i) the number of relatives living in the same city; (ii) a dummy variable, which equals 1 if the household head has a local residence permit; and (iii) social net wealth defined as the log of the level of annual social network income minus the log of the level of annual social network expenditure.

Turning to the borrowing behaviour of rural households, Xiang et al. (2014) examine the influence of non-governmental organizations on formal and informal credit based on a household-level panel dataset collected by the author from 2006 to 2009 with 749 rural households in total. They first asked farmers whether or not they had received loans in each of the past five years from: China Foundation for Poverty Alleviation (CFPA) microfinance, which is a non-governmental organization; formal credit institutions such as the Agricultural Bank of China, the Agricultural Development Bank of China and Rural Credit Cooperatives; and informal networks such as friends and relatives. The findings indicate that the farm's decision to borrow from CFPA microfinance is positively associated with the probability of borrowing from informal networks.

In a similar vein, Cui et al. (2017) investigate the determinants of rural household credit levels based on a cross-sectional household-level dataset with a relatively small sample size, i.e. 489 observations. They find that the age of the household head is positively associated with the probability of borrowing from banks while total household income is inversely associated with the likelihood of borrowing. More recently, Sun et al. (2018) investigate the correlation between social capital and the ability of farm households to access formal and informal loans, using the 2013 CHFS. The findings provide empirical evidence suggesting that friendship is positively associated with the probability of holding a formal loan but inversely associated with informal loan holding for a household headed by a farmer.

To summarise, only a small number of studies on household debt in China exist with limited attention paid to the role of risk tolerance. Furthermore, risk tolerance may potentially influence household debt holding because evidence suggests that there exists uncertainty in

Chinese household income (see, for example, Yu and Zhu, 2013; Chamon et al, 2013).[12] Hence, this paper contributes by furthering understanding of the determinants of household debt in China and focuses on the relationship between a largely ignored determinant, i.e. risk tolerance, and household debt.

3. Data

3.1 Data

The dataset analysed in this paper is from the China Household Finance Survey (CHFS) conducted by the Southwestern University of Finance and Economics in China, which conducts a national survey every two years, starting in 2011.[13] The CHFS collects detailed information on household debt, risk tolerance and demographic characteristics, and has a relatively low non-response rate (for example, 10.9% in 2013). The CHFS employed a stratified three-stage probability proportion to size (PPS) random sample design.[14]

There are three main reasons why the CHFS is used for this study. Firstly, it contains detailed information on household heads' risk tolerance and household indebtedness across urban and rural households. Secondly, in contrast to existing studies for China, the CHFS is a relatively recent dataset and includes almost all provinces of China, and, hence, is representative of the Chinese population. Finally, in contrast to existing studies on household finance in China,

[12] The level of income is controlled for as it is not possible to control for income uncertainty because, although the CHFS provides the opportunity to explore panel data, the CHFS is a relatively short panel and the analysis starts from the first wave. This means that there are no previous time periods to use to construct measures based on past income.

[13] Gan et al. (2014) use the CHFS dataset to report on Chinese household financial development including household demographics, work characteristics, non-financial assets, financial assets, household debt, insurance, social welfare, expenditure, income and wealth.

[14] Taking the first wave as an example, the first stage selected 82 counties (including county-level cities and districts) from 2,585 counties (primary sampling units, or PSUs) from 25 provinces and municipalities in Mainland China. The second stage selected 3 to 4 neighbourhood committees/villages from each of the selected PSUs at the first stage. The third stage selected 20 to 50 households (depending on the level of urbanization and economic development) from each of the neighbourhood committees/villages chosen at the previous stage. Every stage of sampling was carried out using the PPS method and weighted by population size.

this dataset allows panel analysis to allow for time-invariant unobserved heterogeneity across households.

Waves 2011, 2013, 2015 and 2017 are used, which include information on debt and risk tolerance. The number of households increases over these years from 8,438 (2011), 28,141 (2013), 37,289 (2015) to 40,011 (2017). The increase in sample size is because the sampling frame changed over time in order to ensure the national representativeness of the survey.[15]

Initially waves 2011, 2013, 2015 and 2017 are investigated as an unbalanced panel dataset, where the focus is on the households with a head aged over 20, which provide information on the risk tolerance question, with 8.5% of observations being omitted due to this restriction.[16] After allowing for missing values on all covariates, the panel dataset comprises 49,621 households (N) and 91,354 observations (NT). All monetary variables in the 2013, 2015 and 2017 waves are deflated using China's yearly CPI, with the benchmark year 2011 = 100. In addition, the total sample is split into two subsamples according to whether the households reside in rural or urban areas, with the number of observations being 63,378 and 27,976, respectively.

3.2 The Measurement of Household Debt

The focus firstly lies on the relationship between the risk tolerance of the household head and total household debt holding as captured by a binary indicator for holding housing and/or non-housing debt. In addition to exploring total debt holding, the relationship between risk tolerance and the holding of two categories of debt is explored: housing debt, which includes

[15] The first wave in 2011 was distributed in 25 provinces, 82 counties and 320 village committees and residential committees, with a sample size of 8,438 households. The second wave in 2013 covered 29 provinces, 267 counties, and 1,048 village committees and residential committees, with a sample size of 28,141 households. In 2015, the third wave covered 29 provinces, 351 counties, and 1,396 village committees and residential committees, with a sample size of 37,289 households. In 2017, the fourth wave covered 29 provinces, 355 counties, and 1,428 village committees and residential committees, with a sample size of 40,011 households.

[16] The minimum legal age of marriage is 20 in China.

mortgages and any loans from relatives or friends specifically for housing; and non-housing debt, which includes agricultural/business debt, vehicle-purchasing debt, education debt, credit debt and other debt.[17]

Table 1 presents summary statistics for all dependent variables used in the analysis. From Table 1, it can be seen that 28.8% of households hold debt, where 14.7% of households have housing debt and 18.3% of households have non-housing debt, respectively.[18] This indicates a relatively low household debt holding rate in China as compared with the U.S., where 76.6% of households report having household debt in the 2019 U.S. SCF. In the urban sample, the proportions holding any debt, housing debt and non-housing debt are 26.2%, 15.1% and 14.8%, respectively, while in the rural sample, these proportions are 34.6%, 13.8% and 26.2%, respectively. Thus, these statistics suggest that rural households are more likely to hold debt and are more likely to have non-housing debt, while urban households have a higher probability of holding housing debt, which may reflect higher property values in urban areas (Wang et al., 2020).

In addition, the association between risk tolerance and the amount of household debt is explored. The amount of total household debt is defined as the natural logarithm of the amount of total household debt held by the household plus one, which is denoted by *Ln(Total Debt)*. The amount of housing debt is defined as the natural logarithm of the amount of housing debt held by the household plus one, denoted by *Ln(Housing Debt)* and the amount of non-housing

[17] It is not possible to split household debt into formal debt from banks and informal debt from other sources, because information on both formal and informal debt is not available for all debt categories. In addition, the components of non-housing debt are aggregated because less than 3% of households hold a specific category of non-housing debt, e.g., only 2.72% of households hold vehicle-purchasing debt.

[18] About 4.2% of households have both housing debt and non-housing debt.

debt is defined as the natural logarithm of the amount of non-housing debt held by the household plus one, denoted by *Ln(Non-housing Debt)*.

Figure 1 shows the distribution of the log level of total household debt for those heads of household with positive amounts of total household debt, i.e. *Ln(Total Debt)* > 0, with the median level of total household debt being around ¥46,000 (£4,600) for the sample reporting positive total household debt.[19] In a similar vein, Figure 2 shows the distribution of the log level of housing debt for those heads of household with positive amounts of housing debt, with the median level of housing debt being around ¥82,700 (£8,270). Finally, the distribution of the log level of non-housing debt is shown in Figure 3, where the median level of non-housing debt is around ¥19,500 (£1,950).

Finally, among those urban households with positive amounts of total household debt, the median level of total household debt is around ¥73,478 (£7,347), which is considerably larger than that for rural households with the median level being around ¥25,717 (£2,571) for rural households (see, Table A1 in the appendix). Similarly, among those households with positive amounts of housing debt, the median level of housing debt for urban households is around ¥124,773 (£12,477), while for rural households the median level of housing debt is only around ¥28,499 (£2,849), which may reflect higher property values and prices in urban areas. Furthermore, there is only a small difference between urban and rural households regarding the level of non-housing debt. Specifically, the median level of non-housing debt among those urban households with positive amounts of non-housing debt is around ¥26,588 (£2,658) and the

[19] ¥represents the Chinese currency symbol, with unit Yuan/RMB. The Chinese currency is converted into sterling throughout the paper based on the average exchange rate in 2013: 9.6182 CNY/GBP from https://www.exchangerates.org.uk.

median level of non-housing debt among rural households with positive amounts of non-housing debt is ¥17,725 (£1,772).

3.3 The Measurement of Risk Tolerance

Turning to the key explanatory variable, *Risk Tolerance*, the head of household's risk tolerance is based on the question: *'in which project below would you want to invest most if you have adequate money?'* The answers include: (1) a project with high risk and high return; (2) a project with slightly high risk and slightly high return; (3) a project with average risk and average return; (4) a project with slight risk and return; and (5) unwilling to carry any risk. Following Hu et al., (2015), a value of 0 to 4 is assigned to each of the above five options. Specifically, *Risk Tolerance* is a 5-point index ranging from 0 to 4. This index is increasing in risk-tolerance, where 0 denotes a household head who is unwilling to carry any risk; 1 denotes a household head who prefers projects with slight risk and return; 2 denotes a household head who prefers projects with average risk and return; 3 denotes a household head who prefers projects with slightly high risk and slightly high return; and 4 denotes a household head who prefers projects with high risk and high return. Such a measure of *Risk Tolerance* is the same as that in the U.S. SCF, which has been used extensively in the household finance literature (see, for example, Brown et al., 2011).

In addition, the head of household's risk tolerance is measured by including a set of five dummy variables based on the above question rather than an index as a comparison in order to further explore the effect of each specific level of risk tolerance on household debt. Specifically, *No Risk Return* equals 1 if the household head is unwilling to carry any risk; *Low Risk Return* equals 1 if the household head prefers projects with slight risk and return; *Average Risk Return* equals 1 if the household head prefers projects with average risk and return; *Slightly High Risk Return* equals 1 if the household head prefers projects with slightly high risk and

return; and *High Risk Return* equals 1 if the household head prefers projects with high risk and return.

From Table 1, it can be seen that the mean value of *Risk Tolerance* is only 0.939, which indicates a low level of risk tolerance among Chinese heads of household. Furthermore, urban heads of household are, on average, more risk tolerant than rural heads of household because the mean value of *Risk Tolerance* for urban households is 1.009, which is greater than that of rural households, i.e. 0.780. In addition, Table 1 shows that 51.8% of heads of household are unwilling to carry any risk. 18.2% of heads of household prefer projects with low risk and return, 19.6% of heads of household choose projects with average risk and return, and only 4.8% and 5.5% of heads of household prefer projects with slightly high risk and return and high risk and return, respectively. It is not surprising that over half of heads of household are intolerant towards risk, which is in line with the findings in the U.S. (see, for example, Brown et al., 2011).

3.4 The Control Variables

Household controls include household disposable income;[20] total household assets; a proxy for the social network (Fan et al., 2017), which is the natural logarithm of the total amount of expenditure related to giving to non-family members (plus one) including wedding gifts, funeral money, education, medical treatment, and other donations; the number of siblings of the household head and his/her spouse; the number of dependent children aged below 16 in the household; the number of workers in the household excluding the household head and the number of family members aged over 60 in the household excluding the household head (the

[20] The CHFS defines household disposable income as: salary net income after tax; net income from agricultural products after-tax; net income from business after-tax; net income from investment after-tax (rent, stock markets; interest from bank deposits, etc.); and net transfer income after-tax (social security, social insurance, annuity, etc.).

statutory retirement age in China is 60). In addition, the following head of household characteristics are controlled for: health; age; gender; marital status; party membership; the highest education level; and labour market status. For the all households sample, controls are included for whether the household resides in a rural area, as well as region distinguishing between seven regions: *North East*, *North*, *East*, *Central*, *South*, *South West*, *North West* (the omitted category, which has the lowest gross regional product (GRP), i.e., it is the most under developed region in China).[21] The year of interview is controlled for as the data covers four years: 2011 (the omitted category), 2013, 2015 and 2017. Table 1 presents summary statistics for all control variables.

4. Methodology

4.1 The Random Effects Logit Model

In order to explore the determinants of the probability of holding household debt, a random effects Logit model is specified as follows:

$$Pr(Total\ Debt\ Holding_{it} = 1) = \Lambda(\beta_0 + \beta_1 Risk\ Tolerance_{it} + \beta_2 X_{it} + \varepsilon_{it}) \quad (1)$$

$$\varepsilon_{it} = \mu_i + \eta_{it} \quad (2)$$

where the probability of holding any debt for household i at time t is given by *Total Debt Holding*$_{it}$, such that i = 1, 2…, n and t = 2011, 2013, 2015, 2017. $\Lambda(\cdot)$ is the cumulative probability density function of the logistic distribution, β_0 is the intercept, β_1 captures the relationship between the dependent variable, *Total Debt Holding*$_{it}$, and the key explanatory variable, *Risk Tolerance*$_{it}$, and the matrix X_{it} contains the control variables, defined in Section 3.4, generally used in the existing literature on household debt (see, for example, Brown et al., 2013;

[21] The figures for the GRP can be found from the National Bureau of Statistics of China: http://www.stats.gov.cn/tjsj/ndsj/2019/indexeh.htm.

Cui et al., 2017; Sun et al., 2018 and Cull et al., 2019). Following Mundlak (1978), in order to control for household time invariant effects and to enable the estimated parameters to be considered as an approximation to a standard panel fixed effects estimator, a vector of additional controls including the means of the continuous variables, such as the mean of total household disposable annual income, is included.[22] μ_i represents an independent and identically distributed random effect following a normal distribution with mean zero and variance σ_μ^2. η_{it} is a stochastic error term that varies across households and time. η_{it} is assumed to be distributed by the standard logistic distribution. Moreover, μ_i captures household specific unobserved heterogeneity and is uncorrelated with X_{it}. The correlation between the error terms of household i at the time l and k is a constant given by

$$\rho = corr(\varepsilon_{il}, \varepsilon_{ik}) = \frac{\sigma_\mu^2}{(\sigma_\eta^2 + \sigma_\mu^2)} \quad l \neq k \tag{3}$$

where ρ indicates the proportion of the total unexplained variance in the dependent variable contributed by the panel level variance component. The magnitude of ρ captures the extent of the unobserved intra-household correlation over time, where a low value of ρ indicates little unobservable intra-household correlation (Arulampalam, 1999). The analysis is repeated for holding housing debt and for holding non-housing debt.[23]

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[22] This approach is also employed in the random effects Tobit model and the double hurdle model discussed below.

[23] The random effects Logit estimator is employed as the main specification rather than the fixed effects Logit estimator since the latter loses time-invariant information of interest (Bell and Jones, 2015). However, the fixed effects logit model is employed in the robustness section below. In addition, the findings throughout the paper are focused on the marginal effects in order to explore the effect of risk tolerance on household debt in terms of magnitude.

4.2 The Random Effects Tobit Model

In addition to household debt holding, the effect of risk tolerance on the level of household debt held is explored. Thus, as in Brown et al. (2013), in order to explore the determinants of the level of each type of debt at the household level, the level of total household debt, housing debt and non-housing debt are treated as censored outcomes since they cannot have negative values. As the distributions of the three types of debt are highly skewed, following Gropp et al. (1997), logarithmic dependent variables are specified with a value of one added to the household debt variable because some households have no debt.

Generally, the following shows a random effects Tobit estimator for the log level of total household debt, where the same modelling approach is then repeated for the level of housing debt and non-housing debt:

$$Ln(Total\ Debt)_{it} = \beta_0 + \beta_1 Risk\ Tolerance_{it} + \beta_2 X_{it} + \varepsilon_{it} \quad (4)$$

where

$$Ln(Total\ Debt)_{it} = Ln(Total\ Debt)^*_{it} \ \ if\ Ln(Total\ Debt)^*_{it} > 0 \quad (5)$$

$$Ln(Total\ Debt)_{it} = 0 \qquad otherwise \quad (6)$$

$$\varepsilon_{it} = \mu_i + \eta_{it} \quad (7)$$

where the log level of total household debt held by the household is given by *Ln(Total Debt)*$_{it}$, such that i = 1, 2,…, n and t = 2011, 2013, 2015, 2017. β_0 is the intercept, and β_1 and β_2 are the estimated coefficients. The key explanatory variable is *Risk Tolerance*$_{it}$ and the matrix X_{it} includes all other covariates as defined above. ε_{it} is an error term comprising two parts, μ_i and η_{it}, where μ_i represents household specific unobserved heterogeneity (i.e. a random effect) and η_{it} is a stochastic error term that varies across households and time. η_{it} is independent

and identically distributed $N(0, \sigma_\eta^2)$ and μ_i follows a normal distribution, with mean zero and variance σ_μ^2, and is independent of η_{it} and X_{it}. The correlation between the error terms of household i at the time l and k is a constant given by ρ (as discussed above).

5. Results

5.1 Random Effects Logit Analysis

The results from estimating the random effects Logit models are shown in Table 2, where the marginal effects of *Risk Tolerance* and the other covariates are presented for the three outcomes: *Total Debt Holding*, *Housing Debt Holding* and *Non-housing Debt Holding* for the all households sample and then split into the urban and rural samples, respectively.

It can be seen from Table 2 that the marginal effect for *Risk Tolerance* is positive and statistically significant in the case of the probability of holding total household debt for the all households sample, which is in accordance with expectations. In terms of the magnitude of the marginal effect of *Risk Tolerance*, a one-unit increase in the *Risk Tolerance* index is associated with a 1.31% increase in the probability of holding total household debt. In comparison with the effect of the social network, which has been identified as an important determinant of household debt in the context of China (see, e.g., Sun et al., 2018; Cull et al., 2019), an increase of one percent in *Ln(Social Network)* is found to be associated with a 0.27% increase in the probability of holding total household debt. Such a finding suggests that those households with a broader social network have a higher probability of holding total household debt, which is common in China, where households generally prioritize borrowing from relatives or friends when needing a loan. Furthermore, the magnitude of the marginal effect of *Ln(Social Network)* is smaller than that of *Risk Tolerance* suggesting that the household head's risk tolerance is an important determinant of the probability of whether households hold total household debt, which is in line with existing findings for the U.S. from Brown et al. (2013).

Turning to *Housing Debt Holding* and *Non-housing Debt Holding* for the all households sample (see, columns 2 and 3, respectively, in Table 2), it can be seen that the marginal effect for *Risk Tolerance* is not statistically significant in the case of *Housing Debt Holding*, but it is positive and attains statistical significance at the 1% level for *Non-housing Debt Holding*. This might be due to the fact that the purchase of housing can be regarded as an investment or necessity and China's residential property values have steadily risen from 2005 to 2021, which may lower the perceived risk of the investment. Thus, regardless of the risk-tolerance of the household head, households would hold housing debt if they want to purchase a property but cannot afford to buy a house outright.[24] It is important to note that the Chinese Government imposed housing purchase restrictions in 2010, such as raising the down-payment ratio, increasing the mortgage rate and prohibiting mortgages on second home purchases (Cao et al., 2015). Such changes may also affect the riskiness of investment in housing.

Turning to non-housing debt, a one-unit increase in the *Risk Tolerance* index is associated with a 1.61% increase in the probability of holding non-housing debt. This is in accordance with the findings of Brown et al. (2013), i.e. risk tolerance has different effects on different types of household debt. The positive effect found for non-housing debt may reflect the possibility that this type of debt holding is riskier than debt holding undertaken to invest in property. Once again, the effect of the social network is taken as a comparison; the estimated marginal effect of *Ln(Social Network)* on non-housing debt holding is 0.32% (see column 3 in Table 2), which is smaller than that of *Risk Tolerance*. Such a finding is consistent with the results in the

[24] The data relating to residential property in China from 2005 to 2021 can be found at https://fred.stlouisfed.org/series/QCNR628BIS.

case of *Total Debt Holding*, which provides further evidence of the importance of the household head's risk tolerance for the probability of holding total household debt.

For the urban sample, see Table 2, the marginal effect for *Risk Tolerance* is positive and statistically significant in the case of two outcomes: *Total Debt Holding* and *Non-housing Debt Holding*. Specifically, a one-unit increase in the *Risk Tolerance* index is associated with a 1.02% increase in the probability of holding total household debt for urban households. Such a positive effect of risk tolerance on total household debt holding is consistent with the finding for the sample of all households. The household head's risk tolerance does not have a statistically significant impact on the probability of holding housing debt for urban households, which, as discussed above, may reflect the relatively high and rising value of property in urban areas making such purchases regarded as less risky. In contrast, a one-unit increase in the *Risk Tolerance* index is associated with a 1.35% increase in the probability of holding non-housing debt, which accords with the findings for the all households sample.

Turning to the rural households (see Table 2), the results are consistent with the results for the all households sample and the sample of urban households in that *Risk Tolerance* is positively associated with the probability of holding total household debt and non-housing debt. However, the effect of risk tolerance becomes statistically significant in the case of *Housing Debt Holding* in contrast to that of *Housing Debt Holding* in the urban sample. Specifically, a one-unit increase in the household head's risk tolerance is associated with an increase in the probability of holding total household debt, housing debt and non-housing debt of 1.93%, 0.43% and 2.17%, respectively. Such a finding may be because rural households have higher income uncertainty than urban counterparts (Chamon et al., 2013). In accordance with the arguments made above, this arguably means that purchasing housing is relatively risky in rural areas and, hence, whether rural households hold housing debt is influenced by the household

head's risk tolerance. In addition, it is apparent that the magnitude of the marginal effect of *Risk Tolerance* on the probability of holding total household debt is larger for rural households than that for their urban counterparts (see, column 1 in Table 2). This may reflect the fact that urban heads of household have a higher tolerance against the risk associated with debt than rural households. Specifically, the mean value of *Risk Tolerance* for urban households is 1.009 while for rural households it is only 0.780.[25]

In order to explore the effect of specific categories of the household head's risk tolerance, the random effects Logit analysis is repeated by replacing the *Risk Tolerance* index with the set of risk tolerance dummy variables, i.e. *No Risk Return* (the omitted category), *Low Risk Return, Average Risk Return, Slightly High Risk Return* and *High Risk Return*. It can be seen from Table A2 in the appendix that, for the all households sample, the marginal effects of the risk tolerance dummy variables are all positive and statistically significant in the case of *Total Debt Holding*. Specifically, the marginal effects of *Low Risk Return*, *Average Risk Return*, *Slightly High Risk Return* and *High Risk Return* are 0.0162, 0.0264, 0.0455 and 0.0501, respectively, which show a monotonic increase in the effect on the probability of holding total household debt, as the head of household becomes more risk tolerant. A similar monotonically increasing effect of the risk tolerance dummy variables in terms of magnitude on the probability of holding non-housing debt is found. However, turning to the probability of holding housing debt, only *Low Risk Return* and *Slightly High Risk Return* attain statistical significance and only at the 10% level, which provides further evidence, as discussed above, that the probability of holding housing debt may not be determined by the household head's risk tolerance. Such a finding is even more apparent for urban households, where the household head's risk tolerance

[25] The longitudinal aspect of the data is important in terms of the modelling as ρ is relatively large and statistically significant at the 5% level across all samples.

does not have any impact on the probability of holding housing debt. For rural households, the risk tolerance dummy variables are positively associated with the probability of holding total household debt and non-housing debt.[26]

5.2 Random Effects Tobit Analysis

For brevity, given the focus of the paper, the only estimated effects of *Risk Tolerance* on the log level of total household debt, the log level of housing debt and the log level of non-housing debt (see Table 3) are presented. The same controls are included as in the Logit analysis and the pattern of the results remains the same. For risk tolerance, the marginal effects are presented at the extensive and intensive margins.[27] The marginal effect of *Risk Tolerance* at the extensive margin is statistically significant and positively associated with *Ln(Total Debt)* and *Ln(Non-housing Debt)*. Specifically, for the all households sample, a one-unit increase in the household head's risk tolerance is associated with a 1.23% increase and a 1.58% increase in the probability of holding total household debt and non-housing debt, respectively, which accords with the findings from the random effects Logit specification in terms of the magnitude of the marginal effect of the household head's risk tolerance on the probability of holding total household debt and non-housing debt. For urban households, a similar pattern of results is found in that the household head's risk tolerance is positively associated with the probability of holding total household debt and non-housing debt. In addition, *Risk Tolerance* is positively associated with the probability of holding total household debt, housing debt, and non-housing debt for those households living in rural areas.

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[26] Given the focus on risk tolerance and because the results are generally in line with the existing literature, for brevity, the other covariates are not commented on.

[27] A marginal effect at the intensive margin relates to the portion of the variation of the explanatory variable that is correlated with the variation of the expected value of the dependent variable conditional on being non-zero, while the marginal effect at the extensive margin relates to the change in the probability that the dependent variable is greater than zero.

Turning to the marginal effects of *Risk Tolerance* at the intensive margin for the all households sample, it can be seen from Table 3 that a one-unit increase in the household head's risk tolerance is associated with a 12.93% increase in the log level of total household debt. In addition, *Risk Tolerance* is positively associated with the log level of non-housing debt among those with a non-zero log level of non-housing debt. Similar patterns of findings are found for the urban sample, while for the rural sample different findings are once again found in that the marginal effect of *Risk Tolerance* at the intensive margin is statistically significant and positive in the case of all three outcomes (see Table 3). Furthermore, risk tolerance is found to play a more important role in determining the log level of non-housing debt than the log level of housing debt since the magnitude of the marginal effect at the intensive margin stemming from *Risk Tolerance* is 0.2024 in the case of *Ln(Non-housing Debt)*, which is higher than that in the case of *Ln(Housing Debt)*. This may be due to the different motivations behind holding household housing debt and non-housing debt because housing debt differs from non-housing debt. Specifically, a house is not only a place for people to live but it is also regarded as the foundation of a household in China, thus the decision to hold housing debt has greater priority relative to other types of debt for a Chinese household.[28]

[28] Turning to the set of dummy variables capturing different categories of risk tolerance, the marginal effects of *Low Risk Return*, *Average Risk Return*, *Slightly High Risk Return* and *High Risk Return* at the extensive and intensive margins for the all households sample, urban sample and rural sample are presented in Table A3 in the appendix. A monotonically increasing effect of the risk tolerance dummy variables in terms of magnitude on the probability of holding non-housing debt and the amount of household debt held is found. For the urban and rural households, the results are similar to those for the all households sample.

6. Robustness Analysis

6.1 Fixed Effects Logit Analysis

In order to explore the robustness of the results to controlling for unobserved heterogeneity across households, a fixed effects Logit model is specified, which only includes those households who changed debt holding states over two years, three years or four years, to model the probability of holding total household debt as follows:

$$Pr(Total\ Debt\ Holding_{it} = 1) = \Lambda(\beta_0 + \beta_1 Risk\ Tolerance_{it} + \beta_2 X_{it} + \mu_i + \varepsilon_{it}) \qquad (8)$$

$\Lambda(\cdot)$ is the cumulative probability density function of the logistic distribution, β_0 is the intercept, β_1 captures the relationship between the dependent variable and the key explanatory variable. μ_i represents a household-specific unobserved fixed effect. ε_{it} is an idiosyncratic error term that varies across households and time. ε_{it} is assumed to be distributed by the standard logistic distribution. As above, the analysis is repeated for housing debt and non-housing debt holding.

The results are summarised in Table 4, where, for brevity, only the effects of *Risk Tolerance* are presented. It is apparent that the effects of *Risk Tolerance* are statistically significant and positive in the case of *Ln(Total Debt)* and *Ln(Non-housing Debt)* for both the all households sample and the rural sample, which is in accordance with the findings from the random effects Logit specifications. For example, for the all households sample, a one-unit increase in the household head's risk tolerance is associated with a 0.79% increase and a 0.46% increase in the probability of holding total household debt and the probability of holding non-housing debt, respectively. In contrast, the estimated effect of *Risk Tolerance* on the probability of holding housing debt is statistically insignificant across all three samples, which may reflect the fact that the fixed effects Logit estimator excludes those households who maintain states over

time in order to control for unobserved heterogeneity. Housing debt status is likely to be invariant over time for many households as this type of debt is frequently held over relatively long time periods. Thus, there are different sample sizes than that in the random effects Logit specifications. Nevertheless, the results of the fixed effects Logit estimation provide further evidence of the importance of risk tolerance for household total debt and this approach has the added benefit of having controlled for unobserved time invariant characteristics.[29]

6.2 Double Hurdle Analysis

Finally, the robustness of the findings to specifying a double hurdle model is explored. Specifically, households hold a positive amount of debt under the precondition that they first decide to hold debt. In addition, holding zero debt may arise due to two reasons. Firstly, they are not willing to hold any household debt; or, secondly, they decide to hold debt but they currently have a zero amount, which means that zero values of household debt can be observed instead of censored. That is to say, observations where household debt is equal to zero are not the result of being unable to observe the distribution below zero. The double hurdle model is specified as follows:

$$Ln(Total\ Debt)_{it} = s_{it} h^*_{it} \tag{9}$$

$$s_{it} = \begin{cases} 1 & if\ \gamma_0 + \gamma_1 Risk\ Tolerance_{it} + \gamma_2\ Financial\ Illiteracy_{it} + \gamma_3 X_{it} + \omega_{it} > 0 \\ 0 & otherwise \end{cases} \tag{10}$$

[29] Repeating the fixed effects Logit analysis for the set of risk tolerance dummy variables, the marginal effects of the risk tolerance dummy variables are presented in Table A4 in the appendix. Some different patterns of results are found as compared to the fixed effects Logit specifications for the *Risk Tolerance* index. For example, only *High Risk Return* attains statistical significance at the 5% level in the case of *Total Debt Holding.* Nevertheless, these results do provide evidence that is consistent with the findings from the fixed effects Logit estimation with the *Risk Tolerance* index.

where s_{it} is the probability of holding total household debt, which equals 1 if the dependent variable *Ln(Total Debt)*$_{it}$ is not bounded and 0 otherwise. γ_0 is the intercept and γ_1 is the estimated coefficient of independent variable of interest, *Risk Tolerance*$_{it}$.[30] A dummy variable, *Financial Illiteracy*$_{it}$, is used to identify the model, which is defined as below. γ_3 captures the relationship between the covariates and the probability of holding total household debt. ω_{it} is a standard normal error term.

$$h_{it}^{*} = \alpha_0 + \alpha_1 Risk\ Tolerance_{it} + \alpha_2 X_{it} + \nu_{it} \quad (11)$$

where h_{it}^{*} is the continuous latent variable, which can be observed only if s_{it} = 1. α_0 is the intercept, α_1 and α_2 are the estimated coefficients. ν_{it} is an error term and has a truncated normal distribution and is uncorrelated with ω_{it}.

In order to identify the model, *Financial Illiteracy* is included in order to model the probability of holding debt but not the amount of debt held. Conceptually, it is argued that, from the demand-side, a financially illiterate household head may borrow because they might not understand the risk associated with taking on debt (Gathergood, 2012). In other words, those households who do not have any financial knowledge may have a higher probability of holding debt. However, from the supply-side, the amount of debt borrowed from banks or friends is not based on whether the household head has any financial knowledge but on affordability in terms of the ability of the household head to repay the debt or, in the case of informal debt, how close the relationship between the household head and the lender is. *Financial Illiteracy* is defined as a dummy variable, which equals 1 if the household head does not have any financial

[30] The double hurdle estimator used here is based on a pooled sample, which may suffer from bias due to individual heterogeneity. Hence, the results in this section should be regarded as a robustness check. The sample is treated as pooled because otherwise a significant number of observations would be omitted in panel analysis of the double hurdle model where if an individual passes the first hurdle, his or her outcomes would need to be positive in every period.

knowledge, i.e. the household head answered all three of the following financial literacy questions incorrectly: (1) given a 4% interest rate, how much would you have in total after 1 year if you have 100 RMB deposited? Answers include: "under 104", "104", "over 104" and "cannot figure out"; (2) with an interest rate of 5% and an inflation rate of 3%, the products you buy with the money you have saved in the bank for one year is: "more than last year", "the same as the last year", "less than last year" and "cannot figure out"; and (3) which one do you think is more risky, stocks or funds? Answers include: "stocks", "funds", "don't know stocks", "don't know funds" and "don't know both".[31] These three questions are similar to those devised by Lusardi and Mitchell (2008). It can be seen from Table 1 that nearly 50% of heads of household do not have any financial knowledge and a lack of financial literacy is more common in rural areas where about 65% of rural heads of household are financially illiterate while the mean value of *Financial Illiteracy* for urban households is only 38.6%.

In the selection equation (see Table 5), the estimated marginal effect of *Financial Illiteracy* is positive and statistically significant in the case of all three outcomes for the all households sample, which is in accordance with expectations. Households have a higher probability of holding total household debt, housing debt and non-housing debt if the household heads do not have any financial knowledge. It may be the case that the risk behind taking on debt may be ignored or misunderstood by financially illiterate households.[32] The exclusion restriction that *Financial Illiteracy* is statistically insignificant in the amount of debt specifications for those

[31] Although there is no information on financial literacy in 2011, the values of financial illiteracy based on the information from the wave 2013 are used.

[32] If *Financial Illiteracy* is included in the models discussed in the previous sections, the pattern of the findings remains unchanged.

households with a positive amount of debt is tested, and the findings support the validity of the exclusion restriction in a statistical sense (see Table 5).

For the all households sample, conditional on holding debt, a one-unit increase in the household head's risk tolerance is associated with a 16.50% increase, a 2.22% increase and a 17.76% increase in the log level of total household debt, the log level of housing debt and the log level of non-housing debt, respectively. This accords with the findings from the random effects Tobit specification. Such findings provide further support that the risk tolerance of the household head is positively associated with the amount of total household debt. Similar patterns of findings are revealed for the rural sample, where *Financial Illiteracy* is found to be positively associated with the probability of holding total household debt and housing debt, and *Risk Tolerance* is positively associated with the log level of total household debt, the log level of housing debt and the log level of non-housing debt (see Table 5). For urban households, the marginal effect of *Risk Tolerance* is positively associated with the log level of total household debt and the log level of non-housing debt, which accords with the findings from the random effects Tobit specifications. Moreover, *Financial Illiteracy* is statistically significant in the case of *Ln(Total Debt)* and *Ln(Housing Debt)*. Overall, the findings from the double hurdle specifications provide further evidence that the household head's risk tolerance plays an important role in determining the amount of total household debt, housing debt and non-housing debt held by the households.[33]

[33] The double hurdle analysis is also conducted with the set of risk tolerance dummy variables and the marginal effects of the risk tolerance dummy variables and *Financial Illiteracy* are presented in Table A5 in the appendix. It is apparent that the marginal effects of the risk tolerance dummy variables are all statistically significant and positive in the case of *Ln(Total Debt)* and *Ln(Non-housing Debt)* for all three samples. This accords with the findings from the double hurdle analysis for the *Risk Tolerance* index.

7. Conclusion

This paper has investigated the association between household debt and risk tolerance using household-level data from the CHFS (2011, 2013, 2015, 2017). In addition, whether the effect of risk tolerance on household debt varies across urban and rural households has been explored. Household debt is captured by holding total household debt as well as the amount of total household debt held. In addition, total household debt was split into housing debt and non-housing debt.

The findings suggest that the household head's tolerance of risk is positively associated with the probability of holding total household debt, housing debt and non-housing debt. Similarly, *Risk Tolerance* also plays an important role in determining total household debt and non-housing debt holding for the urban and rural samples. The evidence also indicates that the more risk tolerant is the household head the greater is the amount of total household debt and non-housing debt. These findings are robust to employing a variety of estimators.

Additionally, the role of risk tolerance has been found to differ across urban and rural households. Specifically, there exists a positive relationship between risk tolerance and the probability of holding housing debt for rural households while such a relationship is not found for urban households, which may reflect the relatively high house prices in urban areas. Policy interventions might be targeted on the effects of high house prices in urban areas such as: the increase in the minimum down payment ratio; the cap on the loan-to-value ratio; higher mortgage rates for second homes; and restrictions on house-purchasing in the first-tier cities where only those with local *hukou* (household registration) or those who have worked in this city for certain consecutive years, are eligible to purchase one or two houses.

Finally, it is apparent that households characterized by high levels of risk tolerance might be more tolerant of shocks in their financial circumstances and consumption. Hence, the finding that they are more likely to hold debt and are more inclined to accumulate debt accords with intuition. In contrast, those households, who are less tolerant to risk, are found to have a lower probability of holding debt and are less inclined to accumulate debt. Such findings suggest that the observed debt holding and accumulation partially reflect risk tolerance. If policymakers are concerned about levels of debt, one might argue that it would be hard to influence an individual's risk tolerance and it might be the case that policy interventions in other areas such as improving financial literacy might be promising. This accords with the double-hurdle analysis where financially illiterate heads of household are more likely to hold debt. This might help households understand the potential risks associated with taking on debt and this might be especially important in the case of the risks associated with non-housing debt because, as discussed above, non-housing debt is arguably riskier than housing debt. In addition, further work to enhance understanding of the determinants of risk attitudes is important because it has been found to have an influence on debt holding decisions.

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Figure 1:

Distribution of the log level of total household debt in 2011, 2013, 2015 and 2017 (panel), *Ln(Total Debt) > 0*

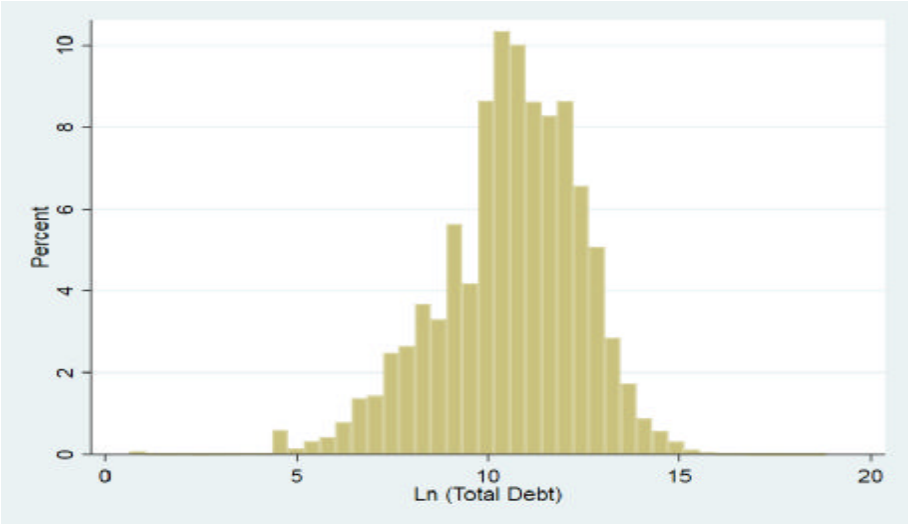

Figure 2:

Distribution of the log level of housing debt in 2011, 2013, 2015 and 2017 (panel), *Ln(Housing Debt)* > 0

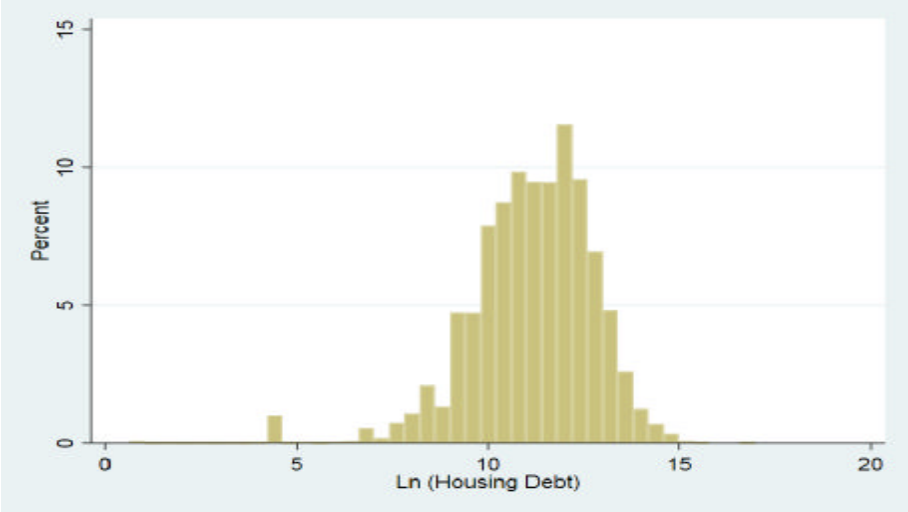

Figure 3:

Distribution of the log level of housing debt in 2011, 2013, 2015 and 2017 (panel), *Ln(Non-housing Debt)* > 0

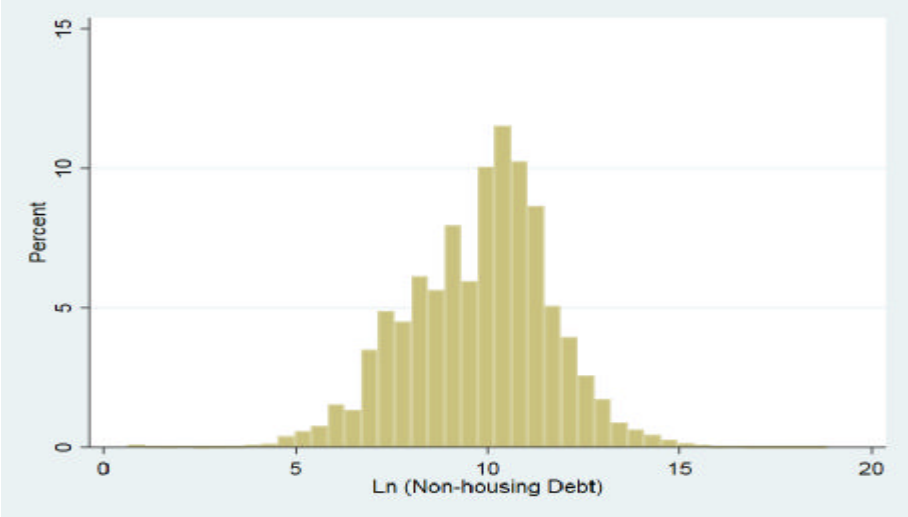

Table 1: Summary Statistics - All Variables; Panel (t = 2011, 2013, 2015 and 2017)

	All Households				Urban Sample				Rural Sample			
	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max	Mean	S. D.	Min	Max
Total Debt Holding	0.288	0.453	0	1	0.262	0.440	0	1	0.346	0.476	0	1
Housing Debt Holding	0.147	0.354	0	1	0.151	0.358	0	1	0.138	0.345	0	1
Non housing Debt Holding	0.183	0.386	0	1	0.148	0.355	0	1	0.262	0.440	0	1
Ln(Total Debt)	3.039	4.887	0	18.840	2.865	4.906	0	18.840	3.434	4.822	0	16.276
Ln(Housing Debt)	1.640	3.997	0	16.983	1.743	4.170	0	16.983	1.407	3.565	0	15.011
Ln(Non housing Debt)	1.787	3.864	0	18.840	1.472	3.618	0	18.840	2.501	4.285	0	16.256
Risk Tolerance	0.939	1.182	0	4	1.009	1.190	0	4	0.780	1.148	0	4
No Risk Return	0.518	0.500	0	1	0.483	0.500	0	1	0.598	0.490	0	1
Low Risk Return	0.182	0.386	0	1	0.191	0.393	0	1	0.162	0.368	0	1
Average Risk Return	0.196	0.397	0	1	0.213	0.410	0	1	0.158	0.365	0	1
Slightly High Risk Return	0.048	0.215	0	1	0.058	0.235	0	1	0.026	0.159	0	1
High Risk Return	0.055	0.227	0	1	0.054	0.226	0	1	0.056	0.231	0	1
Ln(Income)	10.453	1.444	0.151	15.391	10.750	1.338	0.151	15.391	9.779	1.450	0.245	15.391
Ln(Assets)	12.551	1.738	0.635	17.096	12.929	1.704	0.635	17.096	11.696	1.491	0.635	17.096
Ln(Social Network)	6.194	3.422	0	14.221	6.509	3.316	0	14.221	5.479	3.548	0	12.608
No. Siblings	3.323	3.402	0	15	3.129	3.255	0	15	3.764	3.676	0	15
No. Children	0.494	0.740	0	4	0.442	0.671	0	4	0.611	0.867	0	4
No. Workers	0.996	0.994	0	6	0.834	0.879	0	6	1.364	1.131	0	6
No. Aged Over 60	0.407	0.579	0	3	0.381	0.568	0	3	0.465	0.599	0	3
Self Assessed Health	2.197	1.087	0	4	2.300	1.052	0	4	1.964	1.130	0	4
Age	52.902	14.152	20	90	51.932	14.894	20	90	55.098	12.021	20	90
Male	0.762	0.426	0	1	0.707	0.455	0	1	0.887	0.317	0	1
Married	0.870	0.337	0	1	0.857	0.350	0	1	0.899	0.301	0	1
Party Member	0.301	0.459	0	1	0.335	0.472	0	1	0.222	0.416	0	1
No Schooling (Omitted)	0.063	0.243	0	1	0.037	0.189	0	1	0.123	0.328	0	1
Primary School	0.222	0.416	0	1	0.150	0.357	0	1	0.386	0.487	0	1
Junior High	0.333	0.471	0	1	0.320	0.466	0	1	0.365	0.481	0	1
Senior High	0.205	0.404	0	1	0.246	0.431	0	1	0.113	0.317	0	1
College/Bachelor	0.165	0.371	0	1	0.232	0.422	0	1	0.014	0.116	0	1
Master/PhD	0.011	0.103	0	1	0.016	0.124	0	1	0.000	0.013	0	1
Financial Illiteracy	0.472	0.499	0	1	0.386	0.487	0	1	0.648	0.478	0	1
Employed	0.355	0.478	0	1	0.420	0.494	0	1	0.208	0.406	0	1
Self Employed	0.110	0.313	0	1	0.128	0.334	0	1	0.070	0.255	0	1
Retired	0.153	0.360	0	1	0.212	0.409	0	1	0.021	0.144	0	1
Not Working	0.177	0.382	0	1	0.183	0.386	0	1	0.164	0.370	0	1
Farmer (Omitted)	0.205	0.403	0	1	0.058	0.234	0	1	0.537	0.499	0	1
Rural	0.306	0.461	0	1								
North East	0.121	0.326	0	1	0.126	0.332	0	1	0.111	0.314	0	1
East	0.286	0.452	0	1	0.300	0.458	0	1	0.255	0.436	0	1
North	0.163	0.369	0	1	0.176	0.381	0	1	0.134	0.340	0	1
Central	0.122	0.327	0	1	0.110	0.313	0	1	0.149	0.356	0	1
South	0.104	0.305	0	1	0.109	0.311	0	1	0.094	0.292	0	1
South West	0.121	0.326	0	1	0.102	0.303	0	1	0.162	0.368	0	1
North West (Omitted)	0.083	0.276	0	1	0.077	0.267	0	1	0.096	0.294	0	1
2011 Year (Omitted)	0.070	0.255	0	1	0.060	0.238	0	1	0.091	0.287	0	1
2013 Year	0.267	0.443	0	1	0.266	0.442	0	1	0.275	0.446	0	1
2015 Year	0.325	0.468	0	1	0.333	0.471	0	1	0.307	0.461	0	1
2017 Year	0.336	0.472	0	1	0.340	0.474	0	1	0.328	0.469	0	1
Number of Observations	91,354				63,378				27,976			

[a] The summary statistics for financial illiteracy are based on samples with a different number of observations, namely 79,614 in the all households sample, 53,658 in the urban sample and 25,956 in the rural sample, because those households who did not provide information on financial literacy were omitted.

Table 2: The determinants of the probability of Total Debt, Housing Debt and Non-housing Debt Holding - Random effects Logit analysis

	Total Debt Holding		Housing Debt Holding		Non-housing Debt Holding	
All households	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Risk Tolerance	0.0131	10.26	0.0011	1.03	0.0161	14.80
Age	0.0102	10.23	0.0046	5.70	0.0076	8.67
Age^2	- 0.0001	- 13.99	- 0.0001	- 8.85	- 0.0001	- 11.67
Male	0.0084	2.13	- 0.0019	- 0.63	0.0153	4.50
Married	0.0052	1.10	0.0117	2.97	- 0.0026	- 0.63
Party Member	0.0052	1.47	0.0015	0.53	0.0048	1.56
Self Assessed Health	- 0.0345	- 22.83	- 0.0172	- 14.26	- 0.0278	- 21.23
Primary School	- 0.0290	- 4.07	- 0.0188	- 3.16	- 0.0143	- 2.41
Junior High	- 0.0477	- 6.56	- 0.0381	- 6.31	- 0.0236	- 3.89
Senior High	- 0.0489	- 6.25	- 0.0454	- 7.01	- 0.0183	- 2.78
College/Bachelor	- 0.0068	- 0.80	- 0.0108	- 1.58	- 0.0065	- 0.90
Master/PhD	0.0330	2.15	0.0280	2.50	- 0.0032	- 0.25
Employed	- 0.0433	- 8.95	0.0209	5.30	- 0.0790	- 19.31
Self Employed	0.0125	2.18	- 0.0149	- 3.19	0.0231	4.92
Retired	- 0.1315	- 18.81	- 0.0523	- 9.06	- 0.1264	- 19.50
Not Working	- 0.0470	- 8.99	0.0005	0.12	- 0.0590	- 13.30
Ln(Income)	- 0.0006	- 0.45	- 0.0047	- 4.60	0.0019	1.77
Ln(Assets)	0.0240	21.06	0.0455	40.82	- 0.0052	- 5.55
Ln(Social Network)	0.0027	6.27	- 0.0002	- 0.57	0.0032	8.30
No. Siblings	0.0005	0.96	0.0015	3.66	- 0.0011	- 2.25
No. Children	0.0275	14.02	0.0152	9.88	0.0174	10.53
No. Workers	0.0195	12.59	0.0124	10.10	0.0135	10.13
No. Aged Over 60	- 0.0102	- 3.64	- 0.0099	- 4.47	- 0.0034	- 1.46
Rural	0.0793	18.22	0.0304	8.63	0.0680	18.96
North East	- 0.0094	- 1.32	- 0.0173	- 3.01	- 0.0035	- 0.60
East	- 0.0655	- 10.42	- 0.0393	- 7.95	- 0.0469	- 9.06
North	- 0.0324	- 4.78	- 0.0352	- 6.53	- 0.0134	- 2.40
Central	- 0.0250	- 3.53	- 0.0168	- 2.99	- 0.0164	- 2.86
South	- 0.0431	- 6.00	- 0.0124	- 2.22	- 0.0444	- 7.43
South West	0.0004	0.06	0.0247	4.55	- 0.0246	- 4.30
Year 2013	- 0.1017	- 18.17	- 0.1020	- 23.40	- 0.0384	- 7.82
Year 2015	- 0.0604	- 10.55	- 0.0670	- 15.36	- 0.0140	- 2.79
Year 2017	- 0.0002	- 0.04	- 0.0384	- 7.58	0.0267	4.60
ρ; Std Err	0.4013; 0.0077		0.4783; 0.0094		0.3177; 0.0088	
Chibar2 (01); p value	3,114.51; p = [0.0000]		2,491.69; p = [0.0000]		1,479.08; p = [0.0000]	
Wald χ^2 (35); p value	6,240.82; p = [0.0000]		4,289.20; p = [0.0000]		5,200.53; p = [0.0000]	
Observations			91,354			
Urban sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Risk Tolerance	0.0102	6.75	- 0.0009	- 0.71	0.0135	11.09
ρ; Std Err	0.4269; 0.0099		0.5281; 0.0113		0.3067; 0.0120	
Chibar2 (01); p value	2,029.83; p = [0.0000]		1,967.22; p = [0.0000]		704.59; p = [0.0000]	
Wald χ^2 (34); p value	4,270.84; p = [0.0000]		3,030.11; p = [0.0000]		3,076.62; p = [0.0000]	
Observations			63,378			
Rural sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Risk Tolerance	0.0193	7.90	0.0043	2.45	0.0217	9.74
ρ; Std Err	0.3592; 0.0126		0.3713; 0.0170		0.3424; 0.0135	
Chibar2 (01); p value	983.61; p = [0.0000]		484.79; p = [0.0000]		768.70; p = [0.0000]	
Wald χ^2 (34); p value	1,824.66; p = [0.0000]		1,120.95; p = [0.0000]		1,765.99; p = [0.0000]	
Observations			27,976			

[a] Reference categories: Education controls: the omitted group is that household head never attended school; Labour market controls: the omitted group is that household head who is a farmer; Region controls, the omitted group is the North West; Year controls, the omitted group is the year 2011.

Table 3: The determinants of the log level of Total Debt, Housing debt and Non-housing debt – Random effects Tobit analysis

	Ln(Total Debt)				Ln(Housing Debt)				Ln(Non-housing Debt)			
All households	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat
Risk Tolerance	0.0123	10.19	0.1293	10.17	0.0011	1.07	0.0157	1.07	0.0158	14.87	0.1839	14.80
ρ; Std Err	0.4021; 0.0067				0.4666; 0.0087				0.3222; 0.0083			
Chibar2 (01); p value	3,585.53; p = [0.0000]				2,598.44; p = [0.0000]				1,607.68; p = [0.0000]			
Wald χ^2 (35); p value	8,380.18; p = [0.0000]				5,343.29; p = [0.0000]				5,733.06; p = [0.0000]			
Uncensored obs	26,288				13,449				16,696			
Left censored obs	65,066				77,905				74,658			
Observations	91,354				91,354				91,354			
Urban sample	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat
Risk Tolerance	0.0096	6.67	0.1063	6.66	- 0.0011	- 0.64	- 0.0114	- 0.64	0.0135	11.22	0.1785	11.18
ρ; Std Err	0.4240; 0.0085				0.5124; 0.0102				0.3033; 0.0115			
Chibar2 (01); p value	2,335.07; p = [0.0000]				2,169.03; p = [0.0000]				743.52; p = [0.0000]			
Wald χ^2 (34); p value	6,059.79; p = [0.0000]				4,197.10; p = [0.0000]				3,336.43; p = [0.0000]			
Uncensored obs	16,610				9,598				9,363			
Left censored obs	46,768				53,780				54,015			
Observations	63,378				63,378				63,378			
Rural sample	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat
Risk Tolerance	0.0182	8.05	0.1700	8.02	0.0041	2.37	0.0588	2.37	0.0209	9.86	0.2024	9.80
ρ; Std Err	0.3533; 0.0108				0.3599; 0.0163				0.3429; 0.0121			
Chibar2 (01); p value	1,128.96; p = [0.0000]				502.02; p = [0.0000]				867.37; p = [0.0000]			
Wald χ^2 (34); p value	2,277.68; p = [0.0000]				1,191.57; p = [0.0000]				2,030.45; p = [0.0000]			
Uncensored obs	9,678				3,851				7,333			
Left censored obs	18,298				24,125				20,643			
Observations	27,976				27,976				27,976			

[a] E.M.E. indicates the marginal effects at the extensive margin; I.M.E. indicates the marginal effects at the intensive margin.

[b] All control variables are included in this analysis.

Table 4: The determinants of the probability of Total Debt, Housing Debt and Non-housing Debt Holding - Fixed effects Logit analysis

	Total Debt Holding		Housing Debt Holding		Non-housing Debt Holding	
All households	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Risk Tolerance	0.0079	2.31	- 0.0001	- 0.62	0.0046	3.33
LR χ^2 (27); p value	909.60; p = [0.0000]		1,375.28; p = [0.0000]		471.67; p = [0.0000]	
Observations	25,092		15,950		20,941	
Urban sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Risk Tolerance	0.0021	0.86	- 0.0000	- 1.09	0.0033	1.78
LR χ^2 (26); p value	515.16; p = [0.0000]		923.76; p = [0.0000]		197.84; p = [0.0000]	
Observations	14,452		9,678		11,425	
Rural sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Risk Tolerance	0.0129	2.33	0.0004	0.12	0.0107	2.91
LR χ^2 (26); p value	495.19; p = [0.0000]		456.64; p = [0.0000]		465.27; p = [0.0000]	
Observations	10,164		5,974		9,065	

[a] All control variables are included in this analysis.

Table 5: The determinants of the log level of Total Debt, Housing Debt and Non-housing Debt - double hurdle analysis (pooled)

	Total Debt Holding		Housing Debt Holding		Non-housing Debt Holding	
All households	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Outcome & Selection equation						
Risk Tolerance	0.1650	10.46	0.0222	1.70	0.1776	14.69
Selection equation						
Financial Illiteracy	0.1277	3.12	0.1026	3.04	0.0637	2.01
LR χ^2 (35); p value	6,549.46; p = [0.0000]		6,795.78; p = [0.0000]		2,571.79; p = [0.0000]	
Pseudo R^2	0.0892		0.1201		0.0774	
Exclusion restriction						
H0: Financial Illiteracy = 0	p = [0.473]		p = [0.872]		p = [0.166]	
Observations	79,614		79,614		79,614	
Urban sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Outcome & Selection equation						
Risk Tolerance	0.1246	6.39	- 0.0061	- 0.36	0.1489	10.82
Selection equation						
Financial Illiteracy	0.1092	2.18	0.0936	2.13	0.0541	1.50
LR χ^2 (34); p value	3,159.74; p = [0.0000]		3,597.50; p = [0.0000]		1,346.57; p = [0.0000]	
Pseudo R^2	0.0886		0.1214		0.0728	
Exclusion restriction						
H0: Financial Illiteracy = 0	p = [0.718]		p = [0.527]		p = [0.127]	
Observations	53,658		53,658			53,658
Rural sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Outcome & Selection equation						
Risk Tolerance	0.2313	8.57	0.0604	3.05	0.2314	9.81
Selection equation						
Financial Illiteracy	0.1708	2.42	0.1077	2.11	0.0944	1.52
LR χ^2 (34); p value	2,124.34; p = [0.0000]		4,095.48; p = [0.0000]		1,896.06; p = [0.0000]	
Pseudo R^2	0.0731		0.0864		0.0738	
Exclusion restriction						
H0: Financial Illiteracy = 0	p = [0.402]		p = [0.125]		p = [0.975]	
Observations	25,956		25,956		25,956	

[a] All control variables are included in this analysis.
[b] The null hypothesis H0: Financial Illiteracy = 0 is for testing the exclusion restriction where the effect Financial Illiteracy on the amount of debt is tested for those households with positive amount of debt.

Appendix

Table A1: Medians - Outcomes; Panel (t = 2011, 2013, 2015 and 2017)

	All households Median		Urban Median		Rural Median	
	All	Ex. Zero	All	Ex. Zero	All	Ex. Zero
Total Debt	0	¥46,000	0	¥73,478	0	¥25,717
Ln(Total Debt)	0	10.735	0	11.205	0	10.155
Housing Debt	0	¥82,700	0	¥124,773	0	¥28,499
Ln(Housing Debt)	0	11.323	0	11.734	0	10.258
Non housing Debt	0	¥19,500	0	¥26,588	0	¥17,725
Ln(Non housing Debt)	0	9.878	0	10.188	0	9.783
Number of Observations	91,354		63,378		27,976	

[a] All figures are in 2011 prices.

Table A2: The determinants of the probability of Total Debt, Housing Debt and Non-housing Debt Holding - Random effects Logit analysis (risk tolerance dummy variables)

	Total Debt Holding		Housing Debt Holding		Non-housing Debt Holding	
All households	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Low Risk Return	0.0162	4.04	0.0059	1.88	0.0121	3.44
Average Risk Return	0.0264	6.63	0.0007	0.23	0.0336	9.80
Slightly High Risk Return	0.0455	6.79	0.0095	1.87	0.0556	9.81
High Risk Return	0.0501	8.02	0.0029	0.58	0.0595	11.43
ρ; Std Err	0.4012; 0.0077		0.4783; 0.0094		0.3175; 0.0088	
Wald χ^2 (38); p value	6,242.26; p = [0.0000]		4,289.20; p = [0.0000]		5,205.47; p = [0.0000]	
Chibar2 (01); p value	3,112.69; p = [0.0000]		2,490.52; p = [0.0000]		1,476.45; p = [0.0000]	
Observations	91,354		91,354		91,354	
Urban sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Low Risk Return	0.0125	2.67	0.0018	0.46	0.0110	2.79
Average Risk Return	0.0220	4.77	- 0.0021	- 0.55	0.0299	7.89
Slightly High Risk Return	0.0343	4.77	0.0033	0.58	0.0441	7.66
High Risk Return	0.0375	5.12	- 0.0064	- 1.05	0.0491	8.48
ρ; Std Err	0.4269; 0.0099		0.5281; 0.0113		0.3066; 0.0120	
Wald χ^2 (37); p value	4,270.57; p = [0.0000]		3,030.54; p = [0.0000]		3,078.62; p = [0.0000]	
Chibar2 (01); p value	2,029.95; p = [0.0000]		1,966.68; p = [0.0000]		704.31; p = [0.0000]	
Observations	63,378		63,378		63,378	
Rural sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Low Risk Return	0.0266	3.40	0.0163	2.91	0.0161	2.22
Average Risk Return	0.0319	4.04	0.0021	0.36	0.0384	5.29
Slightly High Risk Return	0.0780	4.65	0.0206	1.73	0.0908	6.06
High Risk Return	0.0767	6.44	0.0203	2.37	0.0836	7.78
ρ; Std Err	0.3588; 0.0126		0.3709; 0.0170		0.3416; 0.0135	
Wald χ^2 (37); p value	1,828.02; p = [0.0000]		1,126.40; p = [0.0000]		1,771.08; p = [0.0000]	
Chibar2 (01); p value	980.40; p = [0.0000]		484.01; p = [0.0000]		764.53; p = [0.0000]	
Observations	27,976		27,976		27,976	

[a] No Risk Return is a dummy variable, which equals 1 if the household head is unwilling to carry any risk; Low Risk Return is a dummy variable, which equals 1 if the household head prefers project with slight risk and return; Average Risk Return is a dummy variable, which equals 1 if the household head prefers project with average risk and return; Slightly High Risk Return is a dummy variable, which equals 1 if the household head prefers project with slightly high risk and return; High Risk Return is a dummy variable, which equals 1 if the household head prefers project with high risk and return.

[b] Reference category: Risk tolerance dummies controls: the omitted group is that household head who is unwilling to carry any risk.

[c] All control variables are included in this analysis.

Table A3 The determinants of the log level of Total Debt, Housing Debt and Non-housing Debt - Random effects Tobit analysis (risk tolerance dummy variables)

	Ln(Total Debt)				Ln(Housing Debt)				Ln(Non-housing Debt)			
All households	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat
Low Risk Return	0.0157	4.14	0.1646	4.14	0.0055	1.78	0.0810*	1.78	0.0116	3.40	0.1356	3.40
Average Risk Return	0.0252	6.70	0.2638	6.69	0.0007	0.22	0.0100	0.22	0.0331	9.89	0.3848	9.87
Slightly High Risk Return	0.0434	6.92	0.4545	6.91	0.0095	1.92	0.1400*	1.92	0.0544	9.81	0.6334	9.80
High Risk Retur	0.0462	7.87	0.4838	7.86	0.0029	0.61	0.0434	0.61	0.0581	11.43	0.6760	11.40
ρ; Std Err	0.4020; 0.0067				0.4665; 0.0087				0.3219; 0.0083			
Wald χ^2 (35); p value	8,382.12; p = [0.0000]				5,346.74; p = [0.0000]				5,736.82; p = [0.0000]			
Chibar2 (01); p value	3,583.42; p = [0.0000]				2,597.76; p = [0.0000]				1,605.10; p = [0.0000]			
Uncensored obs	26,288				13,449				16,696			
Left censored obs	65,066				77,905				74,658			
Observations	91,354				91,354				91,354			
Urban sample	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat
Low Risk Return	0.0126	2.83	0.1402	2.83	0.0016	0.44	0.0244	0.44	0.0107	2.78	0.1419	2.78
Average Risk Return	0.0216	4.92	0.2401	4.92	- 0.0019	- 0.52	- 0.0287	- 0.52	0.0301	8.10	0.3997	8.08
Slightly High Risk Return	0.0332	4.90	0.3696	4.90	0.0036	0.65	0.0540	0.65	0.0440	7.74	0.5843	7.72
High Risk Retur	0.0341	4.90	0.3790	4.90	- 0.0059	- 1.01	- 0.0883	- 1.01	0.0484	8.46	0.6425	8.44
ρ; Std Err	0.4241; 0.0085				0.5124; 0.0102				0.3032; 0.0115			
Wald χ^2 (35); p value	6,060.63; p = [0.0000]				4,198.96; p = [0.0000]				3,338.49; p = [0.0000]			
Chibar2 (01); p value	2,335.50; p = [0.0000]				2,068.90; p = [0.0000]				743.08; p = [0.0000]			
Uncensored obs	16,610				9,598				9,363			
Left censored obs	46,768				53,780				54,015			
Obserations	63,378				63,378				63,378			

（Continued）

Table A3: The determinants of the log level of Total Debt, Housing Debt and Non-housing Debt - Random effects Tobit analysis (risk tolerance dummy variables) (Continued)

	Ln(Total Debt)				Ln(Housing Debt)				Ln(Non-housing Debt)			
Rural sample	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat	E.M.E	t-stat	I.M.E	t-stat
Low Risk Return	0.0253	3.49	0.2369	3.49	0.0155	2.79	0.2196	2.79	0.0154	2.21	0.1489	2.21
Average Risk Return	0.0291	3.96	0.2720	3.96	0.0016	0.29	0.0232	0.29	0.0361	5.18	0.3492	5.18
Slightly High Risk Return	0.0726	4.74	0.6799	4.73	0.0197	1.67	0.2796*	1.67	0.0868	6.09	0.8401	6.08
High Risk Retur	0.0732	6.69	0.6848	6.67	0.0196	2.32	0.2790**	2.32	00815	7.98	0.7892	7.95
ρ; Std Err	0.3529; 0.0108				0.3596; 0.0163				0.3422; 0.0121			
Wald χ^2 (35); p value	2,281.67; p = [0.0000]				1,196.82; p = [0.0000]				2,035.05; p = [0.0000]			
Chibar2 (01); p value	1,125.02; p = [0.0000]				501.43; p = [0.0000]				862.60; p = [0.0000]			
Uncensored obs	9,678				3,851				7,333			
Left censored obs	18,298				24,125				20,643			
Observations	27,976				27,976				27,976			

[a] E.M.E. indicates the marginal effects at the extensive margin; I.M.E. indicates the marginal effects at the intensive margin.
[b] No Risk Return is a dummy variable, which equals 1 if the household head is unwilling to carry any risk; Low Risk Return is a dummy variable, which equals 1 if the household head prefers project with slight risk and return; Average Risk Return is a dummy variable, which equals 1 if the household head prefers project with average risk and return; Slightly High Risk Return is a dummy variable, which equals 1 if the household head prefers project with slightly high risk and return; High Risk Return is a dummy variable, which equals 1 if the household head prefers project with high risk and return.
[c] Reference category: Risk tolerance dummies controls: the omitted group is that household head who is unwilling to carry any risk.
[d] All other control variables are included in this analysis.

Table A4: The determinants of the probability of Total Debt, Housing Debt and Non-housing Debt Holding - Fixed effects Logit analysis (risk tolerance dummy variables)

	Total Debt Holding		Housing Debt Holding		Non-housing Debt Holding	
All households	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Low Risk Return	0.0164	1.60	0.0000	0.05	0.0048	1.13
Average Risk Return	0.0127	1.23	- 0.0004	- 0.86	0.0089	2.12
Slightly High Risk Return	0.0173	0.98	0.0002	0.29	0.0081	1.17
High Risk Return	0.0380	2.26	- 0.0004	- 0.54	0.0214	3.22
LR χ^2 (30); p value	910.99; p = [0.0000]		1,376.32; p = [0.0000]		472.78; p = [0.0000]	
Observations	25,092		15,950		20,941	
Urban sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Low Risk Return	0.0096	1.38	0.0000	- 0.29	0.0093	1.70
Average Risk Return	0.0069	0.98	- 0.0001	- 0.72	0.0096	1.73
Slightly High Risk Return	0.0079	0.72	0.0000	0.05	0.0110	1.34
High Risk Return	0.0054	0.45	- 0.0002	- 1.36	0.0117	1.29
LR χ^2 (30); p value	516.59; p = [0.0000]		924.89; p = [0.0000]		199.34; p = [0.0000]	
Observations	14,452		9,678		11,425	
Rural sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Low Risk Return	0.0138	0.78	0.0047	0.48	- 0.0046	- 0.38
Average Risk Return	0.0092	0.52	- 0.0073	- 0.73	0.0113	0.93
Slightly High Risk Return	0.0031	0.09	0.0011	0.05	- 0.0033	- 0.14
High Risk Return	0.0799	2.94	0.0092	0.59	0.0666	3.65
LR χ^2 (30); p value	498.64; p = [0.0000]		458.08; p = [0.0000]		471.76; p = [0.0000]	
Observations	10,164		5,974		9,065	

[a] No Risk Return is a dummy variable, which equals 1 if the household head is unwilling to carry any risk; Low Risk Return is a dummy variable, which equals 1 if the household head prefers project with slight risk and return; Average Risk Return is a dummy variable, which equals 1 if the household head prefers project with average risk and return; Slightly High Risk Return is a dummy variable, which equals 1 if the household head prefers project with slightly high risk and return; High Risk Return is a dummy variable, which equals 1 if the household head prefers project with high risk and return.

[b] Reference category: Risk tolerance dummies controls: the omitted group is that household head who is unwilling to carry any risk.

[c] All control variables are included in this analysis.

Table A5: The determinants of the log level of Total Debt, Housing Debt and Non-housing Debt - Pooled double hurdle analysis (risk tolerance dummy variables)

	Ln(Total Debt)		Ln(Housing Debt)		Ln(Non-housing Debt)	
All households	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Outcome & Selection equation						
Low Risk Return	0.2013	4.15	0.0682	1.71	0.1484	3.84
Average Risk Return	0.3355	6.91	0.0287	0.71	0.3726	9.82
Slightly High Risk Return	0.6134	7.33	0.1625	2.45	0.6506	10.23
High Risk Return	0.6008	7.83	0.0588	0.92	0.6349	10.91
Selection equation						
Financial Illiteracy	0.1289	3.15	0.1035	3.06	0.0639	2.26
LR χ^2 (38); p value	6,559.73; p = [0.0000]		6,803.66; p = [0.0000]		2,574.00; p = [0.0000]	
Pseudo R^2	0.0893		0.1202		0.0775	
Exclusion restriction						
H0: Financial Illiteracy = 0	p = [0.464]		p = [0.875]		p = [0.183]	
Observations	79,614		79,614		79,614	
Urban sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Outcome & Selection equation						
Low Risk Return	0.1218	2.06	- 0.0036	- 0.07	0.1227	2.77
Average Risk Return	0.2695	4.60	- 0.0204	- 0.40	0.3333	7.81
Slightly High Risk Return	0.4375	4.67	0.0698	0.89	0.5041	7.67
High Risk Return	0.4411	4.66	- 0.0739	- 0.89	0.5245	7.93
Selection equation						
Financial Illiteracy	0.1092	2.54	0.0936	2.12	0.0553	1.53
LR χ^2 (38); p value	3,163.47; p = [0.0000]		3,599.13; p = [0.0000]		1,348.83; p = [0.0000]	
Pseudo R^2	0.0886		0.1214		0.0729	
Exclusion restriction						
H0: Financial Illiteracy = 0	p = [0.711]		p = [0.527]		p = [0.142]	
Observations	53,658		53,658		53,658	
Rural sample	M.E.	t-stat	M.E.	t-stat	M.E.	t-stat
Outcome & Selection equation						
Low Risk Return	0.3485	4.10	0.2000	3.21	0.2025	2.69
Average Risk Return	0.3775	4.31	0.0463	0.71	0.4043	5.31
Slightly High Risk Return	1.0578	5.73	0.2919	2.13	1.0793	6.76
High Risk Return	0.8805	6.69	0.2652	2.76	0.8591	7.50
Selection equation						
Financial Illiteracy	0.1721	2.44	0.1108	2.17	0.0920	1.48
LR χ^2 (38); p value	2,126.30; p = [0.0000]		4,100.94; p = [0.0000]		1,899.82; p = [0.0000]	
Pseudo R^2	0.0733		0.0867		0.0740	
Exclusion restriction						
H0: Financial Illiteracy = 0	p = [0.405]		p = [0.118]		p = [0.919]	
Observations	25,956		25,956		25,956	

[a] No Risk Return is a dummy variable, which equals 1 if the household head is unwilling to carry any risk; Low Risk Return is a dummy variable, which equals 1 if the household head prefers project with slight risk and return; Average Risk Return is a dummy variable, which equals 1 if the household head prefers project with average risk and return; Slightly High Risk Return is a dummy variable, which equals 1 if the household head prefers project with slightly high risk and return; High Risk Return is a dummy variable, which equals 1 if the household head prefers project with high risk and return.

[b] All control variables are included in this analysis.

[c] The null hypothesis H0: Financial Illiteracy = 0 is for testing the exclusion restriction where the effect of Financial Illiteracy on the amount of debt is tested for those households with positive amount of debt.