The Impact of Urban Household Income on Household Risk Financial Asset Allocation in China—Empirical Research Based on Probit and Tobit

* Ting Wen
749033108@qq.com

Shaanxi Normal University International Business School Xi 'an, China

Abstract: The increase of per capital disposable income makes the household demand for risky financial assets show an increasing trend, but the risk financial market is still limited participation. In this paper, the CHFS database of Southwestern University of Finance and Economics is selected, the nonlinear Probit model and the Tobit model of restricted dependent variables are used for empirical analysis, and the Logit model is used for robustness test. Combined with the flow preference and consumption-savings theory, on the basis of analyzing the current situation of household income and risk asset allocation. We find that property, transfer and wage income all have a significant positive impact on the allocation and depth of risky financial assets at the significance level of 1%, which suggests that in order to improve the allocation and depth of urban households' risky financial assets, we should focus on increasing the contribution of property income to total household income.

Keywords-Urban household income; Risky financial assets; Probit; Tobit

1 INTRODUCTION

Reform and opening up the residents' disposable income increased significantly and stimulate the family involved in financial markets, given the heterogeneity on the risk of financial asset allocation between urban and rural areas, this paper mainly focuses on urban household income of family on the configuration of the risk of financial assets, by quantifying the risk of urban families financial asset allocation, this paper town family configuration is affected by household income risk financial assets.

Firstly, the exploration results of household finance in China are not sufficient. This paper focuses on the impact of income on household risk financial asset allocation, which can promote the enrichment and further development of relevant theories and is of great significance for how to enhance the depth of allocation, slow down the current situation of high savings, and stimulate the development of risk financial market.

Secondly, considering the characteristics of the research object, Probit and Tobit models are mainly used in this paper. The former is used to analyze the impact of urban household income structure on the allocation of risky financial assets, while the latter is used to analyze the impact of urban household income structure on the depth of risky financial assets allocation. We selected the financial data of urban households in CHFS (2017) released by Southwestern University of Finance and Economics through a questionnaire survey. The survey has strong

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representativeness, extensive scope, detailed content and guaranteed quality. After data processing, a total of 9342 effective sample families were collected, covering 29 provinces (cities) and 363 cities/districts in China[1].

In addition, our research has several advantages. We select the latest available microscopic survey data, which can better show the latest situation of Chinese families. Considering the characteristics and differences of urban and rural income and risky financial asset allocation, we can more accurately explore the correlation between urban household income structure and risky financial asset allocation without a general study of urban and rural areas together. We also choose the allocation and depth of risky financial assets to depict households' allocation of risky financial assets. However, studies on household income structure and financial asset allocation in existing literatures only involve the allocation of a certain financial asset, and there are few studies on the allocation depth.

2 RESEARCH METHODS

2.1 Impact of urban household income on risky financial asset allocation

A large number of studies have shown that the increase in total household income increases the risk tolerance and investment willingness of households[1]. It can be assumed that the income effect of an increase in one type of income while holding other household incomes constant will promote risky asset investment. Studies show that the higher labor income is, the more households can participate in the allocation of risky financial assets and increase the proportion of investment[2]. From the perspective of residents' transactional and value-preserving and value-added needs, the difference in income structure makes residents have different financial needs, and targeted provision of financial services can increase residents' welfare[5]. This section makes use of the flow preference and consumption-savings theory and integrates previous research results to carry out the corresponding theoretical analysis.

First, wage income is the main source of income for urban families and has strong stability. According to Friedman's persistent income theory, as persistent income, it will reduce the income uncertainty faced by families and weaken liquidity constraints and precautionary saving motivation. Second, operating income grows rapidly and plays an increasingly important role in urban household income. The income effect is obvious, but due to market price, supply and demand and other uncontrollable factors, the income fluctuates greatly, so it has a certain risk effect [4]. Third, the property income of urban households is mainly financial asset income and the average amount is not large, suggesting that families with such income are relatively well-off and have certain investment experience. This kind of income growth has a positive incentive effect on financial market participation. Fourth, transfer income essentially belongs to social welfare and security, and the use of funds tends to be less risky. However, with the continuous improvement of urban social security system and the large proportion of this income, the ability of families to withstand future risks has been enhanced.

To sum up, we propose that wage income, property income and transfer income of urban households will promote household allocation of risky financial assets and improve the depth of allocation, while the effect of operating income on the allocation of risky financial assets of urban households depends on the relative size of income effect and risk effect.

2.2 The data source

This paper selects the family finance CHFS (2017) database of Southwestern University of Finance and Economics and selects more than 32,000 representative households for analysis after processing. Household income and financial assets are defined as follows:

Table 1 Family income statement

Household income	content
Wage income	After-tax salaries, after-tax bonuses and after-tax allowances
Operating income	Agricultural income: net income from agricultural production and operation Industrial and commercial income: net income of industrial and commercial operations
Property income	Income from financial assets, rental homes and auto insurance claims
Transfer income	Related income, land expropriation and demolition subsidy, government subsidy (non-agricultural), retirement pension income, insurance income, etc

Table 2 Statement of Financial Assets

Financial assets	Risky financial asset	Stocks, funds, wealth management products, non-RMB assets, gold, bonds (corporate bonds and financial bonds), derivatives, etc
	Risk-free financial assets	Deposits, cash, bonds (Treasury and government bonds)

Through the analysis, we draw the following conclusions: (1) At present, the relatively stable wage income is still the main income in urban households in China, accounting for about 49%, while the property income is the least, only 8%. (2) The income of urban families in different regions is similar. The income in the eastern part of the urban is larger than that in the central and western parts of the urban. Wage income is the main part of all the urban families. (3) The proportion of non-financial assets of urban households is too large. (4) The allocation of risky financial assets in the eastern part of the urban is higher than that in the central and western parts, while the difference is small in the central and western parts. Risk-free financial assets are still the main part of financial assets. Regional differences have little influence on the proportion of risky financial assets to financial assets. See Figure 1, Figure 2 and Table 3 and Table 4 for details.

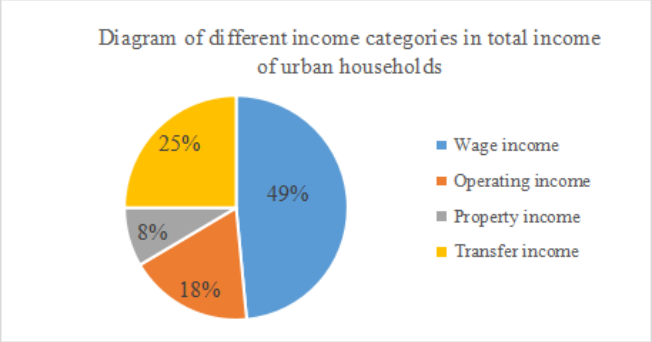

Figure 1 urban income in 2017

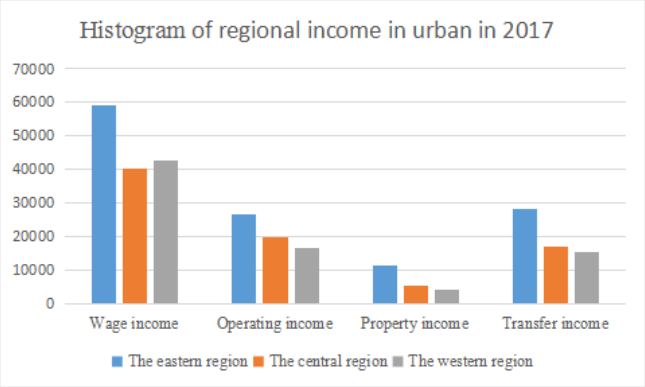

Figure 2 Regional average income of urban in 2017

Table 3 Financial asset allocation of urban households in 2017

category	Asset holding ratio (%)	Proportion of financial assets (%)
Risk-free financial assets	99.1	63.95
Risky financial asset	21.06	36.05

Table 4 regional financial asset allocation in 2017

category	Asset holding ratio (%)			Proportion of financial assets (%)		
	eastern	central	western	eastern	central	western
Risk-free financial assets	97.36	95.99	94.95	67.91	72.03	70.97
Risky financial asset	26.16	14.41	14.77	36.73	34.24	35.01

2.3 Model setting

In this paper, we explore the urban household income situation of family risk of financial assets allocation and the impact of the depth of the configuration, because the former as 0-1 distribution of discrete variables, namely family is configured with the risk of financial assets, the latter is restricted distribution from 0 to 1 ratio of discrete variables, namely the level of configuration, so suitable for Probit, Tobit model to estimate respectively.

(1) Probit model

This model analyzes the impact of urban household income structure on household allocation of risky financial assets, which is explained variable Y, as follows:

$$Y_i^* = \propto + \beta X_i + \varphi control_i + \varepsilon_i, \varepsilon_i \sim N(0, \sigma^2) \quad (1)$$

Among them:

$$holding_i = \begin{cases} 1, if\ Y_i^* > 0 \\ 0, if\ Y_i^* \leq 0 \end{cases} \quad (2)$$

Where, the explained variable$holding_i$=1 means urban households allocate risky financial assets. $x_i$is the key explanatory variable. $control_i$ is the control variable, ε_i is the error term, including unobservable components, etc.

(2) Tobit model

Tobit model focuses on the impact of urban household income structure on the depth of household risk financial asset allocation, as follows: Tobit model focuses on the impact of urban household income structure on the depth of household risk financial asset allocation, as follows:

$$Y_i^* = \propto + \beta X_i + \varphi control_i + \mu_i, \mu_i \sim N\ (0, \sigma^2) \quad (3)$$

Among them:

$$depth_i = \begin{cases} Y_i = Y_I^*, if\ Y_i^* > 0 \\ Y_i = 0, if\ Y_i^* \leq 0 \end{cases} \quad (4)$$

Where, Y_i^* is the latent variable, $depth_i$ is the actual observed value, represents the ratio of risky financial assets to total financial assets, others are the same as the Probit model.

2.4 Variable selection

This paper selects the urban household financial data in CHFS (2017) released by Southwestern University of Finance and Economics through questionnaire survey. According to the research purpose, we use the following variables in the data set (1) Explained variables: whether households hold risky financial assets and the depth of risky financial assets of urban households. (2) The key explanatory variables: wage, operate, transfer and property income, and 1000 yuan was taken as the family income unit. (3) Control variables: Firstly, sex, age, years of education, health, mari and other household characteristics. Secondly, risk

characteristic variables such as agedins and Medins. Thirdly, the characteristics of the external environment such as the east, middle and west regions (Location1, 2 and 3) of the family.

Descriptive statistics of relevant variables are given in the following table 5. It can be concluded that urban households are dominated by wage income and the allocation rate of financial market is low. The variance of property and transfer income is much smaller than that of the other two types of income, and the variable has passed the multicollinearity test.

Table 5 Descriptive analysis

Variable	Obs	Mean	Std.Dev.	Min	Max
holding	9,342	0.115	0.319	0	1
depth	9,342	0.0317	0.118	0	0.887
Share_r	9,342	0.0108	0.0577	0	0.493
wage	9,342	45.74	47.40	0	240
operate	9,342	15.31	117.7	0	3000
property	9,342	2.366	8.668	0	94.70
transfer	9,342	15.97	19.57	0	70
sex	9,342	0.747	0.435	0	1
age	9,342	55.80	13.50	27	88
edu	9,342	8.975	4.360	0	22
health	9,342	2.537	0.988	1	5
mari	9,342	0.845	0.362	0	1
agedins	9,342	0.827	0.378	0	1
medins	9,342	0.934	0.248	0	1
Location1	9,342	0.512	0.500	0	1
Location2	9,342	0.255	0.436	0	1
Location3	9,342	0.233	0.423	0	1

3 EMPIRICAL PROCESS

In this section, we use Probit and Tobit models for hypothesis verification. Then, we replace Probit with Logit and replace Share_r (ratio of stock value to total financial assets) with explained variable depth in Tobit to test the setting form and robustness of the model.

We found that (1) under the 1% significant level, property income has the highest impact on urban household allocation of risky financial assets, wage income has minimal impact, and operating income has no impact. Perhaps the key source of property income is the financial market, leaving other income unchanged, its growth sends a good market signal to investors and encourages them to continue to allocate. Wage income may have the least impact because some urban households still have a portion of their wage income that goes to temporary work. Among the control variables, except the health status, marital status, education level and medical insurance of the head of household, all the other variables have a significant influence on the allocation of risk financial assets of urban households. (2) In terms of the depth impact of each income on the allocation of risky financial assets of urban households, except for

operating income, other income has a positive impact at the significance level of 1%, and the impact degree decreases sequentially according to property, transfer and wage income. The reasons are similar to those mentioned above, and shall not be repeated. (3) By changing the model and variables, we found that the significance of key variables did not change, and the empirical test results were basically consistent with the above, indicating that the model was robust. Details are shown in table 6 and table 7. (Note: Standard deviation in brackets; ***, ** and * represent the significance level of 1%, 5% and 10% respectively, as shown in the following table.)

Table 6 Empirical study on the impact of urban income on household risk financial asset allocation

	(1) assets holding	(2) depth of holding
	Probit	Tobit
VARIABLES	holding	depth
wage	0.0045***	0.0015***
	(0.0005)	(0.0002)
operate	0.0001	0.0001
	(0.0002)	(0.0000)
property	0.0387***	0.0151***
	(0.0049)	(0.0010)
transfer	0.0101***	0.0045***
	(0.0009)	(0.0004)
sex	-0.1268**	-0.0542***
	(0.0468)	(0.0145)
age	-0.0321***	-0.0084***
	(0.0025)	(0.0006)
health	-0.0203	-0.0022
	(0.0320)	(0.0108)
mari	-0.0538	-0.0097
	(0.0465)	(0.0262)
edu	-0.0032	-0.0024
	(0.0062)	(0.0022)
agedins	0.2844***	0.1119***
	(0.0819)	(0.0305)
medins	0.0308	0.0317
	(0.0892)	(0.0315)
location	-0.1012**	-0.0252
	(0.0364)	(0.0153)
_cons	-0.0391	-0.3323***
	(0.2185)	(0.0745)
/		
Var (e.depth)		0.1713***
		(0.0134)
N	9342	9342
pseudo R2	0.24	0.269

	(1) assets holding	(2) depth of holding
	Probit	Tobit

Table 7 Robustness test

	(1) assets holding	(2) depth of holding
	Logit	Tobit
VARIABLES	holding	depth
wage	0.0081***	0.0020***
	(0.0010)	(0.0002)
operate	0.0000	0.0001
	(0.0004)	(0.0001)
property	0.0716***	0.0108***
	(0.0103)	(0.0012)
transfer	0.0180***	0.0037***
	(0.0018)	(0.0006)

4 EMPIRICAL CONCLUSIONS AND POLICY RECOMMENDATIONS

Here, we will summarize the empirical conclusions and put forward some policy suggestions.

4.1 The empirical conclusions

We find that urban household income structure has a significant effect on household allocation of risky financial assets and allocation depth. The empirical results of the two are consistent, but the impact and significance of each income are not completely the same, which can be summarized as follow:

1)Except for operating income, all other incomes have a positive impact on the allocation and depth of urban households' risky financial assets at the significance level of 1%, and the effect decreases sequentially according to property, transfer and wage income.

2)The control variables have no significant influence on the allocation and depth of risky financial assets of urban households except the gender, age and social endowment insurance.

4.2 Policy recommendations

This shows that continuously improving the overall income level of residents, especially focusing on the property income is particularly important to the incentive role of families to participate in the risk financial market, and ultimately promote the development of China's financial market.

Given China's dual economy, future research can be further refined, based on different areas to more detailed discussions on the configuration of the income structure of family risk, if necessary can also explore the specific financial products, Or discuss how changes in income structure at different levels affect household allocation of risky financial assets.

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