

# An Investigation of Influencing Factors on Household Portfolio in China

## ----Based on Micro Econometric Analysis of Tobit Model

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**Abstract** - The purpose of this article is to cognize the characteristics of household portfolio, acknowledge the factors that affect the Chinese household investments, and analyze the household investment structure of different populations. Past research in China has appropriately discuss the present situation and variation tendency of household investment, but few research has exploited its influencing factors with systematic econometric models. Using cross-section data from nationwide survey in China, this paper employs Tobit regression for censored data of household investments, and particularly add to the model the human capital measured as educational investments which has been ignored by people. The empirical results show that the Tobit model outperforms OLS and provide a fuller understanding of the factors that affect the Chinese household investments.

**Index Terms** - household portfolio, Tobit model, educational investments, financial assets

### 1. Introduction

In recent years, with the increasing patterns of investments, the tremendous changes in financial market environment, and the steadily improved economic structure in China, household investment structure has been impacted significantly. Obviously, household assets as an important field of financial research not only has an important implication on household welfare, but affects the capital market directly [1]. It is defined that household assets is an economic pattern owned or controlled by households that can be measured in monetary. Household assets, which is composed of two parts: physical assets and financial assets, includes a variety of household assets, household creditor's rights and other rights. In addition, it reflects the living standards of residents, also, it is one of the main basis to measure the country's economic strength [2]. The household investments behavior, plays an important role in economic society, is a crucial factor affecting the problems such as the development of Chinese investment market, the overall economic operation, household wealth and many other economic society issues [3].

Summary of domestic related researches on household investments, most studies were in view of present situation together with the variation tendency of household assets, but few exploited its influencing factors; moreover, fewer domestic researches regarded the human capital including education and training as an indispensable household investments to be discussed; on empirical part, studies also

lacked systematic econometric model analysis. This paper attempts to make up the deficiency in domestic literature based on nationwide survey data of 300 households in August 2013, builds Tobit model in order to analyze the factors affecting the household investment structure.

This paper is organized as follows: in the first part, we will illustrate the sample data used in this paper and have some descriptive analysis; in the second part, we will list and explain the variables which involved in the model, then build Tobit model and least squares estimation (hereinafter referred to as OLS) model; the third part is empirical test, with the comparison of the two models fitting, searching the impacts of four types of household investments; the finally part is conclusive comments.

### 2. Descriptive Statistical Analysis

#### A. Sample Data Description

Sample data used in this paper was gathered in August 2013, obtained cross-section data which was selected from 19 regions in 10 provinces. Two ways used in research were traditional questionnaire survey and web based survey. A total of 300 questionnaires, 271 questionnaires were recovered, the questionnaire returning rate was about 90.3%. Excluding the invalid ones, there were 263 effective questionnaires with the effective returning rate of 87.7%. The surveyed households involved "High school degree or less", "Technical secondary school degree", "Bachelor or College degree" and "Master's or Doctor's degree" four categories in education. The average age of the surveyed households were mainly concentrated in the 20 to 60 years during which the age uniformly distributed, besides, the age range aimed at the group of people who had income and had the willingness to invest, which made sample data possess significant differences and representativeness.

#### B. Descriptive Analysis

In the surveyed households, 86.5% of them have male head of the households, 77.2% of households are married, 69.2% owns their own house property. As for educational background, family has "Bachelor or College degree" the most for 48.1%, "High school degree or less" for 25.2%, "Technical secondary school degree" for 13.9% , "Master's or Doctor's degree" for 12.8%. The Average annual income of households surveyed is RMB 86,203.04, with a median of RMB 58,000.

The average annual household expenditure on education is RMB 19,058.06. 55.5 percent of households does savings annually, with an average annual savings amount of RMB 28,173.33. 21.7% of households has financial investments, 29.3% does gold or real estate investments. Have a conditional mean estimate with education as an independent variable shows that “High school degree or less”, “Technical secondary school degree”, “Bachelor or College degree”, “Master’s or Doctor’s degree” average annual family income are RMB 38,733.33, RMB 53,500, RMB 112,937.06 and RMB 120,750 respectively.

As can be seen, the capital flow of household investments is savings primarily. Even though the number of families that invest education occupies a higher proportion of total families, the amount of investment in education is limited. By reason of gold or real estate or other physical investments occupy a lower proportion of families, family investment capital flowing in physical investments is less. Which point to note is, since the definition of investments in this paper is the average annual expenditure on specified investments, we regarded the behavior that many families use one-time expenditure as a method to purchase new houses as they transfer the past deposit into real estate formed physical assets directly, it cannot be measured. Hence, this article assumes that one-time purchase expenditures is not a direct physical investment, but it belongs to the past savings.

### 3. Influencing Factors Analysis on Household Portfolio

#### A. The Assumptions and Establishment of Model

Tobit model was first proposed by U.S. economist James Tobin (1958) in researching the expenditures of household durable consumer goods, the basic conditions is part of

explained variables value must be zero with a positive probability, and the remaining non-zero samples must be continuous data that are left-censored at zero [4].

Family does not exist universality in investments, that is, many families don’t have or only have a small amount of investments, the estimation results would be biased as far as we do OLS based on remaining sample data. At the same time, the investments served as explained variable is continuous distributions as well as will not less than zero, so we chose Tobit model which used maximum likelihood method to analyze the problem in this article.

Tobit model is usually expressed as:

$$y_i^* = y_i \beta + \varepsilon_i \quad \varepsilon_i \sim N(0, \sigma^2), i = 1, 2, 3, \dots, n$$

$$\begin{cases} y_i = 0, y_i^* < 0 \\ y_i = y_i^*, y_i^* > 0 \end{cases}$$

In this article, the dependent variables are taken non-negative for latent variables, represent several types of investments that may affect the family investments.

Previous studies show that household financial assets structure is generally affected by household income, educational background, risk preference and other aspects [5]. While the household physical investments are significantly affected by household income, age, house ownership, working conditions and other factors [6].

This paper chose educational investments, bank savings, financial investments together with physical investments as the endogenous variables. Considering the conclusion of previous literatures, we selected six exogenous variables in the study (see Table I).

TABLE I The Explanation of Variables Selected

Variables	Definition	Explanation
EInv	Educational investments	Annual household expenditure on education
Sav	Bank savings	Annual household banks savings
FInv	Financial investments	Annual household expenditure on finance
PIInv	Physical investments	Annual household expenditure on physical assets
Gen	Gender of householders	Test householders’ gender’s impact on investment. Male=0, Female=1.
Mar	Family marital status	Test the impact of family marital status on investment. Married=0, Unmarried=1.
Edu1	Educational status	Test the impact of educational status on investment. High school degree or less=1, Others= 0
Edu2	Educational status	Technical secondary school degree=1, Others= 0.
Edu3	Educational status	Bachelor or College degree=1, Others= 0.
Edu4	Educational status	Master’s or Doctor’s degree=1, Others= 0.
Off	Whether have children	Test the impact of whether have children on investment. Have children=1, Others= 0.
Age	Average age of family	Test the impact of average age of family on investment.
Sal	Household income	Test the impact of household income on investment.

#### B. Model Variables Description

According to the survey sample data obtained, this article divides investments into four categories, namely, educational investments, bank savings, financial investments and physical investments. Among them, the financial investments and

physical investments include "bonds, stocks, funds, futures and other financial derivatives" and "real estates, gold and silver" respectively. Moreover, in family characteristics, we set “gender of householders, family marital status, educational status, whether to have children, the average age of family and

household income” as variables. In consideration of the mutual influence between family members may have a direct effect on investment, educational status is set to the highest degree that family has and divided into “High school degree or less, Technical secondary school degree, Bachelor or College degree, Master’s or Doctor’s degree” four categories. At this point, “gender of householders, family marital status, education status, whether to have children” are dummy variables, “age and income” are numeric variables. Because of dummy variable trap, we removed the constant term. The establishment of the Tobit model (educational investments as an example) as follows:

$$EInv_i = \beta_1 Gen_i + \beta_2 Mar_i + \beta_3 Edu_{1i} + \beta_4 Edu_{2i} + \beta_5 Edu_{3i} + \beta_6 Off_i + \beta_7 Age_i + \beta_8 Sal_i + \varepsilon_i \quad i = 1, 2, 3, \dots, n$$

### C. Results and Interpretation

Run regression analysis based on four types of family investment as the dependent variables, build Tobit and OLS respectively, the results are shown in Table II.

From the estimated results, assuming a confidence level of 5%, income, age, marital status, whether to have children and educational status are the four factors which have different levels of impact on investing. In educational Investments, Both of two models have good fitting effect, which is a reflection on the family generally invest in education. In this part, marital status, household income, whether to have children and educational status are significant impacts. The remaining three kinds of investments are Tobit model fitting better than OLS,

even all variables are statistically insignificant estimated by OLS in physical investments, indicating that there are many intercepted data in samples, also means many families do not have these investments. Income, age and educational status significantly influence bank savings. Income and educational status influence the financial investments. Finally, only income affect the amount of physical investments significantly.

Since the marginal effect of each variables is for the purposes of its conditional mean, the marginal effect of dummy variables equal to the changes arising from the control group rose to the response group [7]. The model can be interpreted as follows: All types of investments are positive correlated with the household income, the higher the household income, the more the total amount of investments. As for the variables affect investments in education, under the condition of other variables constant, it is about RMB 21,016 that each married family household spends than unmarried family. A negative number in variable of children means family with children spends RMB 26,621 more than the family without children for education expenses. Three types of families which did not received the highest level of education spend RMB 4,000 lower than family which received master or doctor’s education. In savings, within the age range, the savings amount is proportional to the average age of family. Finally, in financial investments, the amount of investments and education levels were significantly associated, but did not show a certain regulations.

TABLE II Result of influencing factors on household Portfolio based on Tobit model

	Educational investments		Bank savings		Financial investments		Financial investments	
	Tobit	OLS	Tobit	OLS	Tobit	OLS	Tobit	OLS
GEN	-9801.80 (0.1517)	-749.66 (0.8892)	-10200.92 (0.2345)	-4974.96 (0.3509)	-10823.23 (0.5779)	7494.33 (0.1156)	-3668.83 (0.6743)	840.76 (0.7737)
MAR	21016.17 (0.0188)	13411.83 (0.0533)	16773.38 (0.1182)	7572.72 (0.2692)	-4293.67 (0.8422)	3062.37 (0.6159)	-687.72 (0.9479)	-1871.79 (0.6184)
SAL	0.35 (0.0000)	0.35 (0.0000)	0.11 (0.0000)	0.09 (0.0000)	0.30 (0.0000)	0.21 (0.0000)	0.10 (0.0000)	0.07 (0.0000)
OFF	-26621.55 (0.0013)	-10569.78 (0.0938)	2965.38 (0.7663)	2984.05 (0.6319)	29553.43 (0.1356)	5320.97 (0.3383)	12081.99 (0.2133)	4783.57 (0.1624)
AGE	464.21 (0.0788)	346.60 (0.1174)	1223.34 (0.0003)	584.54 (0.0079)	1275.63 (0.0530)	192.98 (0.3227)	455.85 (0.1789)	56.51 (0.6377)
EDU1	-32112.85 (0.0034)	-19401.89 (0.0348)	-93415.91 (0.0000)	-25233.08 (0.0057)	-150788.5 (0.0000)	-14604.53 (0.0715)	-78913.96 (0.0000)	-5331.84 (0.2840)
EDU2	-31945.29 (0.0072)	-22059.51 (0.0266)	-69173.60 (0.0000)	-22577.85 (0.0219)	-145067.8 (0.0000)	-18744.03 (0.0327)	-55230.78 (0.0007)	-2402.16 (0.6552)
EDU3	-29636.12 (0.0085)	-25595.79 (0.0071)	-48933.44 (0.0010)	-12081.41 (0.1971)	-124901.8 (0.0000)	-21535.42 (0.0103)	-42965.39 (0.0046)	-1931.19 (0.7066)
EDU4	-34278.21 (0.0117)	-32593.51 (0.0052)	-35748.54 (0.0439)	-355.8332 (0.9752)	-177127.2 (0.0000)	-33507.51 (0.0012)	-30912.25 (0.0688)	-395.82 (0.9498)

## 4. Conclusion

This paper analyze factors which influence household investments based on Tobit model, we found that the gender of householders doesn't affect any kinds of family investments;

marital status, family income, whether to have children and educational status are important index on affecting the household investment in education. Married and have children can be positively influence the amount of educational

expenditure. Three types of families which did not received the highest level of education spend lower than family received master's or doctor's education; the average age, income is proportional to the amount of savings, in addition, the higher the degree, the more amount of savings; the amount of investments and education levels were significantly associated, but did not show a certain regulations; finally, income is the only factor that influences the physical investments.

Education is an important pattern of changing human resources into human capital, it is not only a kind of consumer behavior, but also an investment behavior [8]. Accept different stage of education is a primary source of family education expenditure, no doubt that family which has married or have children will cost more, there is a Chinese saying "A good scholar will make an official", Chinese traditional culture emphasizes the role of education in individual development, in this thought, whether highly educated teachers, researchers or farmers, workers, all allow their children to accept higher education without exception.

With the passage of time, the diversification of investment patterns replace the savings in the past of China, younger groups which favor risk and high returns, they invest more funds into the financial market, otherwise older age groups are more likely to choose investments that are low risk and stable income, as a result, their investments are more dependent on the savings. When residents have a low incomes with a small amount of alternative financial assets, the motivation of liquidity preference makes the stock of the financial assets structure singly depend on cash and deposit. When the people's income level, financial and securities market develop, the motivation of income preference prompts the structure of financial assets diversified [9]. Meanwhile, the financial

investments is not ubiquitous, it is easily affected by extreme values.

However, the investment structure of different families are not the same, whether the income, age, educational status, or marital status, have children or not, even the information which cannot be captured in the survey such as ideology, life experience, all above have complicated effects on family investment structure and asset allocation. The results of this study has practical significance and reference value on studying the characteristics of household Portfolio, understanding the effect factors of Chinese household investment structure, analyzing the household investment structure and its assets of different populations.

## References

- [1] B. Chen, T. Li, "Urban Household's Assets and Liabilities in China: Facts and Causes," *J. Economic Research Journal*, vol. 1, 2011.
- [2] Y. Sun, "The American family assets structure and its change trend," *J. Shanghai Econmic Review*, vol. 11, 2005.
- [3] M. Hao, "Beijing residents' family investment research," *J. Research on Economics and Management*, vol. 6, 2009.
- [4] D.N.Gujarati, "Basic Econometrics," *M, China Renmin university press Co.,LTD*, pp. 573-576, 2011.
- [5] Y. Zhang, L. Xu, "Empirical analysis of influence factor of urban household financial assets structure in Jiangsu province," *J. Financial Perspectives Journal*, vol. 1, 2013.
- [6] T. Amemiya, M. Saito, and K. Shimono, "Study of Household Investment Patterns in Japan," *J. The Economic Studies Quarterly*, vol. 44, no.1, March 1993.
- [7] X. Lu, M. Wu, "Determinants of household healthcare expenditure of rural floating population in Beijing: a Tobit model approach," *J. Journal of Peking University (Health Science)*, vol. 5, 2010.
- [8] L. Sun, "Research Influential Factors of Family Investment in Higher Education," *D. Northeast Normal University*, 2010.
- [9] J. LI, G. Tian, "Analysis on the Financial Assets Structure of the Residents in China and its Changing Trend," *J. International Finance Forum (Beijing)*, vol. 11, 2001.