

The Impact of Education Gap on Household Financial Asset Allocation

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Keywords: Household Finance; Asset Allocation; Education Gap

Abstract: As a crucial component of wealth accumulation, household asset allocation decisions have become increasingly significant in the context of accelerated aging process and rising retirement savings pressure. Utilizing data from the China Household Finance Survey (CHFS) from 2015 to 2019, this paper investigates the impact of education gap among core members on households' financial asset allocation decisions. The study reveals that: The education gap among core members has a significant negative impact on household participation in risky financial asset investments; This education gap affects the householder's focus on economic information and the degree of risk aversion through bargaining process; An expanding education gap among core members results in a more concentrated household income source and suppresses household participation in risky financial asset investments. This research highlights that promoting the diversification of household financial asset allocation should not only focus on the decision-makers but also consider the characteristics of other core members.

1. Introduction

In the context of the accelerated aging process and the existing gap in household pension reserves, the importance of rational asset allocation as a key link of household wealth accumulation is increasingly evident. However, Chinese households allocate their assets deviate from traditional theoretical expectations. While housing assets occupy a significant portion of household wealth, most households primarily hold risk free assets, such as bank deposits, showing a general aversion to risky financial assets.

Driven by both theoretical and practical needs, the research on household asset allocation has surged. Related explorations primarily focuses on explaining the "limited participation" phenomenon, considering factors like education level and financial literacy of householder^[1,2], or household income and wealth^[3].

However, in the married families, as a part of family decision-making, asset allocation decisions are inevitably influenced by the characteristics of core members. The formation of asset allocation decisions is based on the bargaining process among the personal characteristics of the investor and the spouse. Throughout the bargaining process, the personal characteristics such as financial literacy

and risk attitudes of both the investor and the spouse will interact, and influencing the asset allocation decisions^[4,5].

Moreover, with social and economic development, the marriage matching patterns have undergone significant changes in China. Educational matching has become a core element in the construction of marital relationships, profoundly affecting income disparity between households and the division of labor within households^[6]. However, existing literature has not sufficiently explored whether the education gap between core members impacts household asset allocation decisions. Some studies have considered the education of householder's spouse, but did not explore the mechanisms. Given this, this paper utilizes the data from the China Household Finance Survey (CHFS), examine the impact mechanisms of education gap among core members on household asset allocation decisions.

2. Literature review and hypotheses

Compared to risk-free financial asset like bank deposit, investing in risky financial assets inevitably entails higher transaction costs. These costs include not only the time cost in learning investment knowledge, gathering asset information, and making allocation decisions, but also the transaction fees associated with investing in risky financial assets^[11,12]. Due to differences in education, financial literacy, income and wealth, investors' ability to engage in risky investment activities varies^[1,2]. When making asset allocation decisions, investors will avoid assets with high investment costs or the asset characteristics they cannot accurately assess, and leading to differentiated asset allocation decisions^[7,8]. Compared to unmarried individuals, asset allocation decisions in married households are more complex. Although members with relative advantages in age, education, and income are more likely to play a dominant role in household financial decisions^[9], financial advice from other members can also significantly enhance the financial literacy of decision-maker and influence the final investment portfolio decisions^[10]. Existing research suggests that education level plays a crucial role in shaping investors' financial literacy. On the one hand, lower education often associated with a lack of necessary financial knowledge. On the other hand, individuals with lower education levels tend to use information devices for entertainment rather than collecting economic information^[11]. Therefore, with the reduce of education gap among core members, other members will be more likely to possess the financial knowledge, conduct effective financial information searches, and provide financial advice to the decision-maker. This enhances the household's overall ability to gather the information on risky financial assets, increases the frequency of exposure to financial information for decision-maker, and leads to a higher probability of household participation in risky financial asset investments. Based on this, the following hypotheses are proposed:

H1: The education gap has a negative impact on household risky financial assets investment.

H2: An increase in the education gap will reduce the householder's attention to economic information and inhibit household investment in risky financial assets.

In reality, asset allocation is a subjective decision made by investors based on objective conditions. Therefore, investors' subjective attitudes also influence the formation of asset allocation decisions. On one hand, risk aversion directly suppresses investors' engagement in risky investments^[12]. On the other hand, factors such as social interaction, trust levels, and overconfidence also affect final asset allocation decisions by altering investors' risk perceptions^[13-15]. In married households, the risk preferences of the decision-maker and the spouse will interact, and leading to a compromised household asset allocation decision^[16,17]. As the education gap among core members increases, other members are more likely to be averse to financial risks compared to the decision-maker, further influencing the decision-maker's risk attitude and the asset

allocation decision through bargaining process. Based on this, the following hypothesis is proposed:

H3: An increase in the education gap will significantly enhance decision-maker's risk aversion and has a negatively impact on household risky financial asset investment.

When making asset allocation decisions, investors consider not only the risks associated with the investments, but also the background risk such as the health status, income stability, housing assets, and insurance^[18-21], to keep the overall risk faced by household manageable. This leads to the phenomenon of "limited participation". Existing research suggests that education is an important factor influencing household members' employment decisions, salary levels, and income stability^[22,23]. Therefore, as the education gap decreases, other members' income stability will improve, leading to a more diversified household income source, reducing the background risk faced by household, and consequently increasing the probability of household investment in risky financial assets. Based on this, the following hypothesis is proposed:

H4: An increase in the education gap will negatively influence investment in risky financial assets through the household's concentration of income sources.

3. Method

3.1. Data and variables

The data used in this paper is from the China Household Finance Survey 2015 to 2019 conducted by the Chinese Household Finance Survey and Research Center of Southwestern University of Finance and Economics in 2015 to 2019. This survey is conducted biennially and collects financial information at both the household and individual, making it well-suited for studies on household asset allocation^[24]. This paper focuses on married households. After excluding households with missing key variables and Winsorizing 1% of the data for continuous variables, 71,786 valid samples were obtained.

Due to the CHFS tracking only a portion of household samples and many households not changing their participation in risky financial assets over the three survey periods. Controlling for both household and time fixed effects would result in a substantial loss of samples. Therefore, this paper adopts a pooled cross section model, controlling for provincial fixed effects and time fixed effects. The regression results of the model with household and time fixed effects will be reported in the robustness tests.

Following the questionnaire design of the CHFS and the research experiences from literature^[25], the dependent variables selected in this paper are "Risk" and "Risk_p". These variables are used to examine the impact of the education gap on household financial asset investment decisions and allocation proportions. Based on literatures, the risky financial assets discussed in this paper mainly include stocks, funds, financial products, financial derivatives, non-RMB assets, and gold. Additionally, in the robustness tests, we will also consider the case of only including stocks. In the CHFS questionnaire, the householder is defined as "the person who plays a decisive role in household affairs, not necessarily the one listed on the household registration". Therefore, the core explanatory variable "Education gap", will be measured based on this definition. The education gap is calculated as the difference in years of education between the householder and spouse. For the selection of control variables, this paper includes a set of member characteristic variables (householder's gender, householder's health status, householder's age, squared age of householder, householder's years of education, spouse's health status, spouse's age, squared age of spouse, economic information attention, risk attitude), a set of household characteristic variables (size, income, net assets, number of houses, registration), as well as time and provincial dummy variables. The settings and descriptive statistics of main variables in this paper are shown in Table 1:

Table 1: Variable description and descriptive statistics

Variable	Description	mean	sd	min	max
Risk	If household holds risky financial assets (stocks, funds, financial products, financial derivatives, non-RMB assets, or gold), assign a value of 1; otherwise, assign a value of 0.	0.132	0.338	0	1
Risk_p	Risky financial assets/Total financial assets	0.0141	0.0620	0	1
Edu_g	The householder's education years minus spouse's education years	1.029	3.405	-16	19
Gender	Householder's gender, assign the value 1 to males and 0 to females.	0.788	0.409	0	1
Age	Householder's age	53.89	12.93	19	97
Age2	Square of householder's age	3,072	1,417	361	9,409
Edu	householder's education years	9.713	3.841	0	22
Health	The self-assessment of householder's health status, ranges from "very good" to "very poor", with values assigned from 1 to 5.	2.615	0.968	1	5
Age_s	Spouse's age	52.48	12.84	18	117
Age_s ²	Square of spouse's age	2,919	1,371	324	13,689
Health_s	The self-assessment of spouse's health status	2.695	0.988	1	5
Size	Household size	3.404	1.438	2	20
Attitude	Assign values from 1 to 5, ranging from a preference for "high risk, high reward" to "unwilling to take any risk"	4.168	1.123	1	5
Information	Regarding the level of attention to economic and financial information, assign values from 1 to 5, ranging from "not attentive" to "very attentive".	2.048	1.091	1	5
House	The number of owner-occupied houses	1.135	0.614	0	21
Registration	Assign a value of 1 for rural household and a value of 0 for urban household	0.318	0.466	0	1
Income	Household annual income/10000	8.519	10.18	0	61.80
Asset	Household net worth /10000	102.4	164.0	-5.844	924.8
Income_d	The ratio of the highest individual income to the combined total income of the householder and spouse	0.753	0.208	0.5	1

3.2. Method

Due to the dependent variable "Risk" is a binary variable, this paper employs a Logit model to investigate the impact of education gap on the probability of household participation in risk financial markets. The specific Logit model is setting as follow:

$$Pr(Risk_i = 1) = \frac{\exp(\beta_0 + \beta_1 Edu_g_i + \beta_2 X_i)}{1 + \exp(\beta_0 + \beta_1 Edu_g_i + \beta_2 X_i)} \quad (1)$$

Among them, Edu_g is the core explanatory variable of this paper, Risk=1 indicates that households hold risky financial assets. X is the control variable set.

Since the truncated nature of variable "Risk_p", this paper employs the Tobit model, which is suitable for analyzing truncated data, to examine the impact of education gap on the proportion of risky financial assets. The specific model is setting as follow:

$$\begin{aligned} Risk_p_i^* &= \beta_0 + \beta_1 Edu_g_i + \beta_2 X_i + \varepsilon_i, \\ Risk_p_i &= \max(0, Risk_p_i^*) \end{aligned} \quad (2)$$

The Risk_p* is a latent variable represents the true value of the proportion of risky financial assets. Risk_p is the observation value of the proportion of risky financial assets. Other variables remaining the same as the Logit model

4. Results

4.1. Education gap and risky financial assets investment

Table 2: Education gap and risky financial assets investment

Variable	(1)	(2)	(3)	(4)
	Risk		Risk_p	
Edu_g	-0.006*** (-17.90)	-0.009*** (-22.49)	-0.006*** (-15.88)	-0.011*** (-20.26)
Edu		0.016*** (41.93)		0.020*** (35.23)
Gender		-0.005* (-1.93)		-0.005 (-1.62)
Age		0.003** (2.33)		0.004** (2.51)
Age2		-0.000** (-2.04)		-0.000* (-1.91)
Health		0.001 (0.73)		-0.001 (-0.36)
Age_s		0.006*** (4.40)		0.007*** (4.44)
Age_s ²		-0.000*** (-3.56)		-0.000*** (-3.45)
Health_s		-0.000 (-0.10)		-0.003 (-1.47)
Size		-0.011*** (-11.73)		-0.014*** (-12.25)
Attitude		-0.025*** (-27.65)		-0.033*** (-25.31)
Information		0.034*** (36.33)		0.044*** (30.67)
House		0.003 (1.56)		-0.017*** (-7.18)
Registration		-0.114*** (-23.65)		-0.132*** (-22.86)
Income		0.001*** (13.09)		0.002*** (16.82)
Asset		0.000*** (20.93)		0.000*** (11.90)
Province		Yes		Yes
Year		Yes		Yes
N	71,786	71,786	71,786	71,786
Pseudo R2	0.005	0.341	0.006	0.482

Note: The logit model reports marginal effects, with z-value in (). The Tobit model reports regression coefficients, with t-value in (). * p<0.1, ** p<0.05, *** p<0.01.

In the baseline regression, this paper will examine the impact of the education gap on household's risky financial assets investment decisions. Table 2 presents the corresponding results.

The dependent variable in columns 1 and 2 is “Risk”, which is regressed using a Logit model. The dependent variable in columns 3 and 4 is the “Risk_p”, which is regressed using a Tobit model.

The regression results show that the average marginal effect (regression coefficient) of the key explanatory variable “Edu_g” is significantly less than 0 at the 1% level in all columns. These results indicate that as the education gap between household core members widens, both the probability and the proportion of the household holding risky financial assets are significantly suppressed. For example, in column 2, controlling for other conditions, for every additional unit of education gap, the probability of the household participating in risky financial asset investment decreases by 0.9%. This provides empirical support for H1.

Regarding the regression results of other control variables, the improvement in the householder’s education years, household income and wealth stimulates investment in risky financial assets. Age shows a “hump-shaped” relationship with risky financial asset investment. Oversized household, low financial information attention, and high risk aversion significantly inhibiting household participation in risky financial investments. Additionally, rural households are less likely to engage in risky financial activities. These conclusions are generally consistent with literatures.

4.2. Discussion on Robustness

Considering the potential endogeneity issues in the baseline regression, this paper attempts to use panel models and instrumental variable for endogeneity treatment. Table 3 reports the corresponding results. Specifically, the column 1 presents the results of panel Logit model controlling for household and time fixed effects, while the column 2 reports the results of a panel Tobit model. As mentioned in the part 3, due to the CHFS tracking only a subset of samples and the majority of households maintaining their risky asset holdings unchanged during the survey period, there is a substantial loss of samples. Specifically, the sample sizes for the models in columns 1 and 2 are 2,283 and 5,949. Additionally, variables that do not change over time are no longer controlled in these columns. From the results in columns 1 and 2, the education gap still has a negative impact on both the probability and proportion of household’s risky financial asset investment.

Columns 3 and 4 report the results of the IVProbit model and IVTobit model. Based on literatures’ experience, the instrumental variable used in this paper is the average education gap among core members in the city where the household is located. On the one hand, the average education gap of core members in the household’s city reflects the matching situation in the local marriage market, which significantly influences the internal education gap within households. On the other hand, the average education gap in the household’s city is not directly related to the household’s risky financial investment decisions.

Table 3: Endogenous treatment

	(1)	(2)	(3)	(4)
Variable	Logit	Tobit	IVProbit	IVTobit
Edu_g	-0.032*	-0.015***	-0.303***	-0.057***
	(-1.76)	(-12.28)	(-16.63)	(-16.63)
Controls	Yes	Yes	Yes	Yes
Wald			0.000	0.000
AR			0.000	0.000
N	2,283	5,949	71,786	71,786

Note: Report regression coefficients. * p<0.1, ** p<0.05, *** p<0.01.

From the results in columns 3 and 4, after using the instrumental variable, the regression coefficient for the “Edu_g” variable remains significantly greater than 0 at the 1% level, and the Ar test rejects the possibility of weak instrument variable. Combining the regression results from Table

3, the conclusion that H1 is remains robust.

To further examine the impact of a broader definition of risky financial assets, this paper narrows the definition of risky financial assets to include only stocks, and investigates the impact of education gap on household stock investment. Table 4 reports the corresponding results, the control variables in each column are setting same as those in the corresponding columns of Table 2. In the regression results, the average marginal effects (regression coefficients) of “Edu_g” variable doesn’t significant changes compared to the results in Table 2. The average marginal effects (regression coefficients) remain significantly less than 0 at the 1% level, H1 remains robust.

Table 4: Robustness test – The substitution of explained variable

	(1)	(2)	(3)	(4)
Variable	Risk		Risk_p	
Edu_g	-0.004*** (-14.77)	-0.006*** (-17.03)	-0.006*** (-13.30)	-0.010*** (-15.48)
Controls		Yes		Yes
Province		Yes		Yes
Year		Yes		Yes
N	71,786	71,786	71,786	71,786
Pseudo R2	0.004	0.352	0.006	0.520

Note: The logit model reports marginal effects, with z-value in (). The Tobit model reports regression coefficients, with t-value in (). * p<0.1, ** p<0.05, *** p<0.01.

In the CHFS data, some households’ respondent is not the householder, which leads to the omission of certain characteristics like risk aversion of the householder. This paper conducts a subsample test by excluding samples that the respondent is not the householder. Table 5 reports the corresponding results, with each model specification matching the corresponding column in Table 2. From the regression results, it can be find that the average marginal effect (regression coefficient) of the core explanatory variable “Edu_g” consistent with the results in Table 2. The conclusion that the expansion of the education gap inhibits household participation in risky financial asset investments remains robust.

Table 5: Robustness test – Subsample

	(1)	(2)	(3)	(4)
Variable	Risk		Risk_p	
Edu_g	-0.007*** (-15.50)	-0.009*** (-17.08)	-0.007*** (-13.64)	-0.011*** (-15.05)
Controls		Yes		Yes
Province		Yes		Yes
Year		Yes		Yes
N	43,522	43,522	43,522	43,522
Pseudo R2	0.006	0.353	0.008	0.492

Note: The logit model reports marginal effects, with z-value in (). The Tobit model reports regression coefficients, with t-value in (). * p<0.1, ** p<0.05, *** p<0.01.

4.3. Mechanism Discussion

To examine H2 and H3, this paper will analyze the impact of education gap on householder’s risk aversion and economic information attention. Table 6 presents the results. Since CHFS solely gathers the data of risk aversion and economic information attention to the respondents, samples that the householder is not the respondent were excluded.

From the regression results in Column 1, on one hand, the regression coefficient for the Edu variable is significantly greater than 0 at the 1% level. This indicates that an increase in education years has a significantly positive effect on economic information attention. On the other hand, the regression coefficient for the education gap is significantly less than 0 at the 1% level, indicating that as the education gap among core members widens, there is a decrease in householder's economic information attention. Combined with the conclusion from Table 2 that economic information attention stimulates household's investment in risky financial assets, H2 has been tested.

According to the results in Column 2, on the one hand, the increase in the householders' education significantly reduces their risk aversion. This finding is consistent with literatures that suggest higher education lead to greater risk preference. On the other hand, the regression coefficient for "Edu_g" is significantly greater than 0 at the 1% level. As the education gap among core members widens, it influences the householder's risk attitude through the bargaining process. Combined with the regression results in Table 2, which show that risk aversion inhibits household investment in risky financial assets, H3 has been tested.

Table 6: Education gap and economic information attention (risk aversion)

	(1)	(2)
Variable	Information	Attitude
Edu_g	-0.028***	0.019***
	(-8.89)	(5.63)
Edu	0.132***	-0.055***
	(39.53)	(-15.58)
Controls	Yes	Yes
Province	Yes	Yes
Year	Yes	Yes
N	43,522	43,522
Pseudo R2	0.0719	0.102

Note: The Ologit model reports regression coefficients, with z-value in (). * p<0.1, ** p<0.05, *** p<0.01.

Table 7: Education gap and income concentration

	(1)	(2)	(3)
Variable	Income_d	Risk	Risk_p
Edu_g	0.006***	-0.010***	-0.010***
	(7.94)	(-15.05)	(-13.71)
Income_d		-0.038***	-0.026***
		(-4.21)	(-2.63)
Controls	Yes	Yes	Yes
Province	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	32,795	32,795	32,795
Pseudo R2	0.116	0.340	0.486

Note: The logit model reports marginal effects, with z-value in (). The Tobit model reports regression coefficients, with t-value in (). * p<0.1, ** p<0.05, *** p<0.01.

To test H4, Table 7 reports the regression results about the impact of education gap on household's income concentration. Due to some households where the householder and spouse don't report their income or their personal income was zero, the sample size used for the analysis is 32,795. In Column 1, the regression coefficient for "Edu_g" is significantly greater than 0 at the 1% level. This indicates that as the education gap among core members widens, household income

becomes more concentrated. According to the results in Columns 2 and 3, the household's income concentration has a significant negative impact on both the probability and the proportion of household investments in risky financial assets. The widening education gap among core members leads to a more concentrated household income, which is unfavorable for diversifying income risk, and it will suppress household participation in risky financial asset investments through the channel of background risk, H4 has been tested.

5. Conclusion

Utilizing data from the China Household Finance Survey from 2015 to 2019, this paper systematically examines the impact of education gap on household risky financial investment decisions and its transmission mechanisms. The research findings indicate that education gap significantly negatively affects both the probability and the proportion of household investments in risky financial assets. This conclusion remains robust after endogeneity treatment, substituting dependent variable settings, and conducting subsample tests. The mechanisms test finds that widening education gap significantly reduces the attention of householders to economic information and increases their risk aversion, leading to lower participation in risky financial asset investments. Excessive education gap results in a more concentrated household income source, leads to a lower probability and proportion of investments in risky financial assets.

The above findings have significant policy implications. Firstly, it is imperative to promote financial education at the household. Given that some households delegate asset management primarily to a single member, conventional financial institutions or community-based financial literacy programs often focus solely on this individual. However, asset allocation is a collaborative decision involving household core members, and their respective attributes will influence the outcome. Neglecting financial literacy education for the non-managing spouse may compromise the rationality of household asset allocation. To enhance such rationality, greater attention should be directed towards educating members who participate in household decision-making but possess lower educational levels. Secondly, there is a need to introduce and popularize financial advisory services. Leveraging the advantages of technology, financial institutions can offer comprehensive advisory services tailored to household members with limited educational backgrounds who struggle with comprehending investment knowledge and exhibit extreme risk aversion tendencies. This approach can prevent them from opposing sound made by other members due to ambiguous avoidance behavior and excessive aversion to risk during risky financial asset investment negotiations, thereby fostering diversification in household asset allocation. Thirdly, it is advisable to encourage financial institutions to provide more diverse and easily understandable financial products. When designing and promoting products targeted at families, it is crucial that these are comprehensible by core members. For those with higher education levels and greater financial literacy who typically assume decision-making roles within the household, product returns and risks should be detailed using various indicators; whereas for less educated members within the same household, product features should be presented through approachable case rather than technical explanations which could lead them to reject reasonable investment plans due to ambiguity avoidance.

Acknowledgements

This research was funded by the Chongqing Social Science Planning Fund, grant number (2021BS052).

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