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Personality Traits and Risk Investment Decisions: An Examination Based on Microdata from Chinese Household Finance

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Abstract:

Introduction: As the fundamental unit of socio-economic activities, the effectiveness of households' asset portfolios is crucial for steady wealth growth and effective risk management, forming the cornerstone of a robust financial system and economic development. Utilizing data from the China Household Finance Survey, this study explores the significance of personality traits on the effectiveness of Chinese households' financial asset portfolios from a cognitive perspective.

Objectives: The primary objective of this study is to analyze the impact of personality traits on the effectiveness of Chinese households' financial asset portfolios. It aims to investigate how non-neurotic, openness, and agreeableness personality traits influence cognitive abilities and, consequently, portfolio performance. Additionally, the study seeks to explore the heterogeneity of these effects across rural and urban households, regional differences, and income levels.

Methods: Drawing on cognitive psychology and personality economics, this study employs a quantitative approach using data from the China Household Finance Survey. It conducts in-depth analysis through regression models to examine the relationship between personality traits and portfolio effectiveness. The research focuses on key personality dimensions, including non-neuroticism, openness, and agreeableness, and their correlation with cognitive abilities and investment behaviors.

Results: The results reveal a significant correlation between personality traits and cognitive abilities. Specifically, non-neurotic personality traits contribute positively to enhancing individuals' cognitive abilities, leading to more effective portfolios. An increase in household heads' openness to experience is associated with improved portfolio effectiveness. Conversely, the development of agreeableness traits is detrimental to enhancing portfolio effectiveness, with notable heterogeneity across rural and urban households, regions (eastern, central, and western), and income levels. Mechanism analysis suggests that extroversion fosters deeper cognitive abilities, enhancing risk-taking willingness and portfolio effectiveness, while agreeableness leads to superficial cognitive abilities, increasing conformity in investment decisions and reducing portfolio effectiveness.

Conclusions: This study offers a novel perspective on the factors influencing household financial decisions from the viewpoint of personality economics. By examining the relationship between personality traits and the effectiveness of financial asset portfolios, it contributes significantly to a comprehensive understanding of household investment behaviors. The findings highlight the importance of considering personality dimensions in financial decision-making and investment strategies, suggesting potential interventions to improve portfolio effectiveness and financial well-being.

Keywords: personality traits; portfolio effectiveness; cognitive abilities; non-neurotic personality

INTRODUCTION

Residents' active participation in the financial market not only enables them to accumulate and increase personal wealth but also effectively diversifies risks through diversified investment approaches, providing better security for future living. More importantly, residents' engagement in the financial market is essentially participation in the country's economic development process. Their investment behaviors directly or indirectly promote industrial upgrading, technological innovation, and employment growth, making significant contributions to the country's sustained prosperity and stability. Furthermore, the development and improvement of the financial market offer an important pathway to narrow the wealth gap and achieve common prosperity. By providing more equitable and transparent financial services, it enables more residents to share in the fruits of economic development. Therefore, residents' active participation in the financial market is not only a necessity for personal wealth growth but also an inevitable choice to promote social progress and achieve national prosperity.

However, according to the 2019 China Household Finance Survey (CHFS) data, Chinese households' participation in the financial market is not high, and their asset portfolios are relatively undiversified. Only 5.9% of households hold risky financial assets such as stocks, funds, and bonds. Among households participating in the financial market, a staggering 68.7% invest in only one type of financial asset. In contrast, data from the Survey of Consumer Finances (SCF) in the United States for the same year shows that 29.8% of American households hold risky financial assets, with only 43.61% investing in a single financial asset. This comparison highlights that compared to developed countries in Europe and America, Chinese households' participation in

the financial market is significantly lower, and their asset structures are more conservative. Such limitations in investment portfolios not only hinder the achievement of household financial goals but also adversely affect social welfare.In response, numerous scholars both domestically and internationally have conducted in-depth studies on factors influencing household financial asset allocation. These studies explore different dimensions, including human capital characteristics, household background characteristics, and economic environment variables. They primarily focus on two aspects of household participation in the financial market: the degree of participation and the diversity of investment portfolios, providing valuable references for better understanding household financial asset allocation.

Firstly, due to individual differences, investors choose suitable investment portfolios based on their actual situations. Human capital characteristics such as age[1], cognitive abilities[2], income[3], financial knowledge[4], years of education[5], financial literacy[6], and risk attitudes may be important factors influencing the diversity of household financial asset allocation[7]. Secondly, differences in household background characteristics lead to varying tendencies in choosing asset portfolios. Low-income households, constrained by liquidity, often find it difficult to participate in high-threshold investment activities, resulting in relatively undiversified asset portfolios[8]. Additionally, social pension insurance can significantly promote household participation in risky financial markets and improve the effectiveness of household investment portfolios by reducing precautionary savings. Furthermore, owning a home can crowd out households' investments in the financial market, thereby reducing the effectiveness of household asset portfolios and affecting the diversity and efficiency of household asset allocation. Some scholars have also studied macro-environmental characteristic variables, finding that digital finance, mobile payments, and financial accessibility significantly impact household financial market participation and financial asset choice.

Besides human capital and household background factors, some scholars have begun to focus on the important role of personality traits, a psychological factor, in investment behavior. The increase in investors' non-cognitive abilities promotes household participation in the financial market and raises the proportion of household investments in risky financial assets[9]. In terms of household stock investment, value personality under the openness dimension significantly influences investment decisions. However, stocks represent only a portion of household assets, and the impact of personality traits on household investment decisions involves a broader range of asset categories. Therefore, to fully understand how personality traits affect households' choices among different assets, it is necessary to move beyond studying single asset types and toward more comprehensive portfolio analysis[10]. As the openness personality trait of household heads increases, households' participation in the financial market correspondingly rises, and the proportion of risky financial assets, especially stocks, also increases. This further reveals the relationship between household heads' openness personality traits and household asset allocation. Nevertheless, current research on how personality traits affect the effectiveness of household financial asset portfolios remains inadequate.

The core objective of household financial asset investment is to optimize asset allocation to achieve maximum investment returns. Personality traits, as a crucial individual psychological factor, cannot be ignored in their influence on investment behavior. Cognitive abilities and personality traits, as the two pillars of individual characteristics, are closely interrelated. When exploring the key individual difference of personality traits, we must acknowledge the relationship between the two. The correlation between personality traits and cognitive abilities changes with age. Not only does extroversion have a significant negative impact on cognitive abilities, but neuroticism also exhibits a significant negative relationship with cognitive abilities[11]. Openness and agreeableness, on the other hand, are positively correlated with cognitive abilities. Existing research has focused on the independent effects of personality traits and cognitive abilities on household asset allocation, while the interaction between the two and their impact on household asset allocation have not been fully explored. Therefore, it is necessary to further reveal the complex relationship between these two factors to more comprehensively understand the decision-making process of household financial asset allocation. Based on this background, this paper utilizes data from the 2010 and 2012 China Family Panel Studies (CFPS) to investigate the impact of personality traits on household asset allocation behavior.

The main marginal contributions of this paper are as follows: (1) From the perspective of personality economics, it explores the impact of personality traits on the effectiveness of household financial asset portfolios. By introducing the Sharpe ratio as a metric to measure the effectiveness of household financial asset portfolios, it breaks through the limitation of previous studies that primarily focused on single asset types. The paper also delves into the broad influence of personality traits on household investment decisions, finding that the development of openness personality traits enhances the effectiveness of financial asset portfolios, while agreeableness personality traits have a negative impact on the effectiveness of household financial asset portfolios. (2) It clarifies the mechanism through which personality traits affect the effectiveness of household financial asset portfolios from two perspectives: enhancing risk-taking willingness and investment conformity. This provides a new perspective for understanding the role of personality traits in investment decision-making. Current domestic research mainly focuses on the

independent effects of personality traits and cognitive abilities on household asset choice. However, this study finds that personality traits influence individual investment behavior by affecting different levels of cognitive abilities. (3) From the perspectives of urban-rural, regional, and income disparities, it explores the heterogeneous impact of personality traits on the effectiveness of household asset portfolios, providing more specific and feasible suggestions for government policies and household decision-making.

OBJECTIVES

1.Theoretical Analysis and Research Hypothesis

1.1. The Impact of Personality Traits on Household Investment Choices

Among various personality classification methods, the "Big Five" personality traits model is widely accepted and applied due to its systematic and comprehensive nature. This model divides personality traits into five dimensions: conscientiousness, agreeableness, extraversion, openness, and neuroticism, which together constitute an individual's complete personality profile. Investors with different personality traits exhibit unique characteristics in their investment choices and behavioral decision-making.

Investors with conscientious personalities emphasize rationality and logic in their investment decisions [12], but excessive analysis, risk aversion, and conservative preferences may limit the effectiveness of their household financial asset portfolios. Extraverted investors are emotionally positive, have a strong desire for interpersonal interaction, are optimistic about future markets, and confident in their investment abilities [13]. However, excessive optimism may lead to risky behaviors and ignorance of potential risks, affecting their investment performance.

In contrast, investors with open personalities possess a vivid imagination and curiosity about new things. They dare to pursue high-risk, high-return investment opportunities. This tendency to try and innovate helps them capture new market opportunities, positively impacting the effectiveness of household financial asset portfolios[14]. Investors with agreeable personalities are easily influenced by others and mainstream trends, showing a herd mentality. They tend to follow market trends, lacking independent judgment, which may cause them to miss unique investment opportunities or blindly follow market hotspots while ignoring risks, thus negatively affecting their household financial asset portfolios. Neurotic investors, due to emotional instability, tend to feel anxious and tense when making decisions about risky financial assets, leaning towards conservative choices. They hold pessimistic expectations about future asset prices and interest payments, developing a resistant attitude towards risky assets, limiting the diversity and potential returns of their investment portfolios. Personality traits significantly influence investors' psychological and behavioral tendencies, thereby significantly impacting their investment behaviors. Thus, this paper proposes Research Hypothesis 1-6.

Study Hypothesis 1: Rour personality and the effectiveness of family asset portfolio.

Study Hypothesis 2: Both the extroverted personality and the effectiveness of the family portfolio impact positively.

Study Hypothesis 3: Open personality and the effectiveness of the family portfolio impact positively.

Study Hypothesis 4: Common personality and the effectiveness of family assets are negatively affected.

Study Hypothesis 5: Neurotic personality and the effectiveness of family assets.

1.2. Mechanism Analysis

Personality traits significantly influence cognitive abilities by affecting individuals' cognitive styles, emotional stability, and other cognitive-related factors. This influence is reflected not only in the efficiency of cognitive task completion but also in various aspects such as learning, decision-making, and problem-solving abilities. The interaction between personality traits and cognitive abilities significantly impacts the breadth and depth of households' holdings of risky financial assets[15]. The correlation between the two may change with age, and there is also a significant negative relationship between neuroticism and cognitive abilities[16]. Openness and agreeableness have a positive correlation with cognitive abilities[17].

The cognitive ability classification model divides cognitive abilities into six levels, from low to high: memorization, comprehension, application, analysis, evaluation, and creation, which serve as criteria for measuring critical thinking abilities[18]. Among them, simple memorization, comprehension, and application of knowledge belong to the shallow cognitive level, while improvements in analysis, evaluation, and creation abilities belong to the deep cognitive level. An increase in shallow cognitive abilities involves absorbing more external information but lacks deep analysis and independent thinking. Information

processing tends to rely more on external information sources rather than independent judgment. Deep cognitive abilities allow individuals to accumulate more information and experience in social interactions, with stronger communication and information acquisition skills. This enables better understanding and analysis of financial market dynamics, facilitating more reasonable and effective decisions in household financial asset portfolio choices through in-depth analysis of investment information and keen insight into investment opportunities. Additionally, individuals with higher cognitive abilities demonstrate a higher tolerance for risks and uncertainties. When cognitive abilities are low, improving them can increase participation in financing and securities lending through risk preference[19].

The openness personality trait, characterized by rich imagination, a strong desire for knowledge, and openness to new things, significantly contributes to enhancing investors' deep cognitive abilities. This trait enables investors to deeply understand risky financial assets and comprehensively evaluate investment opportunities and risks, potentially exhibiting a higher willingness to take risks and demonstrating higher effectiveness and adaptability in the investment process. However, the agreeableness personality trait limits investors' cognitive abilities. Although it may promote improvement in shallow cognitive abilities (i.e., absorbing more external information), this improvement lacks deep analysis and independent thinking. Such investors often tend to follow the crowd, overly rely on others' opinions, and lack independent thinking and critical thinking, making it difficult for them to maintain rationality in investment decisions, thereby affecting the effectiveness of asset allocation. Investors with different personality traits have varying cognitive abilities, influencing how they process financial information and make investment decisions, which is reflected in their investment portfolio choices and performance. Thus, this paper proposes Research Hypothesis 6.

Research Hypothesis 6: The openness personality trait promotes the improvement of individuals' deep cognitive abilities, exhibiting a higher willingness to take risks and having a significant positive impact on the effectiveness of household financial asset portfolios. In contrast, the agreeableness personality trait enhances individuals' shallow cognitive abilities, leading to a herd mentality and reducing the effectiveness of household asset portfolios.

METHODS

2. Data Selection and Variable Setting

2.1.Data selection

The data for this article comes from the China Family Panel Studies (CFPS) project, conducted nationwide by the China Social Science Survey Center. The focus of the study is to explore how the personality traits of household heads affect household investment behavior. Specifically, we will investigate whether the personality traits of household heads influence household participation in financial markets, and whether personality traits affect the effectiveness of household financial portfolios by influencing individual cognitive abilities. Therefore, it is necessary to construct core variables: personality traits, cognitive abilities, and household asset structure variables. The CFPS questionnaire includes self-answered questions by the household head and a household finance survey section. Thus, this article selects the household head (the household financial decision-maker) as the research subject, obtains microdata on the household head's personality traits from the adult questionnaire data, and obtains household financial asset holdings and other household microdata from the household questionnaire data. The household head information and household information are matched based on the household code. The CFPS made significant adjustments to the adult self-answer questionnaire in 2014, and specific questions measuring personality traits were missing. Therefore, this article selects CFPS data from 2010 and 2012 for the study. After excluding missing data, 12,553 full sample data points are finally retained.

2.1.1. Measurement of the "Big Five" Personality Traits

The theoretical development and integration of experimental economics and behavioral economics enable researchers to conduct measurement studies on preferences, rationality, beliefs, etc. [18]. The China Family Panel Studies project includes self-answered questions and interviewer-answered sections, providing rich data for multi-dimensional measurement of participants' personalities. By analyzing the questions in the CFPS questionnaire, five main dimensions and 14 subdivisions of personality traits are constructed. These include the "Big Five" personality dimensions: conscientiousness, extraversion, agreeableness, openness, and neuroticism. Under the dimension of conscientiousness[20], we examine orderliness, enterprising spirit, and prudence; under the dimension of extraversion, we focus on warmth, gregariousness, and positive emotions; under the dimension of agreeableness, we explore trust, altruism, and compliance; under the dimension of openness, we focus on actions and values; and under the dimension of neuroticism, we analyze characteristics such as anxiety, depression, and vulnerability. All evaluation

scores are converted to a 5-point system, where 1 indicates completely disagree and 5 indicates completely agree. The average score obtained is used as the score for that personality dimension, and a higher score indicates a stronger personality trait. See Table 1 for details.

2.1.2. Cognitive Abilities

Cognitive abilities can dimensions from two measurement: word memory ability and mathematical ability[21]. The China Family Panel Studies questionnaire measures the household head's word ability and mathematical ability through some simple questions. Based on the average score of each section, the scores are standardized to range from 0 to 5. A higher score indicates higher cognitive abilities.

Table 1. Questions for Measuring Personality Traits and Cognitive Abilities in the CFPS Survey

Measurement of the "Big Five" personality traits		
Dimension	**Measurement Content**	**Evaluation Criteria**
conscientiousness	The level of neatness in the respondents' attire, the importance they place on achievement, their degree of agreement with the notion that "hard work pays off," and their level of suspicion towards the interviewer.	The respondents' level of organization, career ambition, and prudence.
extraversion	The respondents' level of interpersonal skills, the importance they place on not feeling lonely, and the significance they attach to having fun in life.	The respondents' enthusiasm, sociability, and positive emotionality.
agreeableness	The degree of cooperation shown by the respondents during the survey, and the measurement of the importance they place on getting along well with others and not being disliked.	The respondents' level of trust, altruism, and compliance.
openness	The respondents' interest in the survey, and the importance they place on passing on their lineage/having offspring.	The respondents' level of activity and values.
neuroticism	Frequency of feeling mentally stressed, restless, emotionally depressed, hopeless about the future, finding it difficult to do anything, and feeling that life has no meaning.	The respondents' level of anxiety, depression, and vulnerability.
Measurement of cognitive abilities		
Memory ability		On a scale of 0-10, with higher scores indicating better performance.
Mathematical ability		On a scale of 0-15, with higher scores indicating better performance.

2.1.3. Portfolio Effectiveness

Based on risk and return characteristics, financial assets invested by Chinese households can be broadly classified into three categories: deposits, bonds, and equities[22]. Among these, equity assets include stocks, derivatives, etc. Due to difficulties in obtaining specific data from individual household investment accounts, we cannot directly calculate the return rate of investments in the household financial market. Instead, we adopt the index substitution method to estimate the risk and return rate of various assets[23]. By considering the proportion of each risky asset in the total risky assets of the household, we can calculate the Sharpe

ratio of the household's financial asset portfolio using a weighted average. A higher Sharpe ratio indicates more effective household asset allocation[24].

$$\mathrm{Sap_r it} = \frac{\mathrm{E(R)} - \mathrm{R_f}}{\delta} \quad (1)$$

In this context, represents the weighted return rate of various household assets, denotes the risk-free return rate, which is measured here using the one-year fixed deposit interest rate, and signifies the variance of the household's risky asset portfolio. The risk of deposit assets is considered zero. For bond assets, the return and risk are set based on the monthly average return rate and standard deviation of the China Securities Comprehensive Bond Index[25]. For equity assets, the benchmark for return and risk is established using the monthly return rate and standard deviation of the Shanghai Stock Exchange Index and Shenzhen Stock Exchange Index, weighted by transaction volume[26]. Since we are utilizing household personal financial account data from 2010 and 2012, the time series data interval for selecting surrogate indices spans from January 2005 to December 2015.

2.2. Descriptive Statistics of Variables

As shown in table 2, the results of descriptive statistics reveal that household heads exhibit the strongest personality traits in agreeableness and extraversion, with average scores of 3.950 and 3.900, respectively. They are followed by conscientiousness and openness, with average scores of 3.040 and 2.780, respectively. Neuroticism is the weakest trait, with an average score of 1.500. The cognitive ability level of household heads ranges from 2 to 3, indicating a moderate level of cognitive ability. The average participation rate in the household risk market is approximately 6%, with a Sharpe ratio of only 0.050. The overall sample has an average age of 50.34 years. Male household heads account for 74.0% of the sample, and most households consist of 3-4 members. The average years of education for household heads are 7-8 years, equivalent to a junior high school education. Only 0.4% of household heads are employed in the financial industry. Most household heads are married or cohabiting, self-report good overall health status, and a majority own their homes. Urban household samples account for 31.0% of the total. The average per capita income of households is 10,185.07 yuan, and the average net asset of households is 290,666.20 yuan.(extraversion, agreeableness, openness, and conscientiousness, as well as low neuroticism, relate to high levels of work engagement.）

Table 2. Descriptive Statistics of Variables

Variable	Variable Explanation	Sample Size	Mean	Variance	Minimum Value	Maximum Value
sap	Sharpe Ratio	12553	0.0500	0.210	0.000	1.050
have_market	Whether the household participates in the financial market (1 for yes, 0 for no).	12553	0.0600	0.240	0.000	1.000
con	conscientiousness	12106	3.040	0.490	1.290	5.000
ext	extraversion	12553	3.900	0.670	0.900	5.000
agr	agreeableness	12505	3.950	0.570	1.290	5.000
ope	openness	12553	2.780	0.760	0.860	5.000
neu	neuroticism	12453	1.500	0.650	1.000	5.000
know	Measurement of cognitive abilities	12553	2.340	1.300	0.000	5.000
gender	Gender (1 for male, 0 for female).	12553	0.740	0.440	0.000	1.000
age	Age	12553	50.24	12.80	16.000	97
age2	age2	12553	2688	1346	256.000	9409
marry	Marital status (1 for single, 0 for not single).	12553	0.880	0.320	0.000	1.000
eduy	Years of education	12553	7.230	4.470	0.000	22.000
familysize	Household size	12553	3.790	1.720	1.000	18.000
child_rit	Proportion of children in the household	11926	0.410	0.230	0.000	0.920

hukou	Household registration type (1 for urban, 0 for rural).）	12541	0.310	0.460	0.000	1.000
occupation	Whether financial industry practitioner (1 for yes, 0 for no).	12553	0.004	0.067	0.000	1.000
ethnicity	Whether Han ethnicity (1 for yes, 0 for no).	12553	0.920	0.270	0.000	1.000
unhealth	Health status (1 for poor, 0 for good).	12553	0.180	0.380	0.000	1.000
house	Whether owning a house (1 for yes, 0 for no).	12553	0.850	0.360	0.000	1.000
lnindinc_net	Logarithm of household per capita income	12505	8.650	1.120	0.510	13.82
lntotal_asset	Logarithm of household net assets	12054	11.55	1.640	0.000	17.22

2.3. Model Specification

This paper primarily investigates investors' investment behaviors in financial markets. Since only households participating in financial markets can observe the effectiveness index of asset portfolios, there exists a sample selection bias issue. To enhance the accuracy of model estimation, the Heckman two-step method (1979) is employed to correct the model[27]. Firstly, a probit model is used to predict whether households participate in financial markets. Then, based on the prediction results, the inverse Mills ratio is calculated. The model is set as follows:

$$\mathrm{Market_join_{ij}} = 1\left(\alpha \cdot \mathrm{Persona_{ij}} + \beta \cdot \mathrm{X_{ij}} + \omega_j + \varepsilon_{ij} > 0\right) \quad (2)$$

Where represents the main explanatory variables, namely personality traits measured by the "Big Five" personality traits, including conscientiousness, extraversion, agreeableness, openness, and neuroticism. denotes control variables, including individual characteristics and household background characteristics. Additionally, regional fixed effects and is the residual difference,.

Secondly, an OLS model is applied to estimate the impact of personality traits on the effectiveness of household financial asset portfolios. During model estimation, the inverse Mills ratio estimated from the previous probit model is incorporated into the regression equation as an explanatory variable[28]. The specific model is set as follows:

$$\mathrm{Sap_rit_{ij}} = \begin{cases} \text{Observable}, & \mathrm{Market_join_{ij}} = 1 \\ \text{Unobservable}, & \mathrm{Market_join_{ij}} = 0 \end{cases}$$

$$\mathrm{Sap_rit_{ij}} = \alpha \cdot \mathrm{Persona_{ij}} + \beta \cdot \mathrm{X_{ij}} + \gamma \cdot \lambda_{ij} + \omega_j + \varepsilon_{ij}$$

$$\mathrm{Sap_rit_{ij}} = \begin{cases} \alpha \cdot \mathrm{Persona_{ij}} + \beta \cdot \mathrm{X_{ij}} + \gamma \cdot \lambda_{ij} + \omega_j + \varepsilon_{ij}, & \mathrm{Sap_rit} > 0 \\ 0, & \mathrm{Sap_rit} < 0 \end{cases}$$

Where represents the Sharpe ratio of household asset portfolios. If a household participates in financial markets, the Sharpe value can be observed; otherwise, it cannot. denotes the inverse Mills ratio estimated in the first stage. If the coefficient is significantly different from zero, it indicates that direct OLS estimation would result in sample selection bias, and the Heckman two-step method should be adopted to correct the estimation error.

RESULTS

3.Empirical Analysis

3.1.Personality Traits and the Effectiveness of Household Financial Asset Portfolios

Table 3 reports the test results of personality traits on the effectiveness of household financial asset portfolios. Column (1) presents the regression results of financial market participation decision variance. Studies have shown that households with more underage children have a lower willingness to participate in financial markets. Therefore, the household juvenile dependency ratio is used as an identification variable [20]. In this paper, children aged below 14 are defined as juveniles. Column (2) displays

the Heckman second-stage regression results without controlling for cognitive ability variables. The estimation results reveal that the inverse Mills index (imr) is significantly positive at the 1% level, indicating a sample selection issue when using general regression methods. Among personality trait variables, agreeableness has a coefficient of -0.039, openness has a coefficient of 0.031, and both are significant at the 1% level. Other personality dimensions are not significant. This suggests that agreeableness and openness dimensions of personality have an impact on heads of households' financial market participation and portfolio effectiveness. For every one-unit standard deviation increase in agreeableness, the Sharpe ratio of household financial asset portfolio effectiveness decreases by 0.9%. For every one-unit standard deviation increase in openness, the Sharpe ratio increases by 0.7%. Conscientiousness, extraversion, and neuroticism do not directly affect household portfolio effectiveness. Column (3) exhibits the regression analysis results of cognitive ability without controlling for personality trait variables. The findings indicate that cognitive ability has a coefficient of 0.031 and is significantly positive at the 1% significance level. This implies a positive correlation between individuals' cognitive ability levels and the effectiveness of their household financial asset portfolios, where higher cognitive ability levels correspond to higher portfolio effectiveness.This tests hypothesis 3,4. Rigorous, neurotic personality coefficient is negative, extroverted personality coefficient is positive, but not significant, the result to some extent for hypothesis 1,2, and 5, because the rigor, neuroticism and extroverted personality did not show obvious correlation, so the following will mainly discuss openness and gay influence on the effectiveness of family financial portfolio.

Regarding other control variables, among human capital characteristics, male heads of households have a negative impact on portfolio effectiveness compared to females. Males tend to prefer risk more than females, leading to excessively high portfolio risks and consequently reducing portfolio effectiveness. The age of the head of the household exhibits a nonlinear effect on portfolio effectiveness. The education level of the head of the household and being employed in the financial industry have significantly positive coefficients. This is because individuals with higher education levels and those working in finance often have a deeper understanding of risk. When allocating assets, they focus more on risk management and control, employing strategies like diversification and hedging to reduce overall portfolio risk and enhance portfolio effectiveness. Compared to urban households, rural households in China have lower portfolio effectiveness due to traditional influences that favor savings over financial investments, prioritizing safety and value preservation over high returns, leading to conservative asset allocation. Among household background characteristics, household size has a significantly negative coefficient. Larger households face more consumption expenditures, constraining their investment participation and reducing the optimal allocation of financial assets, thereby lowering portfolio effectiveness. Owning a home has a significantly negative coefficient, indicating that housing crowding out effect reduces households' investments in risky financial markets, thus decreasing portfolio effectiveness [11]. Furthermore, portfolio effectiveness increases with higher household net worth and income levels. Households with greater assets and income enjoy more investment opportunities, allowing them to diversify into various financial products like stocks, funds, and real estate, thereby spreading risk and achieving efficient asset allocation, resulting in higher portfolio effectiveness.

Table 3.The Impact of Personality Traits on the Effectiveness of Household Financial Asset Portfolios

	(1)	(2)	(3)
	Financial Market Participation	Sharpe Ratio	Sharpe Ratio
	Heckman First Stage	Hackman Second Stage	Hackman Second Stage
con	-0.032	-0.014	
	(0.055)	(0.011)	
ext	0.057	0.013	
	(0.052)	(0.008)	
agr	-0.158**	-0.039***	
	(0.057)	(0.009)	
ope	0.082*	0.031***	
	(0.034)	(0.007)	
neu	-0.027	0.004	
	(0.047)	(0.008)	
know	0.188***		0.031***
	(0.047)		(0.008)
gender	-0.273***	-0.068***	-0.077***

	(0.054)	(0.013)	(0.015)
age	0.056***	0.017***	0.019***
	(0.015)	(0.003)	(0.003)
age2	-0.001***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
marry	0.106	0.009	0.008
	(0.111)	(0.020)	(0.020)
eduy	0.038**	0.016***	0.012***
	(0.013)	(0.002)	(0.002)
familysize	-0.157*	-0.009**	-0.010***
	(0.061)	(0.003)	(0.003)
child_rit	0.905*		
	(0.352)		
hukou	0.572***	0.152***	0.162***
	(0.060)	(0.017)	(0.020)
occupation	0.336	0.278***	0.228***
	(0.225)	(0.055)	(0.054)
ethnicity	0.269*	0.034*	0.039*
	(0.123)	(0.016)	(0.017)
unhealth	-0.071	0.009	0.014
	(0.084)	(0.013)	(0.013)
house	-0.668***	-0.152***	-0.165***
	(0.072)	(0.022)	(0.026)
lnindinc_net	0.250***	0.034***	0.039***
	(0.039)	(0.009)	(0.010)
lntotal_asset	0.327***	0.084***	0.090***
	(0.023)	(0.009)	(0.012)
imr		0.098***	0.120**
		(0.028)	(0.037)
Constant Term	-9.507***	-1.799***	-2.091***
	(0.588)	(0.274)	(0.368)
Year Fixed Effects	Control	Control	Control
Province Fixed Effects	Control	Control	Control
N	10944.000	4491.000	4491.000
R2		0.203	0.199

Note: ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively. The same applies to the tables below.

3.2. Robustness Test

3.2.1.Excluding Samples with Financial Industry Professionals as Household Members

Due to their professional backgrounds and occupational characteristics, financial industry professionals usually have a deeper understanding and richer experience of financial markets, investment products, and risk management. If the research sample includes households with members working in the financial industry, the investment decisions and outcomes of these households may be influenced by the professional backgrounds of their members, leading to deviations in estimation results. Therefore, excluding such samples can help us better identify and understand the independent impact of personality traits on the effectiveness of household investment portfolios.

Table 4: Personality Traits and the Effectiveness of Household Financial Asset Portfolios: Excluding Samples with Financial Industry Employees in the Family

	(1)	(2)	(3)
	Sharpe Ratio	Financial Market Participation	Sharpe Ratio
	OLS	Heckman First Stage	Heckman Second Stage
con	-0.004	-0.030	-0.014
	(0.004)	(0.055)	(0.010)
ext	0.003	0.068	0.014
	(0.004)	(0.054)	(0.009)
agr	-0.012**	-0.156*	-0.040***
	(0.004)	(0.062)	(0.011)
ope	0.013***	0.088**	0.033***
	(0.003)	(0.034)	(0.007)
neu	0.000	-0.053	-0.000
	(0.003)	(0.051)	(0.009)
know		0.187***	
		(0.044)	
	(0.004)	(0.054)	(0.012)
age	0.003**	0.050***	0.016***
	(0.001)	(0.014)	(0.003)
age2	-0.000**	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
marry	0.004	0.127	0.010
	(0.006)	(0.110)	(0.020)
eduy	0.005***	0.047***	0.018***
	(0.001)	(0.011)	(0.003)
familysize	-0.004**	-0.170**	-0.013***
	(0.001)	(0.054)	(0.004)
child_rit		0.759*	
		(0.316)	
hukou	0.067***	0.611***	0.160***
	(0.005)	(0.061)	(0.020)
ethnicity	0.000	0.256	0.034
	(0.007)	(0.132)	(0.020)
unhealth	0.002	-0.078	0.007
	(0.005)	(0.086)	(0.014)
house	-0.061***	-0.757***	-0.168***
	(0.006)	(0.069)	(0.024)
lntotal_asset	0.027***	0.395***	0.095***
	(0.001)	(0.021)	(0.011)
imr			0.101**
			(0.031)
Constant Term	-0.301***	-7.923***	-1.601***
	(0.033)	(0.553)	(0.249)
Year Fixed Effects	Control	Control	Control
Province Fixed Effects	Control	Control	Control
N	10921.000	10031.000	4202.000
R2	0.135		0.202

As can be seen from Table 4, after excluding households with heads working in the financial industry, the "Big Five" personality trait variables remain significant. The coefficient for agreeableness is significantly negative, while the coefficient for openness is significantly positive and becomes larger. The coefficients for other personality dimensions are not significant. The openness trait potentially promotes the effectiveness of household investment portfolios, whereas the agreeableness trait is not conducive to the optimization and management of household investment portfolios. These findings are consistent with the previous estimation results, demonstrating the robustness of the results.

3.2.2.Replacement of the Dependent Variable

In the previous section, the weighted average Sharpe ratio was used to measure the effectiveness of financial asset portfolios. Now, we conduct a robustness test using a different measurement method. Equation (6) is adopted to measure the effectiveness of household financial asset portfolios. Here, represents the number of financial asset types held by a household, and denotes the average number of financial asset types held by all sample households. A larger value of indicates a more diversified household investment portfolio [24].

The previous analysis selected the time interval from January 2005 to December 2015, during which the stock market experienced significant ups and downs. In this paper, we choose a new time interval from January 2008 to December 2013, when the stock market was relatively stable. The recalculated weighted average Sharpe ratio for households is defined as the effectiveness of household financial asset allocation 2.

Regression results in Table 5 show that agreeableness and openness personality traits are significant at the 1% level. Specifically, the coefficient for agreeableness is significantly negative, while the coefficient for openness is significantly positive. This suggests that agreeableness reduces the effectiveness of investment portfolios, whereas openness helps enhance the effectiveness of household investment portfolios. Changes in the Sharpe ratio do not affect the relationship between openness and agreeableness personality traits and the effectiveness of household financial asset allocation. Furthermore, the significance level remains unchanged, consistent with the baseline regression results.

$$\text{Index} = x_i - \bar{x}_t \quad (6)$$

Table 5. Personality Traits and the Effectiveness of Household Financial Asset Portfolios: Substituting the Dependent Variable

	(1)	(2)	(3)
	Financial Market Participation	Degree of Portfolio Diversification	Portfolio Effectiveness 2
	Hackman First Stage	Hackman Second Stage	Hackman Second Stage
con	-0.032	0.001	-0.014
	(0.055)	(0.004)	(0.010)
ext	0.057	0.005	0.013
	(0.052)	(0.003)	(0.009)
agr	-0.158**	-0.018***	-0.021***
	(0.057)	(0.004)	(0.011)
ope	0.082*	0.013***	0.019***
	(0.034)	(0.003)	(0.007)
neu	-0.027	0.002	0.004
	(0.047)	(0.003)	(0.009)
know	0.188***		0.008*
	(0.047)		(0.003)
gender	-0.273***	-0.024***	-0.024***
	(0.054)	(0.005)	(0.006)
age	0.056***	0.004***	0.004**
	(0.015)	(0.001)	(0.001)
age2	-0.001***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
marry	0.106	0.003	0.001

	(0.111)	(0.009)	(0.009)
eduy	0.038**	0.006***	0.004***
	(0.013)	(0.001)	(0.001)
familysize	-0.157*	-0.002	-0.002
	(0.061)	(0.001)	(0.001)
child_rit	0.905*		
	(0.352)		
hukou	0.572***	0.051***	0.050***
	(0.060)	(0.007)	(0.009)
occupation	0.208***	0.182***	0.174***
	(0.071)	(0.051)	(0.054)
ethnicity	0.269*	0.011	0.010
	(0.123)	(0.007)	(0.007)
unhealth	-0.071	0.004	0.006
	(0.084)	(0.005)	(0.005)
house	-0.668***	-0.048***	-0.047***
	(0.072)	(0.009)	(0.011)
lnindinc_net	0.250***	0.018***	0.017***
	(0.039)	(0.003)	(0.004)
lntotal_asset	0.327***	0.029***	0.028***
	(0.023)	(0.004)	(0.005)
imr		0.039***	0.037*
		(0.012)	(0.016)
Constant Term	-9.507***	-0.656***	-0.657***
	(0.588)	(0.117)	(0.159)
Year Fixed Effects	Control	Control	Control
Province Fixed Effects	Control	Control	Control
N	10944.000	4491.000	4491.000
R2		0.149	0.154

3.3.Mechanism Analysis: Testing the Mediating Effect of Cognitive Ability

The regression results from the previous section indicate that openness personality can enhance the effectiveness of household asset portfolios, while agreeableness personality is not conducive to improving the effectiveness of household financial asset portfolios. However, the underlying mechanism remains to be further examined.

The theoretical analysis in this paper suggests that the openness personality trait, characterized by rich imagination, a strong desire for knowledge, and an openness to new things, contributes to enhancing investors' cognitive abilities. This trait enables investors to have a deeper understanding of risky financial assets and to more comprehensively evaluate investment opportunities and risks. Therefore, investors with an openness personality may demonstrate a higher willingness to take risks, leading to greater effectiveness and adaptability in the investment process.

On the other hand, the agreeableness personality trait limits investors' cognitive abilities. Such investors tend to rely excessively on others' opinions, lack independent thinking and critical analysis, and are prone to conformity, making it difficult for them to maintain rationality in investment decisions, thereby affecting the effectiveness of asset allocation. The causal relationship between the mechanism variables selected in this paper and the dependent variable has been demonstrated in the previous section.

Table 6.Test of the Mediating Effect of Cognitive Ability

	(1)	**(2)**	**(3)**
	Financial Market Participation	**Sharpe Ratio**	**konw**
	Hackman First Stage	**Hackman Second Stage**	**OLS**
con	-0.032	-0.014	0.039
	(0.055)	(0.011)	(0.022)

ext	0.057	0.013	0.025
	(0.052)	(0.008)	(0.020)
agr	-0.158**	-0.039***	0.083***
	(0.057)	(0.009)	(0.023)
ope	0.082*	0.031***	0.081***
	(0.034)	(0.007)	(0.013)
neu	-0.027	0.004	-0.059**
	(0.047)	(0.008)	(0.022)
know	0.188***		
	(0.047)		
gender	-0.273***	-0.068***	0.138***
	(0.054)	(0.013)	(0.022)
age	0.056***	0.017***	-0.014**
	(0.015)	(0.003)	(0.005)
age2	-0.001***	-0.000***	0.000
	(0.000)	(0.000)	(0.000)
marry	0.106	0.009	0.039
	(0.111)	(0.020)	(0.035)
eduy	0.038**	0.016***	0.205***
	(0.013)	(0.002)	(0.003)
familysize	-0.157*	-0.009**	-0.014*
	(0.061)	(0.003)	(0.007)
child_rit	0.905*		
	(0.352)		
hukou	0.572***	0.152***	0.160***
	(0.060)	(0.017)	(0.024)
occupation	0.434***	0.292***	0.217***
	(0.219)	(0.032)	(0.031)
ethnicity	0.269*	0.034*	0.195***
	(0.123)	(0.016)	(0.044)
unhealth	-0.071	0.009	-0.006
	(0.084)	(0.013)	(0.033)
house	-0.668***	-0.152***	-0.081**
	(0.072)	(0.022)	(0.028)
lnindinc_net	0.250***	0.034***	0.006
	(0.039)	(0.009)	(0.012)
lntotal_asset	0.327***	0.084***	0.019*
	(0.023)	(0.009)	(0.009)
imr		0.098***	
		(0.028)	
Constant Term	-9.507***	-1.799***	0.262
	(0.588)	(0.274)	(0.199)
Year Fixed Effects	Control	Control	Control
Province Fixed Effects	Control	Control	Control
N	10944.000	4491.000	4720.000
R2		0.203	0.710

Hence, this paper focuses on the influence of personality traits on two mechanism variables: risk-taking willingness and investment conformity. The results in column (3) of Table 6 show that openness and agreeableness personalities are significantly positive, indicating that these personality traits promote the improvement of cognitive abilities. This suggests that cognitive abilities are a channel through which personality traits influence household investment choices, validating Hypothesis 6.

To test this channel, this paper explores two aspects: risk-taking under the openness personality dimension and investment conformity under the agreeableness personality dimension.

DISCUSSION

A scientific and rational portfolio of financial assets is crucial for enhancing household financial returns, ensuring the safe appreciation of assets, and achieving long-term wealth accumulation. Increasingly, psychologists and economists are focusing on the significant influence of personality traits on individual investment decisions. Deeply analyzing and rationally utilizing these influence mechanisms play a vital role in optimizing investment decisions. Based on this background, using data from the 2010 and 2012 China Family Panel Studies (CFPS), this study focuses on the impact of personality traits on the effectiveness of household asset portfolios and the transmission pathways of this impact.

The development of non-neurotic personality traits is conducive to improving personal cognitive abilities. Only the conformity and openness traits of household heads have an impact on the effectiveness of household financial asset portfolios. The enhancement of openness traits significantly improves the effectiveness, while conformity traits have a negative impact.

Personality traits affect the effectiveness of household financial asset portfolios by improving individuals' cognitive levels, indicating the existence of a cognitive ability mediation effect of personality traits. This result remains robust after excluding samples of households with financial professionals, replacing asset effectiveness indicators, and addressing endogeneity. Furthermore, the impact of personality traits on the effectiveness of household financial asset portfolios exhibits heterogeneity among urban and rural areas, eastern and central regions, and households with different income levels.

This study further explores the mechanisms through which personality affects the effectiveness of household financial asset portfolios. It finds that the development of conformity leads to an increase in individual conformity psychology, which has a negative impact on the effectiveness of financial asset portfolios. The development of openness can significantly improve households' willingness to take risks, thereby enhancing the effectiveness of financial asset portfolios. Specifically, conformity leads to an increase in superficial cognitive abilities that rely too much on external information, reducing the effectiveness of investment portfolios. In contrast, extroversion helps improve deep cognitive abilities, promoting the effectiveness of household financial asset portfolios.

Strengthen residents' mental health construction and development through multiple channels, focusing on the cultivation and guidance of personality traits. Educate the public to understand and optimize their own personality traits, especially encouraging the development of openness to increase participation and innovation awareness in the financial market. Guide the reasonable expression of conformity traits, avoid excessive conformity and dependence on external information, and cultivate independent thinking and decision-making abilities.

Emphasize the importance of cognitive abilities in the influence of personality traits on asset allocation. Strengthen the training of cognitive thinking and logic, and focus on the practical application of cognitive results. Through the effective improvement of individual cognitive abilities, provide more scientific decision-making for households when allocating risky financial assets, helping them better cope with economic fluctuations and market changes.

Implement differentiated financial policies and services. Through personalized consulting, deeply understand the personality characteristics and risk tolerance of different households, and help them develop asset portfolio strategies that are more suitable for their own situations. At the same time, fully consider the impact of urban-rural, regional, and income differences. For rural areas and regions with lower levels of economic development, we should pay more attention to the guidance of personality traits. By intensifying financial education and promotion, we can enhance the financial literacy of farmers and low-income families, thereby increasing their financial participation and ensuring that financial services benefit a broader group of people.

Data sharing agreement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

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