Proceedings of the 2nd International Conference on Financial Technology and Business Analysis
DOI: 10.54254/2754-1169/63/20231364

The Impact of Personality Traits on Household Commercial Insurance Participation

-- Evidence from China

Wu Kun[1,a,*], Li Qi[1,b], and Hu Yue[1,c]

[1]*School of Economics, Beijing Wuzi University, Fuhe Street, Yongshun Town, Beijing*
a. 20120240042@uibe.edu.cn, b. liqi_2021@163.com, c. huyuehy09@163.com
**corresponding author*

Abstract: This paper empirically investigates the impact of householders' personality traits on the probability and depth of household commercial insurance participation at the micro level using the China Family Panel Studies (CFPS) 2018 data. After considering the robustness tests and endogenous issues, the regression results show that, among the five personality traits, the openness trait can significantly increase the probability of household commercial insurance participation, the annual expenditure on household commercial insurance, and the share of household commercial insurance expenditure in the annual household income, while the effects of other personality traits on commercial insurance are not significant. The mechanism analysis shows that the householder's openness trait can significantly improve his sense of social trust, increase his financial literacy, and then effectively promote household commercial insurance participation. Heterogeneity analysis finds that the promotion effect of openness trait on commercial insurance is more obvious in urban households and the households with high levels of financial assets. The paper provides a new perspective to explain the current low participation rate of commercial insurance in China, and at the same time provides useful references for relevant departments to formulate policies and for commercial insurance companies to standardize their development strategies.

Keywords: personality traits, household commercial insurance participation, sense of social trust, financial literacy

1. Introduction

Commercial insurance, as an important part of the multi-level insurance market, has an irreplaceable role in family risk management and social economic stability [1]. However, at present, the participation rate of household commercial insurance in China is still at a low level, and the growth of the participation rate is not obvious [2]. Although the scale of insurance in China exceeds the world average, the density and depth of insurance are still lagging behind. According to "China Insurance Industry Market Outlook and Investment Planning Analysis Report 2022-2027": China's insurance density in 2021 was 520 USD/person, lower than the global average of 661 USD/person; China's insurance depth in 2021 was 4.15%, lower than the global average of 5.96%.

DOI: 10.54254/2754-1169/63/20231364

Currently, the existing related literature mainly focuses on macro factors, household microeconomics characteristics and demographic characteristics, individual cognitive ability, financial literacy, and demographic characteristics, but little literature focuses on the deeper psychological personality traits behind a series of traits or behaviors on household commercial insurance.

This paper is inspired by the existing literature and aims to explore the influence of householders' five personality traits on household commercial insurance participation. Using the China Family Panel Studies (CFPS) 2018 data for empirical testing, we further analyze the mechanisms behind the effects using the mediation effect model, and explore the heterogeneity of the effects in different types of households through group regression.

The possible marginal contributions of this paper are shown below. First, in terms of research perspective, the existing literature focuses more on the impact of individual cognitive ability or demographic characteristics on household commercial insurance participation, while this paper analyzes the deeper psychological characteristics behind the behavior, and analyzes the impact of householders' personality traits on the participation of the household commercial insurance and its transmission mechanism. Second, in terms of mechanism analysis and heterogeneity discussion, we propose two possible transmission mechanisms, "sense of social trust" and "financial literacy". We further discuss whether there is any heterogeneity in the effect of personality traits on the participation of household commercial insurance in different living areas and different financial asset levels, which, to a certain extent, complements the influence of personality traits on the participation of household commercial insurance, and at the same time, provides a useful reference for the insurance companies and the relevant governmental departments to make decisions or policies.

2. Related Literature

Current research about the influencing factors of household commercial insurance participation can be divided into two main categories: macro and micro influencing factors.

2.1. Macro Influencing Factors

There are relatively few studies on macro influencing factors of household commercial insurance participation, the related literature mainly include macro economic indicators, macro technology indicators, and other regional indicators.

First, from the macro economic indicators, Sun Wei et al. point out that the greater volatility in house prices, the lower demand for household commercial insurance [3]. Zhao Hongmei and Su Huijuan argue that regional development differences are also important influencing factors of household commercial insurance demand [4]. Secondly, analyzing from the macro technology indicators, the degree of inclusive financial development and digital financial penetration in the region can affect household commercial insurance participation by influencing household income, trust in insurance products, and financial literacy [5][6][7]. Third, other macro factors, such as regional dialect diversity, can inhibit household commercial insurance participation by reducing household trust[2]. Qu Linshan et al. point out that if regions increase newspaper coverage of social insurance, the probability of household commercial insurance participation is significantly reduced [8].

2.2. Micro Influencing Factors

Current research on the influencing factors of household commercial insurance participation focuses more on the individual or household micro level. Specifically, they include household economic, demographic and householders' characteristics.

DOI: 10.54254/2754-1169/63/20231364

First, household economic characteristics include factors such as household income and asset level, property ownership, household social network breadth, household Internet and mobile payment usage, land transfer, etc. Albouy and Blagoutine state that the higher level of household income, the higher probability of its participation in commercial insurance, whereas household renting behavior significantly inhibits household commercial insurance participation [9]. Similarly, fluctuations in household income increase households' demand for commercial insurance [10]. Yang Biyun et al. and Yin Zhichao et al. suggest that the use of the Internet and mobile payment can increase the likelihood of household commercial insurance participation by lowering the transaction costs and increasing the availability of commercial insurance to residents [11][12]. In addition, the stronger social interaction, the higher probability and degree of household commercial insurance participation [13][14][15]. Zhao Zengli and Wang Yuyu, on the other hand, find that land transfer can increase rural household commercial insurance participation through three pathways: household income, household indebtedness, and social interaction [16].

Second, household demographic characteristics include family size, childless and elderly dependency ratios, and the gender of children. Lu Yajuan and Wang Jiahua show that with the increase in the number of family members [17], the household commercial insurance demand will increase, especially the life insurance demand[18][19]; on the contrary, a rise in a household old-age dependency ratio significantly inhibits the participation in commercial insurance [18]. In terms of children's gender, Wang Ren et al. suggest that the propensity of such families to invest in commercial insurance will increase significantly if they have a boy or if the proportion of boys in the family increases, while the opposite is true if they have a girl [20].

Third, the householders' characteristics are mainly reflected in the cognitive ability, education level, financial literacy, early experience, well-being, occupation type, and other demographic characteristics. Empirical studies have shown that the householders' cognitive ability, financial literacy level, and educational level have a significant positive correlation with household commercial insurance participation [17][21][22][23][24]. Zhang Hao and Li Wenbin point out that the experience of going to the mountains and going to the countryside significantly enhances the household willingness to participate in commercial insurance [25]. In addition, the type of householder's occupation is also an important factor influencing household commercial insurance participation: non-farming employed people have a stronger willingness to purchase commercial insurance compared to farming people [26]. Cao Zhi et al. argue that there is a positive correlation between residents' sense of well-being and the probability of household commercial insurance participation and depth [27]. Other demographic characteristics, such as the householder's age and health status, also have an impact on commercial insurance participation [17].

In summary, the current research on the influencing factors of household commercial insurance can be divided into two broad categories: macro and micro, especially in micro level. The micro influencing factors mainly include the household economy, demographic characteristics, the householders' demographic characteristics and cognitive abilities, but the influence of the deeper psychological characteristic factors behind individual behavior is yet to be further explored.

3. Research Design

3.1. Data Resource

The data used in this paper mainly comes from the China Family Panel Studies (CFPS) program. The project is implemented by Institute of Social Science Survey (ISSS) and the survey questions cover three levels: individual, household, and community, which can satisfy the construction of the variables needed for this paper. The sample covers 25 provinces/municipalities/autonomous regions in China, which is relatively representative.

DOI: 10.54254/2754-1169/63/20231364

The CFPS program has successfully implemented and released six issues of data in 2010, 2012, 2014, 2016, 2018 and 2020, but since the independent variables of this paper are householder's personality traits, and only the questionnaire of CFPS2018 involves the questions of the Big Five personality traits, we use CFPS2018 data for empirical testing only.

After eliminating the data that were not merged successfully, non-householder data, missing-key-variables data, inapplicable data, refused-to-answer data, and data answered "don't know", 12,702 valid household samples are finally obtained.

3.2. Variables

3.2.1. Dependent Variables

The dependent variables in this paper are designed to measure household commercial insurance participation, including: "whether or not the household participates in commercial insurance" (insur_if), "the household's annual expenditure on commercial insurance"(insur_ln), and "the ratio of the household annual expenditure on commercial insurance to the household annual income"(insur_ra).

The specific constructions of the three proxy variables are based on the CFPS 2018 Household Economic Questionnaire questions "In the past 12 months, how much did your household spend on commercial insurance (e.g., commercial health insurance, automobile insurance, homeowners' property insurance, commercial life, etc.)?": (1) if the expenditure is greater than 0, the household is defined as participating in commercial insurance, takes the value of 1, otherwise takes the value of 0; (2) the value of the actual amount of expenditure on commercial insurance plus 1 taking the logarithm of the value of the variable is taken as the value of the variable; (3) the variable is assigned a value of the amount of the actual amount of expenditure on commercial insurance divided by the net income of the household.

3.2.2. Independent Variables

The independent variables of this paper are the five householder's personality traits, which means emotional stability, conscientiousness, openness, extra-version and agreeableness. The specific constructs are based on the 15 Big Five personality survey questions from the CFPS 2018 individual questionnaire, which are shown in Table1.

First, the scores of negative questions are positively treated. Second, the score of each question are processed dimensionlessly so that the score interval was unified within [0,1]. Finally, the scores of the three questions under each dimension are respectively averaged to obtain five householder's personality traits variables: st_emo, st_con, st_ope, st_ext, st_agr, with the larger value representing the more pronounced the corresponding trait.

Table 1: Questions that reflect the "Big Five Personality Traits" in the CFPS2018.

Big five personality traits	Corresponding question	Effect direction
Emotional stability	Often worried	-
	Easily stressed	-
	Relaxed and can cope well with stress	+
Conscientiousness	Doing things rigorously and seriously	+
	Often lazy	-
	Efficient in their work	+
Openness	Original and can generate new ideas	+

DOI: 10.54254/2754-1169/63/20231364

Table 1: (continued).

	Values artistic and aesthetic experiences	+
	Imaginative	+
Extra-version	Talkative	+
	Cheerful and social	+
	Subtle and conservative	-
Agreeableness	Sometimes rude and impolite to others	-
	Tolerant by nature	+
	Considerate of others, kind to almost everyone	+

3.2.3. Control Variables

Referencing to related literature [28], this paper controls a total of 12 variables including individual, household, and regional levels as follows:

Householders' individual characteristics include: householder's age (age); the square of the householder's age divided by 100 (age2); householder's gender (male), which takes the value of 1 if the householder is male and 0 if the householder is female; householder's educational attainment (eduy); the householder's marital status (marry), which takes the value of 1 if the householder has a spouse in the marriage or is in a cohabiting status and 0 otherwise; whether the householder is a member of an agricultural household (hk), which takes the value of 1 if the householder is a member of an agricultural household and 0 otherwise; whether the householder is willing to take risks (risk), if the householder drinks more than 3 times a week, it takes the value of 1, otherwise it takes the value of 0; the householder's employment status (employ), which takes the value of 1 if the householder is in employment, and 0 otherwise.

Household characteristics include: the number of people in the household (fsize); whether the household owns property (house); and whether the household owns a car (car).

The control variable at the regional level is the log GDP value of the province/municipality/autonomous region where the household is located in 2018 (GDP).

3.3. Methodology

The dependent variables in this paper are categorized into the qualitative indicator "whether or not the household participates in commercial insurance (insur_if)" and the quantitative indicators "the household's annual expenditure on commercial insurance (insur_ln)", "the ratio of the household annual expenditure on commercial insurance to the household annual income (insur_ra)". Referring to the related literature [29][30][31], combining with the specifics of the CFPS2018 data, the Probit model and the Tobit model are selected for regression analysis. The specific regression equations are equation (1), equation (2) and equation (3), respectively:

$$\text{insur\_if} = 1(\beta_0 + \beta_1 * \text{traits} + \beta_2 * X + \varepsilon > 0) \quad (1)$$

$$\text{insur\_ln}^* = \gamma_0 + \gamma_1 * \text{traits} + \gamma_2 * X + \mu \;\; \text{insur\_ln} = \max(0, \text{insur\_ln}^*) \quad (2)$$

$$\text{insur\_ra}^* = \varphi_0 + \varphi_1 * \text{traits} + \varphi_2 * X + \omega \; \text{insur\_ra} = \max(0, \text{insur\_ra}^*)\min(\text{insur\_ra}^*, 1) \quad (3)$$

Where equation (1) is the Probit model, and equation (2), equation (3) are the Tobit models. traits refers to the five personality traits, X refers to the 12 control variables, ε, μ, ω are error terms, ε~N

DOI: 10.54254/2754-1169/63/20231364

$(0,\sigma^2)$. insur_if means "whether or not the household participates in commercial insurance", take the value of 0 or 1, insur_ln means "the household's annual expenditure on commercial insurance", which is the household annual expenditure on commercial insurance plus 1 and then takes the logarithm. insur_ra means "the ratio of the household annual expenditure on commercial insurance to the household annual income", which takes the value in [0,1].

4. Empirical Analysis

4.1. Statistical Analysis

Table2 gives the descriptive statistics for the full householders' sample.

Table 2: Descriptive statistics (Full Sample).

VarName	Obs	Mean	SD	Min	Median	Max
insur_if	12702	0.319	0.466	0	0	1
insur_ln	12702	2.577	3.850	0	0	11.5
insur_ra	12702	0.023	0.090	0	0	5
st_emo	12702	0.512	0.188	0	0.5	1
st_con	12702	0.723	0.159	0	0.75	1
st_ope	12702	0.535	0.216	0	0.583	1
st_ext	12702	0.593	0.177	0	0.583	1
st_agr	12702	0.711	0.150	0	0.75	1
age	12702	49.826	15.070	16	50	93
age2	12702	27.097	15.264	2.56	25	86.5
male	12702	0.528	0.499	0	1	1
eduy	12702	7.746	4.923	0	9	22
marry	12702	0.826	0.379	0	1	1
hk	12702	0.721	0.449	0	1	1
risk	12702	0.162	0.369	0	0	1
employ	12702	0.752	0.432	0	1	1
fsize	12702	3.563	1.896	1	3	21
house	12702	0.807	0.395	0	1	1
car	12702	0.292	0.455	0	0	1
GDP	12702	10.300	0.737	7.35	10.4	11.5

From the three dependent variables, an average of 31.9% of household commercial insurance participation, the logarithmic value of the annual amount of household commercial insurance expenditures averages 2.577, and the ratio of annual commercial insurance expenditures to the total annual household income averages 2.3%. The above data indicates that the probability and depth of household commercial insurance participation in China are not high, further indicating that it is necessary to study the influencing factors of household commercial insurance participation in China. From the key independent variables, the most obvious of the five personality traits of China's residents is conscientiousness, with an average score of 0.723; followed by the agreeableness trait, with an average score of 0.711.

In terms of control variables at the individual level, the householders' average age is about 50 years; 52.8% of householders are male; the average educational attainment is about 8 years; 82.6% of householders are married; 72.1% of householders are in agricultural family; 16.2% of householders

DOI: 10.54254/2754-1169/63/20231364

are willing to take risks; and 75.2% of householders are in employment. In terms of household characteristics, the average number of household is about 4; 80.7% of households own property; and 29.2% own a car. The mean value of the log of 2018 GDP for the area where the household is located is 10.300.

4.2. Basic Regressions

Based on the above empirical design, the first three columns of Table3 present the basic regression results of the model.

Columns (1), (2) and (3) of Table3 show that among the five personality traits, the marginal coefficients of openness (ope) on the three dependent variables are all significantly positive at the 1% level, indicating that the higher householder's openness level, the higher probability, expenditure and ratio of household commercial insurance participation. While the other four personality traits do not have a significant effect on household commercial insurance participation.

4.3. Robustness Test

To further demonstrate the robustness of the results obtained from the basic regressions, this section is using three methods: changing the key independent variables' measurement, changing the sample size, and using propensity score matching method.

4.3.1. Replace the Measurement Method of Independent Variables

In the basic regressions, the key independent variables "five personality traits" are constructed by averaging the scores of similar questions, and this part is replaced by factor analysis, which screens out the common factors of similar personality trait questions as proxies for the personality trait variables. The specific regression results are shown in columns (4), (5) and (6) of Table3.

The regression results show that the estimated coefficients of the openness (ope) trait remain significantly positive at the 1% level after changing the measurement of the five key independent variables, which means the results obtained are consistent with the basic regression.

4.3.2. Reduce the Regression Sample: Keep Married Sample

Considering that there may be differences between married and unmarried households in terms of family responsibilities and support burden, which may interfere with the empirical results, this section only screens out the samples whose householders are married, and reduces the sample size to re-regress the results in order to test whether the results are robust or not. The specific results are shown in columns (7), (8) and (9) of Table3.

The regression results after reducing the sample show that the coefficient on the householder's openness (ope) characteristic remains significantly positive at the 1% level in the married sample, and the findings remain consistent with basic regressions.

Table 3: The impact of personality traits on household commercial insurance participation.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Basic regressions			Replace independent variables			Keep married sample		
	insur_if	insur_ln	insur_ra	insur_if	insur_ln	insur_ra	insur_if	insur_ln	insur_ra
st_emo	0.004	0.084	0.001	0.002	0.024	0.000	0.001	0.083	0.001
	(0.019)	(0.140)	(0.002)	(0.003)	(0.026)	(0.000)	(0.021)	(0.156)	(0.002)
st_con	-0.003	0.000	-0.002	-0.001	-0.005	-0.000	-0.027	-0.195	-0.005*
	(0.023)	(0.175)	(0.003)	(0.004)	(0.029)	(0.000)	(0.026)	(0.195)	(0.003)

DOI: 10.54254/2754-1169/63/20231364

Table 3: (continued).

st_ope	0.067***	0.586***	0.010***	0.014***	0.121***	0.002***	0.079***	0.666***	0.012***
	(0.017)	(0.127)	(0.002)	(0.004)	(0.029)	(0.000)	(0.019)	(0.140)	(0.002)
st_ext	-0.016	-0.159	-0.004*	-0.003	-0.023	-0.001	-0.031	-0.277*	-0.006**
	(0.020)	(0.150)	(0.002)	(0.004)	(0.028)	(0.000)	(0.023)	(0.167)	(0.003)
st_agr	0.040*	0.269	0.002	0.008**	0.058**	0.001	0.055**	0.370*	0.003
	(0.024)	(0.179)	(0.003)	(0.004)	(0.029)	(0.000)	(0.027)	(0.199)	(0.003)
age	0.011***	0.105***	0.002***	0.011***	0.104***	0.002***	0.010***	0.101***	0.002***
	(0.002)	(0.013)	(0.000)	(0.002)	(0.013)	(0.000)	(0.002)	(0.015)	(0.000)
age2	-0.015***	-0.136***	-0.002***	-0.015***	-0.136***	-0.002***	-0.014***	-0.136***	-0.002***
	(0.002)	(0.013)	(0.000)	(0.002)	(0.013)	(0.000)	(0.002)	(0.016)	(0.000)
male	-0.005	-0.070	-0.002**	-0.005	-0.072	-0.002**	0.001	-0.027	-0.001
	(0.007)	(0.056)	(0.001)	(0.007)	(0.056)	(0.001)	(0.008)	(0.063)	(0.001)
eduy	0.007***	0.064***	0.001***	0.007***	0.064***	0.001***	0.008***	0.068***	0.001***
	(0.001)	(0.007)	(0.000)	(0.001)	(0.007)	(0.000)	(0.001)	(0.007)	(0.000)
marry	0.031***	0.222***	0.001	0.030***	0.221***	0.001	0.000	0.000	0.000
	(0.010)	(0.080)	(0.001)	(0.010)	(0.080)	(0.001)	(0.000)	(0.000)	(0.000)
hk	-0.048***	-0.381***	-0.003***	-0.048***	-0.381***	-0.003***	-0.050***	-0.392***	-0.002**
	(0.008)	(0.062)	(0.001)	(0.008)	(0.062)	(0.001)	(0.009)	(0.069)	(0.001)
risk	0.023**	0.181**	0.002*	0.023**	0.179**	0.002*	0.030***	0.224***	0.002*
	(0.009)	(0.072)	(0.001)	(0.009)	(0.072)	(0.001)	(0.011)	(0.079)	(0.001)
employ	0.005	0.006	-0.001	0.005	0.006	-0.001	0.010	0.030	-0.001
	(0.009)	(0.068)	(0.001)	(0.009)	(0.068)	(0.001)	(0.010)	(0.076)	(0.001)
fsize	0.007***	0.068***	0.000	0.007***	0.068***	0.000	0.006***	0.060***	0.000
	(0.002)	(0.015)	(0.000)	(0.002)	(0.015)	(0.000)	(0.002)	(0.016)	(0.000)
house	0.021**	0.154**	0.003***	0.021**	0.154**	0.003***	0.013	0.094	0.002*
	(0.009)	(0.071)	(0.001)	(0.009)	(0.071)	(0.001)	(0.011)	(0.081)	(0.001)
car	0.362***	3.004***	0.035***	0.362***	3.004***	0.035***	0.370***	3.076***	0.035***
	(0.005)	(0.059)	(0.001)	(0.005)	(0.059)	(0.001)	(0.005)	(0.064)	(0.001)
GDP	0.013***	0.119***	0.001	0.013***	0.118***	0.001	0.012**	0.111***	0.000
	(0.005)	(0.035)	(0.001)	(0.005)	(0.035)	(0.001)	(0.005)	(0.039)	(0.001)
N	12702	12702	12702	12702	12702	12702	10498	10498	10498
Pseudo R^2	0.2975	0.1321	0.8237	0.2975	0.1321	0.8233	0.2943	0.1281	0.9940

Note: For the convenience of explanation, the coefficients reported in Table3 are average marginal effects rather than regression coefficients. *, **, *** indicate statistical significant at 10%, 5%, 1% levels. The values in "( )" below the coefficients are standard errors.

4.3.3. Propensity Score Matching (PSM) Method

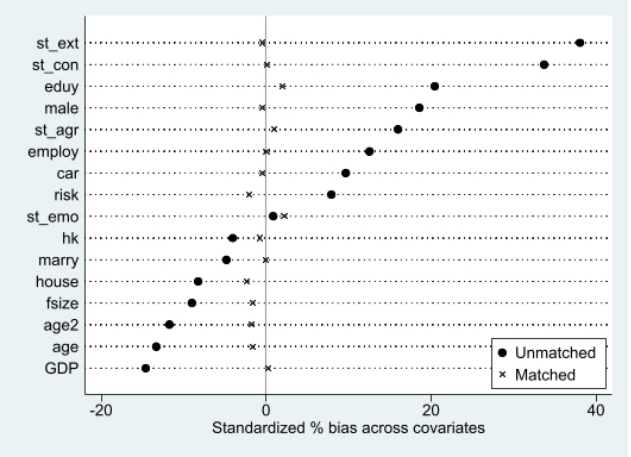
The results of both the basic regressions and robustness tests indicate that among the five personality traits, the openness (ope) trait significantly and positively increases the probability and depth of household commercial insurance participation. However, it is further considered that the formation of an individual's high or low level of openness may not be random and can be influenced by factors

DOI: 10.54254/2754-1169/63/20231364

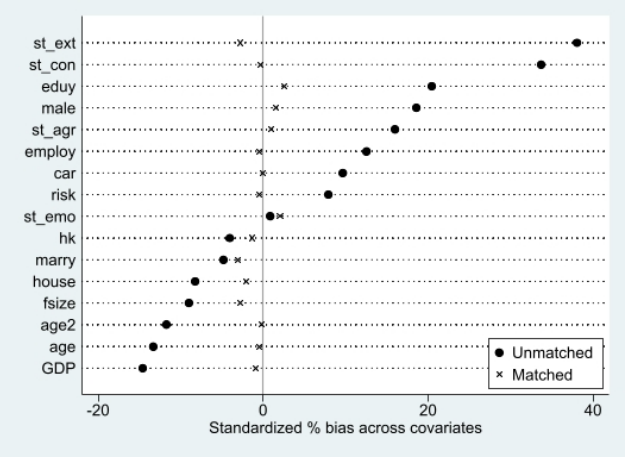
that are not easily measurable, such as the family's investment in education at an early age or the parental guidance model, which can lead to the problem of self-selection bias.

To mitigate potential endogenous issue, this component retests by using propensity score matching. Specifically, the sample is divided into two groups according to the average score of openness, and we use four matching methods: 1-to-1 nearest-neighbor matching, 1-to-4 nearest-neighbor matching, radius matching, and kernel matching.

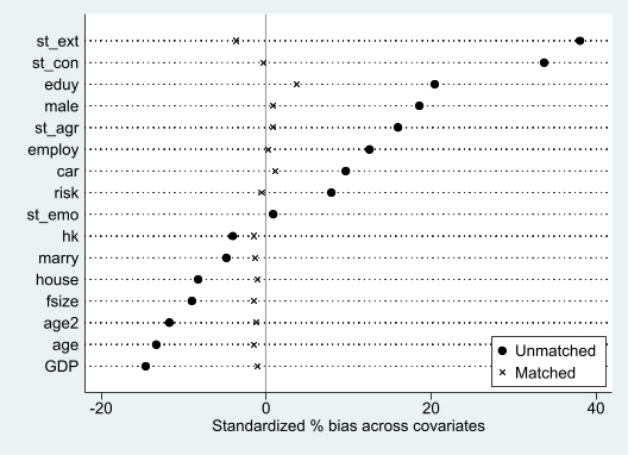
Figure1 shows the variables' standardized deviation graphs of the four matching methods before and after matching, and it can be seen that the standardized deviation of all variables after matching is significantly less than 10%, which indicates that the matching results can satisfy the balance requirements.



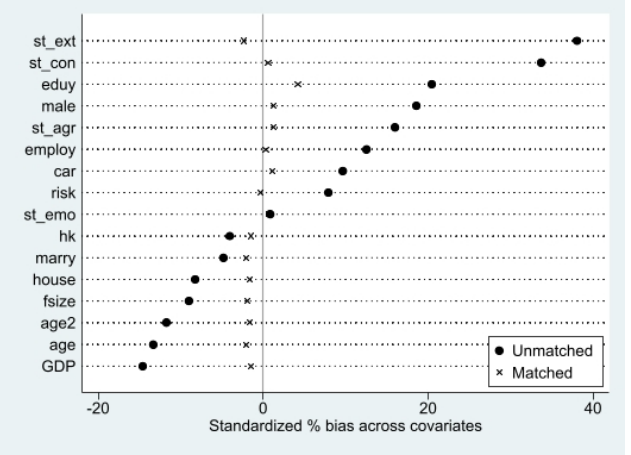
(a)1-to-1 nearest-neighbor matching.



(b)1-to-4 nearest-neighbor matching.



(c)Radius matching.



(d)Kernel matching.

Figure 1: Plot of standardized deviation for each variable before and after matching.

Table4 reports the results of the four PSM regressions, and it suggests that the average treatment effects of the openness (ope) trait on the three dependent variables (insur_if,insur_ln,insur_ra) are all significantly positive.

The above PSM results indicate that the potential self-selection bias issue is less disturbing to the empirical results of this paper, and the conclusions obtained from the basic regressions are robust.

DOI: 10.54254/2754-1169/63/20231364

Table 4: The impact of openness on household commercial insurance participation (PSM).

Variables	1-to-1 nearest-neighbor matching		1-to-4 nearest-neighbor matching		radius matching		kernel matching	
	ATT	SE	ATT	SE	ATT	SE	ATT	SE
insur_if	0.029**	0.012	0.026***	0.010	0.030***	0.009	0.030***	0.009
insur_ln	0.257***	0.099	0.254***	0.081	0.284***	0.075	0.290***	0.074
insur_ra	0.006***	0.002	0.005***	0.002	0.005***	0.002	0.005***	0.002

Note: *, **, *** indicate statistical significant at 10%, 5%, 1% levels.

4.4. Mechanism Analysis

4.4.1. Sense of Social Trust Level Channel

The existing literature point out that an individual's willingness to participate in commercial insurance is positively affected by his/her level of trust [32]. And considering the fact that householders with obvious openness trait may be more willing to engage in social interactions and have a higher level of trust in society than those with a low level of openness, this paper argues that "the sense of social trust level" may be positively affected by openness, which means the sense of social trust level may be a possible mechanism through which the openness promotes the participation of household commercial insurance.

Table5 gives the results of the mediation effects model. Column (1) has "sense of social trust level (trust)" as dependent variable, and the regression coefficient of openness(ope) is significantly positive at the 1% level, indicating that the higher the degree of householder's openness, the higher the degree of his or her trust in society. Columns (2), (3) and (4) add the mediator variable "trust" in the basic regression model, and the results show that the marginal effects of "trust" and "ope" on dependent variables are significantly positive.

The above results indicate that the more pronounced the openness characteristic of householder, the higher his or her trust in the outside world, and then the stronger sense of social trust, the more willing to participate in household commercial insurance, i.e., the hypotheses of the previous section are verified. "sense of social trust level" is a possible mechanism by which the openness promotes the household commercial insurance participation.

4.4.2. Financial Literacy Level Channel

Based on the conclusions of existing studies, the higher financial literacy level of householder, the higher probability that the household will participate in commercial insurance [28]. And considering that individuals with obvious openness characteristics may have stronger willingness to know about financial knowledge and may have better financial literacy, this paper hypothesizes that "financial literacy level" may be another possible mechanism by which the openness promotes the household commercial insurance participation.

Table6 reports the regression results of the mediated effects model.

Table 5: The mechanism of openness on household commercial insurance participation: sense of social trust.

Variables	(1)	(2)	(3)	(4)
	trust	insur_if	insur_ln	insur_ra
trust		0.005***	0.035***	0.000
		(0.002)	(0.012)	(0.000)

DOI: 10.54254/2754-1169/63/20231364

Table 5: (continued).

st_emo	0.489***	-0.001	0.049	0.001
	(0.108)	(0.019)	(0.141)	(0.002)
st_con	-0.740***	0.001	0.028	-0.002
	(0.133)	(0.023)	(0.176)	(0.003)
st_ope	0.867***	0.064***	0.568***	0.010***
	(0.095)	(0.017)	(0.127)	(0.002)
st_ext	-0.427***	-0.013	-0.141	-0.004*
	(0.115)	(0.020)	(0.150)	(0.002)
st_agr	0.159	0.038	0.258	0.002
	(0.137)	(0.024)	(0.179)	(0.003)
age	-0.067***	0.011***	0.108***	0.002***
	(0.009)	(0.002)	(0.013)	(0.000)
age2	0.060***	-0.015***	-0.140***	-0.002***
	(0.009)	(0.002)	(0.013)	(0.000)
male	0.443***	-0.007	-0.087	-0.002**
	(0.043)	(0.007)	(0.056)	(0.001)
eduy	0.038***	0.007***	0.061***	0.001***
	(0.005)	(0.001)	(0.007)	(0.000)
marry	-0.026	0.031***	0.225***	0.001
	(0.057)	(0.010)	(0.080)	(0.001)
hk	-0.238***	-0.048***	-0.378***	-0.003***
	(0.049)	(0.008)	(0.062)	(0.001)
risk	0.021	0.024**	0.187***	0.002*
	(0.056)	(0.009)	(0.072)	(0.001)
employ	0.241***	0.005	0.002	-0.001
	(0.051)	(0.009)	(0.068)	(0.001)
fsize	-0.016	0.007***	0.067***	0.000
	(0.012)	(0.002)	(0.015)	(0.000)
house	0.053	0.021**	0.156**	0.003***
	(0.054)	(0.009)	(0.071)	(0.001)
car	0.114**	0.361***	3.002***	0.036***
	(0.046)	(0.005)	(0.059)	(0.001)
GDP	0.085***	0.012***	0.112***	0.001
	(0.027)	(0.005)	(0.035)	(0.001)
N	12679	12679	12679	12679
Adj R^2	0.0577	—	—	—
Pseudo R^2	—	0.2987	0.1326	0.8258

Note: For the convenience of explanation, the coefficients reported in Table5 column (2), (3), (4) are average marginal effects rather than regression coefficients. *, **, *** indicate statistical significant at 10%, 5%, 1% levels. The values in "()" below the coefficients are standard errors.

DOI: 10.54254/2754-1169/63/20231364

Table 6: The mechanism of openness on household commercial insurance participation: finance literacy.

Variables	(1)	(2)	(3)	(4)
	finance	insur_if	insur_ln	insur_ra
finance		0.035***	0.291***	0.003***
		(0.006)	(0.048)	(0.001)
st_emo	0.246***	-0.004	0.075	0.003
	(0.071)	(0.031)	(0.235)	(0.003)
st_con	0.018	0.036	0.185	-0.001
	(0.092)	(0.040)	(0.305)	(0.004)
st_ope	0.491***	0.060**	0.574**	0.012***
	(0.066)	(0.029)	(0.223)	(0.003)
st_ext	-0.081	0.008	0.070	0.001
	(0.077)	(0.034)	(0.255)	(0.004)
st_agr	0.147	0.049	0.356	0.004
	(0.094)	(0.041)	(0.311)	(0.005)
age	0.002	0.013***	0.119***	0.002***
	(0.006)	(0.003)	(0.023)	(0.000)
age2	-0.009	-0.016***	-0.149***	-0.002***
	(0.006)	(0.003)	(0.024)	(0.000)
male	0.189***	-0.029**	-0.256***	-0.003**
	(0.029)	(0.013)	(0.096)	(0.001)
eduy	0.057***	0.005***	0.050***	0.001***
	(0.004)	(0.002)	(0.013)	(0.000)
marry	0.019	0.046***	0.368***	0.003
	(0.037)	(0.017)	(0.132)	(0.002)
hk	-0.264***	-0.023*	-0.173*	0.001
	(0.030)	(0.013)	(0.100)	(0.001)
risk	-0.029	0.004	0.050	0.000
	(0.037)	(0.016)	(0.123)	(0.002)
employ	-0.020	0.028*	0.189	0.002
	(0.034)	(0.015)	(0.117)	(0.002)
fsize	-0.017*	0.015***	0.138***	0.001***
	(0.009)	(0.004)	(0.029)	(0.000)
house	-0.042	0.011	0.096	0.002
	(0.033)	(0.015)	(0.110)	(0.002)
car	0.132***	0.380***	3.209***	0.033***
	(0.030)	(0.008)	(0.099)	(0.001)
GDP	-0.010	0.017**	0.152**	0.000
	(0.019)	(0.008)	(0.063)	(0.001)
N	4669	4669	4669	4669
Adj R^2	0.2026	—	—	—
Pseudo R^2	—	0.3093	0.1245	1.6741

Note: For the convenience of explanation, the coefficients reported in Table6 column (2), (3), (4) are average marginal effects rather than regression coefficients. *, **, *** indicate statistical significant at 10%, 5%, 1% levels. The values in "()" below the coefficients are standard errors.

DOI: 10.54254/2754-1169/63/20231364

As shown in column (1) of Table6, when the dependent variable is "financial literacy level (finance)", the regression coefficient of the householder's openness (ope) characteristic is significantly positive at the 1% level, indicating that the more pronounced the openness characteristic of the householder is, the better his or her financial literacy level is. On the other hand, Columns (2), (3), (4) of Table6 incorporate the mediator variable "finance" based on the basic regression models, and the results show that the marginal effects of "finance" and "ope" on the three dependent variables are all positive at the 1% level.

The above results indicate that the householder's openness trait can effectively improve their financial literacy level, and better financial literacy level can promote the probability and degree of household commercial insurance participation. It can be proved that "financial literacy level" is one of the possible mechanisms through which the openness promotes the participation in household commercial insurance.

4.5. Heterogeneity Analysis

The empirical analysis above concludes that the householder's openness trait can significantly contribute to the probability and depth of participation in household commercial insurance, and this part is based on the differences between rural and urban households, the differences in the endowment of financial assets for the heterogeneity analysis, in order to study whether there is a heterogeneous manifestation of the openness-trait positive impact on household commercial insurance participation in different types of households.

4.5.1. Heterogeneity of Living Areas

First, considering that there are still some differences in the level of economic and financial development, educational and medical resources between rural and urban areas in China, this section divides the sample into a "rural household sample (rural)" and "an urban household sample(city)" based on the household's actual living area.

The results reported in Table7 show that the impacts of the openness trait on the three dependent variables are significantly positive in both the rural and urban samples, but the impact coefficients are larger in the urban household sample. The above results indicate that the facilitating effects of openness trait on the probability and depth of household commercial insurance participation is more pronounced in the urban household sample.

Analyzing the reasons, it may be that the number of insurance companies and the degree of development of insurance services in rural areas are lagging behind compared to urban areas, and even if openness level is increased to the same extent as that of urban household heads, it may be unable to efficiently promote the participation in family commercial insurance because of the difference in real insurance resources.

4.5.2. Heterogeneity of Financial Asset

Second, considering the different endowment of financial assets may also have an impact on the "relationship between openness and household commercial insurance participation", this part divide the full sample into two groups according to the median level of financial asset: if the household financial asset is bigger than the median, the household is regarded as high level; otherwise the household is regard as low level. In Table8, Columns (1), (3), (5) show the regression results for the low asset group, and Columns (2), (4), (6) show the regression results for the high asset group.

Table8 shows: the positive contribution of householder's openness to household commercial insurance participation is significant only among high level group and no longer significant in the low level group.

DOI: 10.54254/2754-1169/63/20231364

Table 7: The impact of openness on household commercial insurance participation in different types of households: living in rural or city.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	rural	city	rural	city	rural	city
	insur_if	insur_if	insur_ln	insur_ln	insur_ra	insur_ra
st_emo	0.006	-0.001	0.088	0.051	0.001	0.000
	(0.023)	(0.032)	(0.173)	(0.249)	(0.003)	(0.004)
st_con	-0.036	0.076*	-0.228	0.516	-0.004	0.002
	(0.028)	(0.042)	(0.210)	(0.327)	(0.003)	(0.005)
st_ope	0.060***	0.094***	0.482***	0.908***	0.009***	0.015***
	(0.020)	(0.031)	(0.150)	(0.240)	(0.002)	(0.004)
st_ext	-0.041*	0.018	-0.379**	0.142	-0.008***	0.002
	(0.024)	(0.035)	(0.184)	(0.271)	(0.003)	(0.004)
st_agr	0.048*	0.028	0.328	0.185	0.002	0.002
	(0.029)	(0.042)	(0.219)	(0.321)	(0.003)	(0.005)
age	0.009***	0.015***	0.084***	0.142***	0.001***	0.002***
	(0.002)	(0.003)	(0.015)	(0.023)	(0.000)	(0.000)
age2	-0.012***	-0.018***	-0.114***	-0.173***	-0.002***	-0.003***
	(0.002)	(0.003)	(0.016)	(0.024)	(0.000)	(0.000)
male	0.010	-0.040***	0.043	-0.342***	0.000	-0.005***
	(0.009)	(0.013)	(0.069)	(0.101)	(0.001)	(0.002)
eduy	0.008***	0.006***	0.064***	0.055***	0.001***	0.000**
	(0.001)	(0.002)	(0.008)	(0.013)	(0.000)	(0.000)
marry	0.019	0.046***	0.136	0.376***	0.001	0.002
	(0.013)	(0.018)	(0.101)	(0.141)	(0.002)	(0.002)
hk	-0.033**	-0.046***	-0.233**	-0.345***	-0.001	-0.001
	(0.014)	(0.014)	(0.101)	(0.111)	(0.002)	(0.002)
risk	0.024**	0.016	0.183**	0.146	0.002	0.003
	(0.011)	(0.018)	(0.084)	(0.139)	(0.001)	(0.002)
employ	-0.004	0.037**	-0.041	0.283**	-0.001	0.003
	(0.011)	(0.016)	(0.087)	(0.124)	(0.001)	(0.002)
fsize	0.006**	0.008**	0.056***	0.084***	0.000	0.000
	(0.002)	(0.004)	(0.017)	(0.032)	(0.000)	(0.000)
house	0.004	0.034**	0.058	0.287**	0.003**	0.004**
	(0.013)	(0.015)	(0.097)	(0.117)	(0.002)	(0.002)
car	0.351***	0.377***	2.874***	3.245***	0.036***	0.034***
	(0.006)	(0.008)	(0.072)	(0.106)	(0.001)	(0.002)
GDP	0.008	0.025***	0.078*	0.208***	0.001	0.001
	(0.006)	(0.008)	(0.042)	(0.065)	(0.001)	(0.001)
N	8241	4243	8241	4243	8241	4243
Pseudo R^2	0.2813	0.3135	0.1312	0.1259	0.7022	1.2657

Note: For the convenience of explanation, the coefficients reported in Table7 are average marginal effects rather than regression coefficients. *, **, *** indicate statistical significant at 10%, 5%, 1% levels. The values in "()" below the coefficients are standard errors.

DOI: 10.54254/2754-1169/63/20231364

Table 8: The impact of openness on household commercial insurance participation in different types of households: different level of financial assets.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	fasset_low	fasset_high	fasset_low	fasset_high	fasset_low	fasset_high
	insur_if	insur_if	insur_ln	insur_ln	insur_ra	insur_ra
st_emo	-0.033	0.025	-0.229	0.227	-0.004	0.003
	(0.024)	(0.028)	(0.198)	(0.206)	(0.003)	(0.003)
st_con	0.027	-0.039	0.261	-0.304	0.004	-0.007*
	(0.029)	(0.036)	(0.234)	(0.267)	(0.004)	(0.004)
st_ope	0.022	0.109***	0.229	0.905***	0.005*	0.016***
	(0.021)	(0.026)	(0.169)	(0.193)	(0.003)	(0.003)
st_ext	0.018	-0.043	0.064	-0.311	-0.003	-0.006*
	(0.026)	(0.030)	(0.210)	(0.222)	(0.003)	(0.003)
st_agr	0.036	0.030	0.234	0.231	0.002	0.002
	(0.030)	(0.036)	(0.243)	(0.269)	(0.004)	(0.004)
age	0.008***	0.014***	0.079***	0.132***	0.001***	0.002***
	(0.002)	(0.002)	(0.017)	(0.019)	(0.000)	(0.000)
age2	-0.011***	-0.018***	-0.109***	-0.164***	-0.002***	-0.003***
	(0.002)	(0.003)	(0.018)	(0.020)	(0.000)	(0.000)
male	-0.009	-0.003	-0.096	-0.069	-0.002	-0.002*
	(0.010)	(0.011)	(0.078)	(0.083)	(0.001)	(0.001)
eduy	0.006***	0.006***	0.049***	0.054***	0.001***	0.000**
	(0.001)	(0.001)	(0.009)	(0.010)	(0.000)	(0.000)
marry	0.018	0.033**	0.120	0.226*	0.000	0.001
	(0.013)	(0.016)	(0.106)	(0.124)	(0.002)	(0.002)
hk	-0.044***	-0.038***	-0.382***	-0.300***	-0.004***	-0.001
	(0.011)	(0.012)	(0.092)	(0.090)	(0.001)	(0.001)
risk	0.023*	0.020	0.190*	0.147	0.002	0.002
	(0.012)	(0.014)	(0.101)	(0.105)	(0.002)	(0.002)
employ	-0.001	0.012	-0.017	0.043	-0.000	-0.001
	(0.011)	(0.014)	(0.091)	(0.105)	(0.001)	(0.002)
fsize	0.006**	0.008***	0.061***	0.082***	0.000	0.000
	(0.002)	(0.003)	(0.020)	(0.023)	(0.000)	(0.000)
house	0.019	0.025*	0.157	0.187*	0.004**	0.004**
	(0.013)	(0.014)	(0.104)	(0.102)	(0.002)	(0.002)
car	0.307***	0.394***	2.608***	3.323***	0.035***	0.036***
	(0.007)	(0.007)	(0.086)	(0.085)	(0.001)	(0.001)
GDP	0.010*	0.006	0.093*	0.072	0.001	-0.000
	(0.006)	(0.007)	(0.047)	(0.052)	(0.001)	(0.001)
N	6257	6445	6257	6445	6257	6445
Pseudo R^2	0.2688	0.2772	0.1318	0.1119	0.5367	1.6745

Note: For the convenience of explanation, the coefficients reported in Table8 are average marginal effects rather than regression coefficients. *, **, *** indicate statistical significant at 10%, 5%, 1% levels. The values in "()" below the coefficients are standard errors.

DOI: 10.54254/2754-1169/63/20231364

Analyzing the reason, it may be that if the household has few financial assets, even if the openness trait is increased, it may not have extra funds to participate in the commercial insurance market, so the promotion effect of openness is no longer significant in the low level group.

5. Conclusions and Policy Recommendations

This paper utilizes the China Family Panel Studies (CFPS) 2018 Data to conduct an empirical study, and the basic regression results show that the more pronounced openness trait of householder, the higher probability and depth of household commercial insurance participation. And after transforming the key independent variables, reducing the sample, and using the propensity score matching method for robustness testing, the results obtained are consistent with the basic regression.

The mediation effect model is used to further analyze the potential mechanisms behind the above relationships, and the results show that "the sense of social trust" and "financial literacy" are two possible mechanisms for the openness trait to promote the household commercial insurance participation, i.e., the more pronounced householder's openness trait is, the higher level sense of social trust or higher level financial literacy he/she has, and then if he/she has higher sense of social trust or financial literacy level, it will in turn effectively increase the probability and depth of household commercial insurance participation.

Heterogeneity analysis reveals that the facilitating effect of householder's openness trait on household commercial insurance participation is more pronounced in households living in urban areas and in households with high levels of financial asset holdings.

Based on the above empirical findings, this paper argues that relevant policy departments should pay attention to the important influence of individual personality traits, especially openness trait, on the household commercial insurance market: in the short term, individual personality traits have a certain degree of stability, and relevant policies should focus on matching with the openness trait; in the long term, individual personality traits have plasticity, and attention should be paid to cultivating the openness trait of individuals. In addition, the construction of insurance facilities in rural areas should be further improved, and attention should be paid to the needs of families with low levels of assets, so as to provide more targeted and adapted insurance products, thereby expanding the market for household commercial insurance, increasing the probability and depth of household commercial insurance participation, and giving fuller play to the important role of commercial insurance in the risk management of the family and the stable development of the economy of the society.

References

[1] *Sui, L.R., Li Y.Y. and Fang H.L. (2022) Promoting the High-Quality Development of Household Commercial Insurance. Macroeconomic Management, 4, 76-82.*

[2] *Zhang, C., Weng, X.Y. and Hu, S.D. (2023) The Effect of Dialect Diversity on Household Commercial Insurance Participation. Journal of Economics, 2, 1-34.*

[3] *Sun, W., Chan, K. H. and Wang, P. (2013) The Impact of House Price Volatility on Demand for Personal Insurance. Insurance Research, 10, 48-57.*

[4] *Zhao, H.M. and Su H.J. (2013). Research on Factors Influencing the Demand for Property Insurance in China: Based on Region-Weighted and Time-Weighted Panel Data. Insurance Research, 2, 38-44.*

[5] *Wang, R.Z. and Huang X.Y. (2021) Empirical Study on the Impact of Digital Financial Inclusion on Household Commercial Insurance Demand. Journal of Northwest University for Nationalities (Philosophy and Social Science Edition), 4, 123-137.*

[6] *Li, X., Wu, Y. and Li, J. (2021) Digital Financial Development and Household Commercial Insurance Participation. Statistical Research, 5, 29-41.*

[7] *Liu, D.J. and Zhuang, P.T. (2021) Digital Financial Inclusion and Household Commercial Insurance Purchase. Consumer Economics, 2, 67-78.*

DOI: 10.54254/2754-1169/63/20231364

[8] Qu, L.S., He, Y. and Xu, X. (2021) Newspaper Reporting and Household Commercial Insurance Investment: Based on the Perspective of Social Insurance Reporting. Journal of Central University of Finance and Economics, 12, 45-56.
[9] Albouy, F. X. and Blagoutine, D. (2001) Insurance and Transition Economics: The Insurance Market in Russia. The Geneva Papers on Risk and Insurance, 3, 467-479.
[10] Yin, Z.C., Yan, Y. and Jiang, J.L. (2021) Income Fluctuations, Social Networks and Household Demand for Commercial Insurance. Research on Financial Issues, 8, 52-61.
[11] Yang, B.Y., Wu, X. and Yi, X.J. (2019) Internet Use and Household Commercial Insurance Purchase: Evidence from CFPS Data. Insurance Research, 12, 30-47.
[12] Yin, Z.C., Tian, W.T. and Wang, X.Q. (2022) The Impact of Mobile Payment on Household Commercial Insurance Participation: An Empirical Analysis Based on Chinese Household Finance Survey Data. Research on Financial Issues, 11, 57-66.
[13] Li, D., Ding, J.S. and Ma, S. (2019) The Impact of Social Interaction on Household Commercial Insurance Participation: An Empirical Analysis From China Household Finance Survey (CHFS) Data. Financial Research, 7, 96-114.
[14] Wang, H.P. and Tang, Y.Y. (2022) Social Interaction, Network Information and Household Commercial Insurance Participation. Macroeconomic Research, 6, 93-111.
[15] Sun, H. and Zhang, R.S. (2023) Transmission Mechanism and Effect of Social Interaction on Household Commercial Insurance Allocation. Journal of Shenzhen University (Humanities and Social Sciences Edition), 3, 72-82.
[16] Zhao, Z.L., Wang, Y.Y. (2022) Land Transfer and Rural Household Commercial Insurance Participation. Research World, 7, 65-77.
[17] Lu Yajuan, Wang Jiahua. Study on the Influencing Factors of Household Commercial Insurance Holding Behavior under the Perspective of Aging: An Empirical Analysis Based on CHFS Research Data. Journal of Hohai University (Philosophy and Social Science Edition), 1, 25-30.
[18] Li, G.H., Li, Z.Y. and Lu, X. (2021) The Ageing Population, Dependency Burdens and Household Commercial Insurance Purchase: Evidence from China. Applied Economics Letters, 4, 1-5.
[19] Zhang, H., Li, W.B., Zhou, L. and Lai, T. (2023) Multiple Children and Family Business Insurance: Altruism or Investment. Journal of Central University of Finance and Economics, 1, 26-38.
[20] Wang, R., Xia, Y., Xu, J.Y., Xu, H. and Xu, X. (2022) Child Structure and Family Business Insurance: Evidence from China's Household Finance Survey. China Soft Science, 7, 183-192.
[21] Yang, L. and Liu, Z.X. (2019) The Impact of Financial Literacy on Household Commercial Insurance Consumption Decisions: An Analysis Based on the China Household Finance Survey (CHFS). Consumer Economics, 5, 53-63.
[22] Wang, X.Q., Jia, H.W. and Yin, C.H. (2019) The Impact of Cognitive Ability on the Commercial Insurance Demand of Middle-Aged and Elderly Households. Insurance Research, 8, 81-97.
[23] Cao, G.H., Wang, N. and Ren, C.L. (2020) Cognitive Ability, Financial Literacy and Household Commercial Insurance Demand. Financial Forum, 12, 48-58.
[24] Yu, X.L., Shao, C.Y., Liu, H.M. and Han, L.L. (2022) Cognitive Ability, Financial Literacy and Demand for Commercial Insurance among Middle-Aged and Elderly Households: An Empirical Study of Structural Equations Based on Complex Networks. World Economic Letters, 6, 77-98.
[25] Zhang, H. and Li, W.B. (2022) Individuals' Early Experiences and Household Commercial Insurance Participation. Economic Science, 1, 126-140.
[26] Yang, H., Wu, K.J. and Fu, X.Z. (2021) A Study on the Impact of Non-Farm Employment on Rural Households' Participation in Commercial Insurance: An Empirical Analysis from CFPS data. Social Security Research, 6, 43-54.
[27] Cao, Z., Ye, X. and Wu, Fei. (2020) The Impact of Residents' Happiness on Family Commercial Insurance: A Transmission Mechanism Test Based on the Heterogeneity Perspective. Journal of Jiangxi University of Finance and Economics, 2, 62-75.
[28] Qin, F., Wang, W.C. and He, J.C. (2016) The Impact of Financial Literacy on Commercial Insurance Participation: An Empirical Analysis from China Household Finance Survey (CHFS) Data. Financial Research, 10, 143-158.
[29] Wu, W.X., Rong, P.G. and Xu, Q. (2011) Health and Household Asset Choice. Economic Research, 1, 43-54.
[30] Yin, Z.C., Song, Q.Y. and Wu, Yu. (2014) Financial Knowledge, Investment Experience and Household Asset Choice. Economic Research, 4, 62-75.
[31] Meng, Y.J. (2014) Cognitive Ability and Household Asset Choice. Economic Research, 1, 132-142.
[32] Song, T., Wu, Y.F. and Chen, J. (2012) Social Interaction, Trust and Farmers' Willingness to Purchase Commercial Pension Insurance. Journal of Huazhong University of Science and Technology (Social Science Edition), 1, 99-106.