Article

The Impact of Income on Rural Residents' Retirement Saving: Evidence from China

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Abstract: Population aging is a fundamental national condition that runs through China in the 21st century. The aging degree of rural areas in China is high, but the government-sponsored retirement plans have difficulty in meeting the retirement living needs. Guiding rural residents to save for retirement is the main way to alleviate the economic pressure of retirement life in rural areas. This paper uses data from the CAFF50 Survey to examine the impact of income level and income uncertainty on the retirement saving behavior of rural residents. Different from existing literature, this paper categorizes the retirement saving behavior into three aspects: "retirement saving decision", "retirement saving amount", and "retirement saving way choice". The results show the following: (1) Income level has a positive impact on the retirement saving decision, saving amount, the choice of real estate, and a negative impact on the choice of bank savings. (2) Income uncertainty has a positive impact on retirement saving decision, the choice of stock and fund, and a negative impact on the choice of bank savings, but the impact of income uncertainty on the amount is not significant. (3) There is an interaction effect between income level and income uncertainty on the impact on retirement saving amount, bank savings choice, and real estate choice. Based on the above conclusions, we think that it is necessary to increase fiscal subsidies and tax incentives, optimize retirement financial products, provide retirement financial education, and increase the participation enthusiasm of rural residents in retirement savings.

Keywords: income level; income uncertainty; retirement saving; preventive savings

1. Introduction

Since China officially entered the aging society in 2000, the speed of population aging has been increasing. The proportion of elderly people aged 65 and above has rapidly increased from 6.96% in 2000 to 14.9% by the end of 2022, and the rate of increase is getting faster and faster. From 2010 to 2020, the population aged 65 and above increased by 4.63%, an increase of 2.72% compared to the previous decade. According to the prediction of the United Nations, the elderly population aged 65 and above in China will increase to around 30% by 2060 and will be in a period of long-term aging plateau [1]. From 2000 to 2050, the global population aging level will increase by 12%, while China's population aging level will increase by 24% during the same period. It is expected that China's elderly population will reach 480 million by 2050, accounting for about 2/5 of the elderly population in Asia. Compared with developed countries, China's aging population is not only "early" but also "fast", and there is a trend of acceleration in the future [2–4].

The degree of aging in rural areas of China is significantly higher than that in urban areas. The seventh population census data (2020) show that the proportion of elderly people aged 60 and above and aged 65 and above in rural areas is 23.81% and 17.72%, respectively, which is 7.99% and 6.61% higher than those in urban areas. Moreover, urbanization, family planning, and advances in medical technology have accelerated the growth rate of the

proportion of rural elderly population [5,6]. According to the age migration structure of the population census, the proportion of elderly people aged 65 and above in rural areas will reach 46.4% of the total population by 2050, which is 2.1 times that of urban areas. Among them, the proportion of empty-nest elderly people in rural areas will reach 26.1%, which is 2.9 times that of urban areas.

At the same time as the aging population intensifies, pension funds are barely sufficient to meet the elderly care needs of rural residents. At present, China's pension system consists of three pillars: pillar I; is basic pension insurance, pillar II is enterprise annuity, and pillar III is personal retirement savings. Among them, pillar I of basic pension insurance is a state system established and implemented by the state in accordance with laws and regulations, including basic pension insurance for urban and rural residents, basic pension insurance for urban employees, and basic pension insurance for government agencies and institutions. The first type is basic pension insurance for urban and rural residents who do not have fixed jobs, while the latter two types of basic pension insurance cover residents working in urban enterprises and government institutions, respectively. Pillar II refers to a supplementary pension system voluntarily established by enterprises based on their own economic strength and status, outside the national pension system, to provide a certain degree of retirement income security for their employees. It can be seen that pillar II of China only involves employees of large companies, and the proportion of residents living in rural areas can be almost negligible. Therefore, in addition to voluntary savings, rural residents can only rely on the basic pension insurance for urban and rural residents in pillar I. Although they can receive pension after the age of 60, the amount they receive is quite low. According to data from the National Bureau of Statistics in 2022, the monthly per capita pension for rural elderly in China is only CNY 189, which is insufficient to meet the elderly care needs of rural residents.

In order to actively respond to the aging population and alleviate the economic pressure of retirement life, since 2006, the State Council, China Securities Regulatory Commission, China Banking and Insurance Regulatory Commission, and other departments have intensively introduced various policies to encourage people to save for retirement. However, numerous studies have shown that China's residents' retirement savings are insufficient and have a single structure, mainly relying on bank savings [7–9]. Moreover, the actual and subjective evaluation of the economic security of rural elderly people is lower than that of urban elderly people [10]. According to relevant data, 73.3% of urban elderly people believe that they have the financial ability to live a good retirement life, while 54.5% of rural elderly people believe so [11]. The actual proportion of urban elderly people with retirement savings is 80.9%, while the proportion of rural elderly people is only 5.3%, which is significantly lower than that of urban elderly people [12]. Zhang et al. [13] found that, compared to urban elderly people, the proportion of rural elderly people making retirement plans in advance is lower, and most rural elderly people choose bank savings. Chen et al. [14] found that 59% of Chinese believe they are unable to save enough money for retirement, and the proportion of rural people making retirement financial preparations is only half that of urban people. Sun et al. [15] found that the level of retirement saving of urban residents is higher than that of rural areas.

What is the reason for the higher degree of aging in rural areas but the lower level of retirement savings compared to cities? Some scholars analyze it based on individual, household, and social characteristics, as well as other reasons. According to the theory of investment management, income, as the representative of residents' economic ability, plays a key role in retirement saving. The life-cycle hypothesis believes that rational consumers will arrange their consumption according to their lifetime income and hope that consumption in each period can be stable, so that total consumption equals to total income. When they have the ability to work, they will use part of their income for savings as a source of financial support in old age. However, exploring the relationship between "income level" and retirement saving alone does not seem to yield satisfactory results. The preventive savings theory provides a good explanatory framework for us to further explore

the relationship between the two. This theory points out that people should consider both current income levels and future income uncertainty when making consumption and savings decisions. Based on the above reasons, this paper explores the impact of income level and income uncertainty on retirement saving. Different from existing literature, this paper categorizes retirement saving behavior into three aspects: "retirement saving decision", "retirement saving amount", and "retirement saving way choice".

2. Theoretical Analysis and Hypotheses

The relationship between income level and savings has been widely recognized. Keynes' theory of national income determination states that savings increase with income levels, and the marginal propensity to save increases. The persistent income hypothesis divides income into persistent income and temporary income. Persistent income refers to predictable and continuous income, while temporary income refers to occasional income. Consumption mainly comes from persistent income, and the majority of temporary income is used for savings. Both theories mentioned above demonstrate that income determines savings. Scholars have also conducted extensive empirical research on the relationship between income level and savings, and, whether from a macro or micro perspective, income level positively affects savings [16–19]. The low income level leads to a relatively small share of rural residents' income that can be used for savings, resulting in a smaller marginal propensity for savings [16], and the increase in rural savings rate mainly stems from the increase in income [17]. The difference in income will affect household savings and asset holdings [18], and it has a significant positive impact on household stock, fund, and bond participation [19].

The direct impact of income level on retirement savings can be traced back to the life-cycle hypothesis, which believes that rational consumers will arrange consumption according to their lifetime income and hope that consumption in each period can be stable, so that total consumption is equal to total income. When they have the ability to work, they will use part of their income to save as the source of financial support in old age. That is to say, income level will positively affect the retirement savings. The empirical analysis results also show that an increase in income level will positively affect the participation probability in the government-sponsored retirement plan, commercial endowment insurance, retirement plan, etc. Early surveys targeting the United States showed that, the higher the income level, the higher the amount paid in the retirement savings [20]. Hong et al. [21] found that the monthly income level of households is an important factor affecting the financial preparation of middle-aged people for retirement, based on data from the 2015 National Household Survey in South Korea. Some studies have shown that income levels or economic conditions are important factors affecting residents' willingness to participate in voluntary retirement savings plans [22,23]. The contribution amount of supplementary retirement savings plans for lower-income groups is very low, and there is even no plan for retirement [24,25]. Yao et al. [26] pointed out that only 11.3% of people with incomes below USD 16,000 have personal retirement plans, while 66.5% of people with incomes equal to or greater than USD 60,000 have personal retirement plans. High-income individuals are more willing to make retirement financial plans [27,28]. Compared to residents with incomes below USD 25,000, high-income individuals are 11% to 14% more likely to participate in additional retirement savings plans [29].

The income level can also have an indirect impact on the retirement saving behavior through influencing financial literacy, risk attitude, etc. On the one hand, an increase in income level will increase an individual's financial literacy level. Financial literacy is a necessary determining factor when people make investment decisions, and it will increase the probability of making retirement savings plans [30]. On the other hand, residents with higher income levels are more able to bear the losses caused by investment, that is, the stronger their risk preference. And risk preference is a factor that cannot be ignored in investment decisions. Research shows that, the stronger the degree of risk preference, the higher the likelihood of making a retirement plan [31]. In addition, individuals with

high income levels place more emphasis on investment, have longer life expectancy, pay more attention to the retirement life quality, and require higher retirement economic costs. Therefore, they will save more retirement assets.

Based on the above analysis, this paper proposes the following hypothesis:

Hypothesis 1: *Income level will affect the retirement saving behavior.*

Dreze et al. [32] first studied the impact of income uncertainty on investment portfolio. They found that, when the financial market is imperfect, income uncertainty can affect residents' investment portfolio. This conclusion is consistent with the preventive savings theory, which points out that consumers not only save based on current income, but also increase savings to prevent future uncertainty, namely, preventive savings, which mainly comes from income fluctuations. The expected future consumption marginal utility under uncertainty is greater than the marginal utility under certainty. The greater the uncertainty of income, the stronger the willingness to save for prevention. Subsequently, the random walk hypothesis, liquidity constraint hypothesis, and buffer inventory hypothesis, which emerged under uncertain conditions, all confirmed the importance of income uncertainty in savings.

The increase In income uncertainty will increase residents' holdings of safety assets and reduce the holding of risky assets [33,34]. The purpose of retirement saving is to maintain the principal and increase the value of retirement financial assets. Compared with other investments, retirement saving is less speculative and has lower risk, making it a kind of safe asset. Therefore, the higher the uncertainty of income, the more inclined it is to increase the holding of retirement savings. Campbell et al. [35] found that heterogeneity of labor income risks strongly affects the optimal investment portfolio within the life cycle. Higher income uncertainty can induce individuals to save more in the early stages of their life cycle, but in the later stages of their working life, people may change their savings patterns [36]. Some empirical research results also show that an increase in income uncertainty will increase the likelihood of social security, a retirement financial investment. Li et al. [37] pointed out that the frequency of job changes has a negative impact on the probability of retirement insurance for urban employees, meaning that, the higher the income uncertainty, the more willing they are to continue participating in a government-sponsored retirement plan. Sun et al. [38] found that, the greater the income risk, the greater the probability of having retirement financial investments.

The main reasons for the positive impact of income uncertainty on retirement saving are as follows. On the one hand, individuals with stable labor income often have better welfare benefits and higher pensions and are unwilling to make additional retirement savings. On the other hand, income uncertainty may affect risk attitudes and further affect retirement savings. Bonin et al. [39] found that individuals with a high level of risk preference are more likely to choose jobs with high income uncertainty, while individuals who are unwilling to take risks are more likely to work in industries with low income uncertainty. Hartog et al. [40] found that, the lower the uncertainty of income, the stronger the risk tolerance and the lower the demand for related risk avoidance products, indicating a lower probability of making low-risk investments such as buying retirement financial products.

Based on the above analysis, we believe that income uncertainty will have an impact on the retirement saving behavior, and we propose the following hypothesis:

Hypothesis 2: *Income uncertainty will affect the retirement saving behavior.*

The above analysis indicates that both income level and income uncertainty positively affect residents' retirement saving behavior, but whether there is an interaction between the two is worth further exploration. On the one hand, residents with high income levels have strong economic capacity for retirement saving and can have sufficient money to prepare for their retirement. However, if income uncertainty is low, it means they have stable work and

income levels, and they have low risk-aversion awareness and, thus, reduced willingness to save for retirement. On the other hand, residents with high income uncertainty lack a sense of economic security and have a strong willingness of preventive savings. They will increase their retirement savings. If their income level is high, their strong economic ability will strengthen the level of savings. Based on the above analysis, we think that income level and income uncertainty will have an impact on the behavior of retirement saving, and there may be an interactive mechanism. Based on the above analysis, this article proposes the following hypothesis:

Hypothesis 3: *There is an interactive effect of income level and income uncertainty on the retirement saving behavior.*

3. Data and Variables

3.1. Data Source

The data are from the survey of urban and rural residents in China conducted by the China Ageing Finance Forum (CAFF50). It is the first nationwide survey specifically targeting retirement savings in China. The survey was designed by the China Household Finance Survey and Research Center according to the demographic characteristics of each province and city, taking full account of sex ratio, age level, income level, regional differences, and other factors. It was conducted by Tianhong Asset Management and the Industrial Bank in 31 provinces in the mainland of China through the combination of online network platform and offline research. Firstly, the sample size of each province and city was allocated based on the population size, and the target sample size for each age group in each province and city was determined through two dimensions: age distribution and gender ratio of the population aged 15 and above. Secondly, utilizing Tianhong Fund and Industrial Bank's customer base distributed across the country, targeted questionnaires were launched based on the target visits of each age group. Considering the differences in customer age structure, Tianhong Fund focused on investigating groups under the age of 50, while Industrial Bank focused on investigating groups aged 50 and above. In addition, considering the convenience of the execution process, in terms of survey methods, Tianhong Fund used mobile apps to collect questionnaires online, while Industrial Bank used offline visits and real-time data transmission through mobile apps. Finally, the project team members processed and integrated the data collected online and offline to obtain the database used in this paper. The main content of the survey include: (1) participation in retirement plan, including participation in government-sponsored retirement plan and willingness to buy commercial Endowment Insurance; (2) retirement financial activities, including understanding of retirement saving and retirement saving behavior. The target sample size of this survey was 46,000, and 45,282 questionnaires were effectively collected. After removing the missing key variables, a total of 38,051 valid questionnaires were collected. Due to the fact that the retirement saving is mainly aimed at people with a certain economic foundation who have not entered the elderly life, this study selected rural residents aged 30–59, with a total of 3852 valid samples.

3.2. Variables

3.2.1. Explained Variable

The dependent variable of this paper is the retirement saving behavior, which is measured from three aspects: retirement saving decision, retirement saving amount, and retirement saving way choice, described as follows. (1) The retirement saving decision refers to whether the respondent has saved for retirement purposes. When the respondent has saved for retirement, the value of retirement saving decision is 1, otherwise it is 0. (2) The retirement saving amount refers to the savings or investment amounts that the respondent has for retirement. In the questionnaire, the question "What is the approximate range of retirement saving you currently have?" was set. A total of 11 intervals were set for options ranging from less than CNY 100 thousand to over CNY 10 million. We

selected the middle value of the interval to measure the actual amount of retirement savings. (3) Retirement saving way choice refers to whether the respondents choose a certain way for retirement saving, including bank savings, stocks or funds, commercial endowment insurance, and real estate. If a certain way is selected, this saving way choice is assigned a value of 1; otherwise, it is 0.

3.2.2. Core Explanatory Variable

The core explanatory variables of this study are income level and income uncertainty. Firstly, based on the selection of the respondents' monthly income level range, the logarithm of the median is selected as the determining value of the income level.

Income uncertainty refers to the unpredictability of income, which refers to the stability or risk of income. There is currently no unified indicator for measuring income uncertainty. The existing measurement methods mainly measure from the following aspects: (1) Based on work and occupational status, such as the nature of the workplace [41,42], the proportion of employed individuals in households [43], the number of income earners in households [44], and the unemployment rate in the region [45]. These methods are relatively simple to measure, but it can only reflect the uncertainty of income from work, which is not comprehensive enough and may have some errors. (2) Based on subjective income perception, which is an individual's subjective evaluation of income stability [46,47]. This type of method is less commonly used by scholars due to its high subjectivity. (3) By calculating the deviation between actual income and expected income, such as the deviation between expected income and actual income measured based on actual income over a period of time [48], or the deviation between income and actual income predicted based on individual characteristics such as gender, age, education, etc. This method is widely used by scholars, but it does not remove income fluctuations that individuals can predict. Therefore, the income uncertainty of this measurement may be higher than the actual value. (4) Measuring the variance or standard deviation related to income, such as the variance or standard deviation of household income in recent years [49], the logarithm of the variance, standard deviation, and variance of household income within the group calculated based on occupational type and education years [50,51], and the subjective variance of actual income constructed by the variance of expected inflation and expected income growth [52]. This type of method covers various sources of income uncertainty and has been adopted by many scholars. This paper refers to the research of Carroll et al. [52] and measures the income uncertainty by multiplying the intra-group variances of the three groups by the logarithm based on their education level, occupation, and province where respondents are located.

3.2.3. Control Variables

Both individual and household characteristics have impacts on the retirement saving behavior. Gender, age, and education level in personal characteristics have been confirmed by numerous scholars [20,25,53]. Gerrans et al. [54] found that retirement savings increase with age and begin to decline in the middle to late thirties. Household assets, real estate, and other household characteristics can also affect retirement savings [13,26]. Individual occupation is also a major factor affecting retirement savings. Shi [55] found that people employed by foreign-funded enterprises have the highest probability of buying endowment insurance, while residents without work have the lowest probability of buying endowment insurance. Whether to have a government-sponsored retirement plan is an important factor to save for retirement. In addition, a major factor hindering residents' investment behavior would be concerns about fraud, so whether residents have experienced financial fraud is also included in the control variable. Based on the analysis above, this paper selects variables that reflect individual and household characteristics in the control variables, including gender, age, education level, household assets and property, occupation, government-sponsored retirement plan, and financial fraud experience. The definitions and descriptions of each variable are shown in Table 1.

Table 1. Variable Definition and Description.

Variables	Definition	Obs	Mean	S.E.	Min	Max
Retirement saving decision	Whether to have retirement savings: Yes = 1; No = 0	3852	0.8487	0.3584	0	1
Retirement saving amount	Actual amount of retirement savings held by respondents	3852	32.9245	71.1833	0	850
Bank savings choice	Whether to choose bank savings for retirement saving: Yes = 1; No = 0	3852	0.4860	0.4999	0	1
Stock or found choice	Whether to choose stocks or funds for retirement saving: Yes = 1; No = 0	3852	0.1713	0.3769	0	1
Commercial Endowment Insurance choice	Whether to choose commercial endowment insurance for retirement saving: Yes = 1; No = 0	3852	0.3702	0.4829	0	1
Real estate choice	Whether to choose real estate for retirement saving: Yes = 1; No = 0	3852	0.0704	0.2558	0	1
Income level	The logarithm of respondents' monthly income	3852	8.0105	1.6273	0	12
Income uncertainty	After grouping based on education, occupation, province, calculate the product of logarithmic variance of income for groups other than oneself	3852	70.9164	187.8912	10	2000
Household assets	Total household asset amount (CNY 10 thousand)	3852	11.1376	3.5980	0	22
Education level	actual years of education received	3852	39.4097	7.9048	30	59
Age	Respondent's actual age at the time of interview	3852	0.6615	0.4733	0	1
Gender	Male = 1; Female = 0	3852	1.9315	0.9566	1	6
Household properties	Family-owned properties (sets)	3852	0.1576	0.3644	0	1
Occupation	Employees of government agencies and institutions/state-owned enterprises/collective enterprises/military personnel = 1; Other = 0	3852	0.8466	0.3604	0	1

4. Estimation Results and Robustness Test

4.1. Estimation Model

This paper measures the retirement saving behavior from three aspects: retirement saving decision, retirement saving amount, and retirement saving way choice.

(1) The retirement saving decision refers to whether respondents have retirement savings. It belongs to a binary variable. Assuming the probability of y = 1 is P, the distribution function of y is:

$$f(y) = P^y (1 - P)^y; \; y = 0,1, \tag{1}$$

We use the Binary Logit Model for the analysis in this paper. The dependent variable is restricted to the range of [0–1], and maximum likelihood estimation is used to estimate the regression parameters. The basic form of the model (model 1) is as follows:

$$\text{decision}_i = F(\alpha + \beta income_i + \sum_{j=1}^{m} \beta_j X_{ij} + \mu) = 1/(1 + \exp(-(\alpha + \beta income_i + \sum_{j=1}^{m} \beta_j X_{ij} + \mu))) \tag{2}$$

decision_i is the probability of having retirement savings, where i represents the household ID. β represents the regression coefficient for income level or income uncertainty, while β_j represents the regression coefficient for each control variable, where j is the ID number of the control variable. m represents the number of control variables; X_{ij} is the control variable, indicating the jth control factor for the ith sample. α is the intercept, and μ is the error term.

(2) The retirement saving amount refers to the total amount of savings accumulated by respondents for their retirement. It is a continuous variable. We use OLS regression (model 2) to test the impact of income on retirement saving amount:

$$\text{saving}_i = \beta_i \times income_i + \lambda \times ctrl_i + \varepsilon_i \tag{3}$$

saving_i represents the retirement saving amount, and $income_i$ represents the income level or income uncertainty of the respondents. $Ctrl_i$ is the control variable, and ε_i is the random error term.

(3)　Retirement saving way choice refers to the investment or savings way that residents choose in order to prepare for their retirement. This paper selected four representative saving ways: bank savings, stocks or funds, commercial endowment insurance, and real estate. Whether to choose a certain saving way is a binary variable (for example, choosing bank savings for retirement saving product is defined as 1; otherwise, it is defined as 0). If the probability of y = 1 is P, then the distribution function of y is:

$$f(y) = P^y(1 - P)^y; \ y = 0,1, \tag{4}$$

For this type of data, we use a binary logit model for analysis. The basic form of the model (model 3) is as follows:

$$\text{way}_i = F\left(\alpha + \beta income_i + \sum_{j=1}^{m} \beta_j X_{ij} + \mu\right) = 1/\left(1 + \exp\left(-\left(\alpha + \beta income_i + \sum_{j=1}^{m} \beta_j X_{ij} + \mu\right)\right)\right) \tag{5}$$

way_i is the probability of selecting a certain type of retirement saving (respectively referring to the probability of bank savings choice, stocks or funds choice, commercial endowment insurance choice, and real estate choice), and other variables and symbols are the same as above.

4.2. Estimation Rusults

4.2.1. Impact of Income on Retirement Saving Decision

Using Model 1, the impact of income on retirement saving decision is analyzed, and the regression results are shown in Table 2. Column (1) shows the impact of income level on retirement saving decision, where the coefficient of income level is positive and passes the significance test at the 1% level, indicating that, with other variables held constant, rural residents with higher personal income levels are more likely to save for retirement. The possible reason is that residents with higher income levels have stronger economic capabilities, higher financial literacy, and are good at utilizing the financial market for retirement saving. Column (2) reports the regression results on the impact of income uncertainty on retirement saving decision, where the coefficient of income uncertainty is positive, indicating that, with other variables held constant, rural residents with higher degrees of income uncertainty are more likely to save for retirement. Most rural residents are risk averse and unwilling to face the decrease in future consumption levels caused by income uncertainty. Therefore, they save more assets to cope with future elderly care. The interactive effect is shown in Column (3), where there is no interaction mechanism between the income level and income uncertainty of rural residents in their impact on retirement saving decision. The above conclusions verify assumptions 1 and 2.

4.2.2. Impact of Income on the Retirement Saving Amount

Using Model 2, we analyzed the impact of income on the retirement saving amount, and the regression results are shown in Table 3. Column (1) shows the impact of income level on the retirement saving amount. The coefficient of income level is positive and passes the 1% significance level test, indicating that, under the condition that other variables remain unchanged, rural residents with high personal income levels tend to have more retirement savings. Column (2) reports the impact of income uncertainty on the retirement saving amount. The results show that the coefficient of income uncertainty is positive but does not pass the significance test, indicating that rural residents' retirement saving amount will not be affected by income uncertainty. This differs from the previous conclusions. Income uncertainty can affect the retirement saving decision but cannot affect retirement saving amount. One possible reason is that, when rural residents face uncertain income risks, due to risk aversion, they may choose to save for retirement. However, most rural people hold onto the concept of raising children to support their old age. They are willing to spend more money to support their children rather than save too much for their own retirement. Therefore, in the face of income uncertainty, although rural residents are

willing to save for retirement, they will not have a large scale of savings. The results of the interaction effect are shown in Column (3). There is an interaction mechanism between the income level and income uncertainty of rural residents in their impact on the retirement saving amount. These conclusions confirm Hypothesis 1 and Hypothesis 3.

Table 2. Impact of income on retirement saving decision.

Variables	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Income level	0.1473 ***	0.0250			0.1130 ***	0.0393
Income uncertainty			2.1000 ***	0.3090	1.6920 ***	0.3560
Income level × Income uncertainty					0.0924	0.1060
Gender	−0.2430 **	0.1060	−0.2080 **	0.1040	−0.2700 **	0.1070
Age	−0.1260 *	0.0748	−0.1100	0.0746	−0.1130	0.0751
Age Squared	0.0019 **	0.0009	0.0017 *	0.0009	0.0017 *	0.0009
Education	0.0009	0.0144	−0.0415 **	0.0166	−0.0377 **	0.0168
Occupation	0.4290 ***	0.1640	0.2400	0.1680	0.2640	0.1690
Government-sponsored retirement plan	1.1520 ***	0.1080	1.0870 ***	0.1100	1.0720 ***	0.1100
Financial fraud experience	−0.0068	0.1030	−0.0032	0.1030	0.0020	0.1030
Household assets	−0.0005 *	0.0003	−0.0005 *	0.0003	−0.0005 *	0.0003
Household house	0.4000 ***	0.0657	0.4050 ***	0.0647	0.3830 ***	0.0655
Constant	1.0410	1.5100	−33.1400 ***	5.3350	−27.0200 ***	6.1250
R2	0.0995		0.1030		0.1061	
LR chi2	325.7200 ***		337.1700 ***		347.5500 ***	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3. Impact of income on retirement saving amount (OLS).

Variables	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Income level	6.2712 ***	0.9197			20.2728 ***	1.6216
Income uncertainty			7.8168	10.2505	8.3644	11.0954
Income level × Income uncertainty					36.4360 ***	3.5453
Gender	−4.2590	2.6655	−1.9157	2.6666	−5.0835 *	2.6255
Age	−1.4287	1.7061	−1.3221	1.7181	−0.2227	1.6832
Age Squared	0.0251	0.0200	0.0242	0.0201	0.0116	0.0197
Education	1.0057 ***	0.3722	1.2657 ***	0.4476	0.5649	0.4466
Occupation	1.5863	3.3840	1.4680	3.5193	2.1304	3.4494
Government-sponsored retirement plan	0.9930	3.9867	2.9069	4.0397	2.3763	3.9503
Financial fraud experience	9.0673 ***	2.7377	8.8755 ***	2.7571	8.9757 ***	2.6940
Household assets	0.1039 ***	0.0074	0.1055 ***	0.0074	0.0943 ***	0.0073
Household house	5.0373 ***	1.4281	6.6901 ***	1.4213	3.5291 **	1.4145
Constant	−26.5650	36.0883	−120.2336	173.8010	−305.0110	189.2261
R2	45.1200 ***		39.9700 ***		47.9300 ***	
LR chi2	0.1217		0.1093		0.1501	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

OLS is used to study the impact of independent variables on the mean of the dependent variable. In order to more accurately capture the effects of income level and income uncertainty on the distribution of retirement saving amount, we use quantile regression for further analysis. The results are shown in Table 4. The income level has a significant positive impact on the retirement saving amount at the 25th percentile and above, and the impact degree shows an increasing trend as a whole. Income uncertainty has a positive impact on the retirement saving amount at the 25th, 50th, and 75th percentiles. The impact degree increases first and then decreases. Except for the 10th percentile, there is an interaction between income level and income uncertainty on retirement saving amount at other percentiles. For residents with low levels of retirement savings, the actual saving amount will not be affected by income level and income uncertainty. A possible reason is

that residents with low savings have lower actual economic capacity and financial literacy levels. For residents with high levels of retirement savings, the actual savings will not be affected by income uncertainty. The possible reason is that their savings are sufficient to cope with future income risks.

Table 4. Impact of income on retirement saving amount (quantile regression).

Variables	q10	q25	q50	q75	q90
Income level	3.75×10^{-18}	3.2738 **	6.9089 ***	6.5517 **	9.8372 **
	(1.32×10^{-15})	(1.3866)	(1.1580)	(2.6980)	(4.1076)
Income uncertainty	-4.52×10^{-16}	3.4979 **	18.5240 ***	16.5128 **	1.9762
	(6.70×10^{-15})	(1.4708)	(3.5994)	(7.2845)	(15.0449)
Income level × Income uncertainty	-9.98×10^{-17}	4.9409 **	11.3184 ***	11.1105 *	21.9122 *
	(2.38×10^{-15})	(2.0904)	(1.8929)	(6.1784)	(11.2838)
Control variables			control		

Note: Figures in brackets are standard errors. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.2.3. Impact of Income on the Retirement Saving Way Choice

Using Model 3, we analyzed the impact of income on the retirement saving way choice, and the results are shown in Table 5. According to the results, income level has a significant negative impact on the probability of choosing bank savings for retirement and a significant positive impact on the probability of choosing real estate for retirement. However, it has no significant impact on the choice of stocks or funds and commercial endowment insurance. The main reason is that the risk of bank savings is relatively low. As income increases, the ability to bear risks increases, and the probability of choosing bank savings decreases accordingly. Due to the development of China's real estate market in recent decades, real estate has lower risks and higher returns compared to other financial assets, making high-income residents more inclined to choose such products for investment. Income uncertainty has a significant negative impact on the choice of bank savings and a significant positive impact on the choice of stocks and funds. The impact of income uncertainty on the choice of the other two retirement financial assets is not significant. The main reason is that the basic pension level of rural residents is very low, and when facing uncertain income risks, they have greater concerns about their future retirement life. They will increase their risk preference and invest more in risky retirement financial products, such as stocks and funds, while reducing products with lower returns, such as bank savings. In terms of interaction, there is an interaction mechanism between income level and income uncertainty when choosing bank savings and real estate as retirement financial assets. The above conclusions confirm Hypotheses 1, 2, and 3.

4.3. Robustness Test

In the previous analysis of income's impact on the retirement saving amount and retirement saving choice, we could only observe the effects of individuals who have retirement savings. Among individuals who did not have retirement savings, the effects of income level and income uncertainty on them cannot be considered because the amount and way choice cannot be observed. Therefore, there is a significant sample selection bias in the data. To address this issue, we used the Heckman two-stage method, with the first stage being whether an individual has retirement savings and the second stage being the saving amount and saving way choice. The results of the two-stage analysis are shown in Table 6. As the results show, after considering sample selection bias, in terms of the impact of income on the retirement saving amount: both income level and income uncertainty have passed the significant test and there is an interaction between the two. In terms of the impact of income on the retirement saving way choice: income level has a significant negative impact on choosing bank savings and a significant positive impact on choosing real estate; income uncertainty has a significant negative impact on choosing bank savings and a significant positive impact on choosing stocks or funds; and there is a significant

interaction between income level and income uncertainty in their impact on bank savings and real estate. The conclusions are consistent with those without considering selection bias.

Table 5. Impact of income on the retirement saving way choice.

Variables	Bank Savings Choice	Stocks or Funds Choice	Commercial Endowment Insurance Choice	Real Estate Choice
Income level	−0.1336 ***	0.0129	−0.0446	0.4003 ***
Income uncertainty	−0.8377 **	1.2431 ***	0.4700	−0.0947
Income level × Income uncertainty	−0.2322 **	−0.1136	−0.1101	0.5293 ***
Gender	−0.0492	0.2437 **	−0.1130	−0.1875
Age	−0.0576	−0.0688	−0.0073	−0.1618 *
Age Squared	0.0008	0.0007	0.0001	0.0019 *
Education	0.0157	0.0117	0.0263 **	0.0353
Occupation	0.2619 ***	0.1008	−0.1488	−0.0614
Government-sponsored retirement plan	−0.0244	0.0907	0.5591 ***	−0.1553
Financial fraud experience	−0.0996	0.0042	−0.0455	0.1901
Household assets	−0.0004 *	0.0000	0.0004 **	0.0002
Household house	−0.0683 *	−0.0141	0.0319	0.0475
Constant	16.5296 ***	−21.3624 ***	−8.5081	−1.2794
R2	0.0112	0.0156	0.0135	0.0270
LR chi2	50.0500 ***	50.8200 ***	60.1400 ***	49.5800 ***

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6. Results of the Robustness Test.

Variables	Retirement Saving Amount	Bank Savings Choice	Stocks or Funds Choice	Commercial Endowment Insurance Choice	Real Estate
Income level	22.4059 *** (1.7591)	−0.1370 *** (0.0527)	−0.0010 (0.0662)	−0.0483 (0.0521)	0.3674 *** (0.0988)
Income uncertainty	39.5662 *** (14.9578)	−0.8879 ** (0.4406)	1.0323 * (0.5962)	0.4178 (0.4442)	−0.7758 (0.7829)
Income level × Income uncertainty	34.7902 *** (3.5800)	−0.2294 ** (0.1068)	−0.0974 (0.1644)	−0.1074 (0.1085)	0.5769 *** (0.1930)
Lambda	388.1367 *** (124.9874)	−0.6252 (3.6878)	−2.7147 (5.1574)	−0.6686 (3.8410)	−8.4396 (6.6287)
Control variables	Yes	Yes	Yes	Yes	Yes
F	45.1000 ***				
LR chi2		50.0800 ***	51.1000 ***	60.1700 ***	51.2400 ***
R2	0.1526	0.0112	0.0157	0.0135	0.0279

Note: Figures in brackets are standard errors. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Conclusions and Policy Implications

This paper found that, as income levels increase, residents are more likely to save for retirement and have a larger scale of savings. The potential of the future retirement financial market will be enormous in rural China. The greater the uncertainty of rural residents' income, the more aware they are of the necessity to prepare materially for retirement, and the more likely they are to engage in retirement saving. It indicates that Chinese rural residents have a strong sense of preventive storage and will prepare retirement financial assets based on their own income uncertainty. This has positive significance for alleviating the economic pressure of aging. Looking at the impact of income on the retirement saving way choice, income levels have a negative impact on the choice of bank savings while

having a positive impact on the choice of real estate. Income uncertainty has a negative impact on the choice of bank savings while having a positive impact on the choice of stocks or funds.

Based on the above conclusions, we provide the following policy recommendations: (1) Increase government financial subsidies and tax preferences to improve the enthusiasm of rural residents to save for retirement. Income level has a significant positive impact on the decision making and amount of retirement savings. Improving the participation ability of residents in retirement saving is particularly important. Therefore, we should actively promote tax preferences, such as expanding the scope of tax-deferred endowment insurance, giving residents who purchase commercial endowment insurance certain tax preferences, referring to the implementation of such products, and extending the scope to bank savings, funds, stocks, and other retirement financial markets to provide residents with tax preferences. (2) Optimize retirement financial products. Residents with high income uncertainty have a higher probability and amount of retirement savings, mainly in order to prevent future income risks, which also shows that they have a high degree of risk avoidance. Therefore, when designing retirement financial products, financial institutions should timely understand the residents' financial needs for retirement, identify the risk tolerance of consumers, design various types of retirement financial products that meet the retirement needs and risk preferences of residents, and comply with the characteristics of residents' life cycle. It is recommended to design exit mechanisms based on the age, health status, and unemployment status of investors to prevent uncertain income risks. (3) Financial institutions should focus on promoting retirement financial products to rural residents with high income levels and income uncertainty. These people are a potential group in the retirement financial market. (4) The government should closely monitor rural residents with low income levels and income uncertainty and provide retirement financial education. Residents with low income levels and income uncertainty have a small possibility for and amount of retirement savings. This means that these residents have inadequate retirement financial savings, so it is necessary to provide them with retirement financial education to raise awareness of the severity of population aging. (5) Banks, real estate agents, and fund companies should provide differentiated retirement financial products. The impact of income level on rural residents' bank savings choices is negative, while the impact on real estate choices is positive; the impact of income uncertainty on rural residents' bank savings choices is negative, while the impact on stock or fund choices is positive. In other words, bank savings are more attractive to rural residents with lower income levels and higher income uncertainty, while real estate is more attractive to rural residents with higher income levels. Therefore, banks should target rural residents with lower income levels and higher income uncertainty and promote the use of bank savings for retirement asset preservation. Residents with higher income levels and unstable incomes are less likely to choose bank savings for retirement asset preservation. Therefore, suitable bank savings products should be designed for these groups, such as longer-term products with higher risk–reward ratios to attract them. Real estate agents should target residents with higher income levels for promotion. Stocks, funds, and other institutions should target residents with higher income uncertainty for promotion to increase their enthusiasm for choosing these products. Residents with more stable incomes are less likely to choose stocks or funds for retirement asset preservation. Therefore, products suitable for them should be designed, such as money funds and bond funds with relatively lower risk–reward ratios.

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