

Article

Rural Social Security, Precautionary Savings, and the Upgrading of Rural Residents' Consumption Structure in China

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Abstract: Based on the 2012 and 2018 China Family Panel Studies (CFPS) data, this paper explores the influence mechanism between rural social security, precautionary savings, and the upgrading of rural residents' consumption structure in China from theoretical and empirical perspectives. The results show that China's rural social security can significantly promote the upgrading of rural residents' consumption structure, and 1.79% of the positive effect of China's rural social security on the upgrading of rural residents' consumption structure in China is realized through the mediating effect of precautionary saving; the robustness of the regression results is tested by a placebo test and substitution matching method. Through further research, it is found that the promotion effect of China's rural social security on the upgrading of rural residents' consumption structure in China varies by region and age. In order to promote the sustainable upgrading of rural residents' consumption structure, rural social security policies should be further improved, and new rural social pension insurance policies should be formulated according to local conditions, which will ultimately promote the economic development of rural areas.

Keywords: upgrading of consumption structure; social security; precautionary savings; PSM-DID; mediation effect



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1. Introduction

Consumption plays a vital role in economic development. According to the report on consumer spending released by China's National Bureau of Statistics, China's final consumption expenditure contributed 5.3 percentage points to economic growth in 2021, contributing 65.4% to China's economic growth, which shows that consumption has become the main engine of China's economic growth. The large base and high proportion of the rural population objectively requires that China's economic development cannot ignore the huge potential of the rural consumer market: according to the results of the Seventh National Census of China, the population of Chinese farmers reached 510 million by 1 November 2020, accounting for 36.11% of the total population. Studies on rural consumption in China suggest that the level of contribution of rural consumption to GDP in China in 2020 was maintained at more than 8%, which is an important endogenous driver of China's economic growth [1]. However, the analysis of consumption data of urban and rural residents reveals that the per capita consumption expenditure of urban and rural residents in China in 2021 was CNY 30,307 and CNY 15,916, respectively, and the per capita consumption of rural residents only accounts for 52.5% of the per capita consumption of urban residents, which not only indicates the low consumption level of rural residents in China, but also the obvious consumption gap between urban and rural residents [2]. According to the Statistical Communiqué of the People's Republic of China on the 2021 National Economic and Social Development, the Engel coefficient of urban residents in China was 28.6% and the Engel coefficient of rural residents was 32.7% in 2021, further indicating that there is a gap between the consumption structure of Chinese rural residents and that of urban residents [3], and the consumption structure of rural residents needs to be continuously optimized [4].

Among the studies on factors affecting consumption, it is found that social security, as an important system for maintaining social stability and an important means for regulating income distribution, has a certain influence on consumption. Scholars have conducted a great deal of research on the impact of social security on consumption. Among them, Keynes [5] proposed the “Absolute Income Hypothesis” in 1936, which advocated the redistribution of national income through the establishment of a social security system to improve the lives of low-income groups with a higher propensity to consume, thus increasing the overall consumption level. Modigliani [6] then proposed the “Life-Cycle Hypothesis”, which argues that a better social security system reduces people’s willingness to save and increases consumption rates. Friedman’s [7] “Permanent Income Hypothesis” treats social security as permanent income and argues that increasing the overall level of social welfare can change residents’ income expectations and thus affect their consumption. Leland [8] added to and improved the previous theories by including uncertainty in the study of consumption, and proposed the “Precautionary Savings Theory”, which argues that social security can reduce the uncertainty of residents or households about future income and expenditure, thus reducing savings and expanding consumption.

In response to the early theoretical theories, most scholars believe that there is a positive relationship between social security and consumption, but some scholars are cautious about this view. For example, Feldstein [9] creatively proposed that social security has an “asset substitution effect” that leads to an increase in consumption and an “induced retirement effect” that leads to a decrease in consumption. Subsequently, many studies on the “crowding-in effect” and “crowding-out effect” of social security on consumption have emerged. A considerable number of scholars believe that social security has an obvious “crowding-in effect” on residents’ consumption, and that increasing the level of social security can significantly reduce residents’ precautionary saving motive, increase residents’ consumption expenditure, and improve their consumption structure [10–13]. At the same time, some scholars believe that social security has a significant “crowding-out effect” on consumption, and social security reduces residents’ consumption to a certain extent, and empirical studies have found that residents’ savings do not decrease but increase with social security [14–17]. Some other scholars argue that social security does not have a significant effect on consumption, and the consumption expenditure of residents does not change with the increase in the social security level [18,19].

Taking into account the actual situation in China, scholars have also conducted a lot of studies on social security and rural residents’ consumption in rural China. Studies have confirmed that various types of social security can promote the upgrading of residents’ consumption structure to a certain extent [20], but compared with the relatively perfect social security system in Chinese cities and towns, the social security system in rural China is still lacking, and farmers’ groups will have a cautious consumption mentality of increasing savings and reducing consumption when facing uncertainties in medical care and pensions, which leads to a lower level of consumption and consumption structure among Chinese rural residents [21,22]. Therefore, improving China’s rural social security system is crucial to maintaining the stability of China’s rural society, improving the consumption structure of rural residents, and promoting rural economic growth. In this regard, the “National Rural Revitalization Strategic Plan 2018–2020” issued by the State Council of the Central Committee of the Communist Party of China specifically states that “the construction of the rural social security system should be strengthened Comprehensively build a multi-level social security system that covers all people, is integrated between urban and rural areas, has clear rights and responsibilities, provides moderate protection, and is sustainable.”

In summary, according to the existing studies, it is found that the social security system can influence the consumption structure of residents to a certain extent. Then, how does China’s rural social security system affect the upgrading of rural residents’ consumption structure through the transmission path? To what extent does the rural social security system influence the upgrading of rural residents’ consumption structure through this transmission path? Is there any heterogeneity in the impact of China’s rural social security

system on the upgrading of rural residents' consumption structure across different regions and different age groups? To address these questions, this paper conducts a theoretical and empirical analysis to further clarify the relationship between rural social security and the upgrading of rural residents' consumption structure in China.

The existing literature provides good ideas for this paper to draw on, but no scholars have yet empirically studied the mechanism of the effect of rural social security on the upgrading of rural residents' consumption structure in China, using precautionary savings as a mediator. Moreover, there are few empirical studies involving the impact and heterogeneity of rural social security on the upgrading of rural residents' consumption structure in China. Therefore, firstly, this paper theoretically elaborates on the relationship and transmission path between rural social security and the upgrading of rural residents' consumption structure in China, and puts forward the corresponding research hypotheses; secondly, using CFPS data from 2012 and 2018, we construct a PSM-DID model to verify whether rural social security has an impact on the upgrading of rural residents' consumption structure in China, and use a benchmark regression model and a mediated effect model to empirically verify the transmission mechanism between Chinese rural social security and the upgrading of rural residents' consumption structure. Finally, it tests the theoretical hypothesis of the heterogeneity of China's rural social security on the upgrading of rural residents' consumption structure and provides empirical evidence for the formulation of social security policies in different regions and at different ages.

The possible marginal contributions of this paper are as follows. The first major contribution is to expand the research perspective by bringing preventive savings as a mediator into the study of rural social security and rural residents' consumption structure upgrading in China; the second major contribution is the innovation in research results by constructing a framework mechanism of social security, preventive savings, and rural residents' consumption structure upgrading in rural China, which is not only theoretically innovative, but also provides brand new evidence for social security and rural economic development in rural China in real practice; in other words, the research results of our article have certain theoretical and practical significance.

2. Theoretical Mechanisms and Research Hypotheses

2.1. Logic of the Impact of Rural Social Security on the Upgrading of the Consumption Structure of Rural Residents

Consumption structure is an important feature of the macroeconomy of the target market and can reflect the level of economic and cultural development of a country. When people face uncertainties such as the market economy and future risks, their consumption behavior becomes cautious with the motive of preventing future risks, which leads to conservative overall consumption and a low level of consumption structure [23]. Relevant studies have shown that the implementation of social security policies has a positive effect on stimulating consumption, which can effectively regulate the income gap between social classes, increase the level of consumption expenditure of low-income classes, and ultimately promote the upgrading of consumption structure [24,25].

On the one hand, rural social security directly reduces rural residents' medical and pension expenditures through state financial subsidies, which in turn affects the upgrading of rural residents' consumption structure [26,27]. Social security, as a form of income redistribution, is where the government directly pays part of the pension insurance and medical insurance for rural residents through financial subsidies to cover their out-of-pocket expenses in the current period and in the future when they face pension and medical problems. It increases the disposable income of rural residents, which in turn increases their consumption expenditure level and ultimately promotes the upgrading of the consumption structure of rural residents [28,29].

On the other hand, rural social security influences the upgrading of rural residents' consumption structure by reducing risk expectations, reducing uncertainty, and increasing consumption confidence [30]. Since consumption is influenced by various unpredictable

factors in the future, consumption choices are subject to a certain degree of uncertainty, and this uncertainty enhances people's precautionary saving motive and thus reduces consumption expenditure. In particular, for rural residents who derive part of their income from agriculture, the uncertainty about future income is further exacerbated by the fact that agricultural products themselves are subject to both uncertainties from the market and from nature [31]. By reducing people's uncertainty about future consumption and income, the social security system enhances confidence in future consumption and increases expectations of future income, thus increasing consumption levels and ultimately influencing rural residents to upgrade their consumption structure.

Accordingly, this paper proposes research Hypothesis 1:

Hypothesis 1. *There is a significant direct effect of China's rural social security on the upgrading of the consumption structure of rural residents.*

2.2. Influence Logic of Rural Social Security, Precautionary Savings, and the Upgrading of Rural Residents' Consumption Structure

In the process of China's economic development, the phenomenon that residents' consumption motivation is chronically low and the savings rate is persistently high has been called the "high savings rate puzzle" in China [32], which has hindered the healthy and sustainable development of China's economy. The key to solving this phenomenon lies in how to increase residents' willingness to consume, develop their consumption potential, and transform the high savings rate into consumption [33]. One explanation for the high savings rate puzzle in China is the precautionary saving motive of the residents to cope with the uncertainty of future spending risks. Social security is considered to be one of the most important factors affecting the precautionary saving motive [34,35], and there are three main directions in which it affects precautionary saving. The first view is that social security has an "asset substitution effect" that squeezes out savings; that is, social security, as a lasting income, increases the expected income after retirement, and protects the retiree's livelihood, thus reducing the willingness to save during working life. The second view is that social security has an "induced retirement effect" that squeezes savings; that is, social security makes residents more inclined to retire early, thus extending the expected retirement period and reducing the period of available income, and residents save more before retirement in order to meet the needs of the extended retirement period [36]. The third view is the "intergenerational transfer hypothesis", which argues that social security does not affect savings. Scholars supporting this hypothesis argue that any form of social security spending requires intergenerational transfers from households to compensate, which would offset some of the crowding-out effect of social security, and therefore the impact of social security spending on consumption is not significant in the long run.

According to Keynes' [37] Absolute Income Hypothesis, there is a stable functional relationship between income, savings, and consumption; therefore, the impact of precautionary savings on the upgrading of consumption structure is mainly realized through the trade-off between savings and consumption [38,39]. In other words, precautionary saving behavior triggered by the presence of uncertainty factors will directly increase residents' savings and reduce their consumption, thus causing some impact on consumption structure upgrading [40].

Overall, the logic of the impact between rural social security, precautionary savings, and consumption structure upgrading is as follows (Figure 1): as China's rural social security system continues to improve, rural residents' uncertainty about future expenditures is being alleviated to varying degrees, and thus, rural residents' willingness to save precautionarily is gradually decreasing. The impact of social security on precautionary savings is undeniable, and there is a functional relationship between savings and consumption so that changes in savings are constantly influencing rural residents' consumption, and thus the upgrading of farmers' consumption structure.

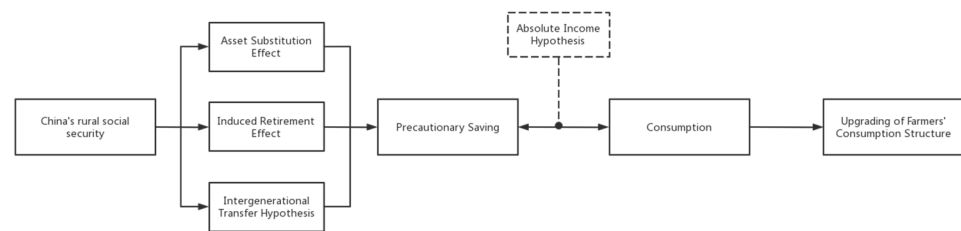


Figure 1. Analysis of the theoretical mechanism of rural social security affecting the upgrading of consumption structure of rural residents.

Accordingly, this paper proposes research Hypothesis 2:

Hypothesis 2. *Rural social security will indirectly affect the upgrading of rural residents' consumption structure through precautionary savings.*

Based on the objective differences in social security levels in China due to the regional allocation of financial resources, the level of social security provision in rural China is clearly differentiated across regions [41]. At the same time, the government's social security efforts and categories vary for each age group and are, to some extent, tilted toward the older population, resulting in different levels of social security received by people at different ages. Therefore, the magnitude of the impact of rural social security on the upgrading of rural residents' consumption structure can be somewhat heterogeneous across regions and age groups in China.

Accordingly, this paper proposes research Hypothesis 3:

Hypothesis 3. *There is some heterogeneity in the impact of rural social security on the upgrading of rural residents' consumption structure.*

3. Models, Variables, and Data

3.1. Econometric Model Construction

Various econometric analysis methods were used in this study according to practical needs, mainly including the following quantitative analysis methods.

3.1.1. Double Differential Propensity-Score Matching (PSM-DID)

Since rural residents decide whether to participate in the new rural social pension insurance in China, the decision of whether to participate is influenced by unobservable factors such as rural residents' preferences, perceptions, and expectations, and there is a certain "sample self-selection" effect, which leads to a non-random division of the experimental and control groups in the empirical testing process and makes the sample estimates biased. In order to solve the problem of sample self-selection, the sample is not randomized. To address the endogeneity problem caused by sample self-selection, Heckman (1998) proposed the "Propensity-Score Matching Difference-in-Difference Model" (PSM-DID), which is a combination of a PSM model and a DID model [42]. In this case, the PSM model is responsible for matching control subjects to the experimental group sample, and the DID model is responsible for identifying the effects of policy shocks. Bringing the matched samples based on propensity scores into the DID model for regression minimizes the possible adverse effects of selectivity bias and endogeneity issues on the estimation results. Therefore, the PSM-DID model is chosen in this study to assess the effects of social security policy implementation in rural China by comparing the differences between farmers who participate in the new rural social pension insurance and those who do not.

The ideal scenario to assess the effect of rural social security policies is to compare the change in the index of consumption structure escalation when rural residents i are uninsured and insured, respectively. Hypothesis $D_i \in \{0, 1\}$ indicates whether rural resident i is insured: where the resident is insured, then $D_i = 1$, otherwise $D_i = 0$.

Hypothesis Y_i denotes the index reflecting the upgrading of the consumption structure of rural residents i . For rural residents i , there are two potential outcomes: the index of upgrading the consumption structure after being insured Y_{i1} , and the index of upgrading the consumption structure when uninsured Y_{i0} . Then, the impact of the rural social security system on rural residents i can be expressed as $Y_{i1} - Y_{i0}$. From this, the average treatment effect (ATT) of the rural social security system on the experimental group (insured group) can be deduced:

$$\sigma_{ATT} = E\{(Y_{i1} - Y_{i0})|D_i = 1\} = E\{Y_{i1}|D_i = 1\} - E\{Y_{i0}|D_i = 1\} \quad (1)$$

where $E\{Y_{i0}|D_i = 1\}$ denotes the consumption structure upgrading index of the actual insured rural residents when they were uninsured. To minimize the possible adverse effects of selection bias and endogeneity problems on the estimation results, the propensity-score matching method is chosen for counterfactual estimation in this study. The sample propensity score $P(X)$ is first estimated using a logit model based on a set of characteristic variables X . Based on this propensity score, one or more control group samples with similar or even identical characteristics are found for each experimental group sample to be matched, and the latter's consumption structure upgrading index is used as the counterfactual inference result of the former.

$$\sigma_{ATT}^{PSM} = \frac{1}{n_1} \sum_{i \in I_1 \cap S_p} \left\{ Y_{i1} - \sum_{j \in I_0 \cap S_p} W(i, j) Y_{i0} \right\} \quad (2)$$

where I_1 and I_0 denote the experimental and control group samples, respectively, and S_p denotes the common support area of the propensity scores of the experimental and control groups.

In this study, the impact of rural social security on the upgrading of rural residents' consumption structure is assessed using the differences-in-difference method based on the propensity-score matching method.

$$\sigma_{ATT}^{PSM-DID} = \frac{1}{n_1} \sum_{i \in I_1 \cap S_p} \left\{ (Y_{i1}^{t_1} - Y_{i1}^{t_0}) - \sum_{j \in I_0 \cap S_p} W(i, j) (Y_{j0}^{t_1} - Y_{j0}^{t_0}) \right\} \quad (3)$$

where t_0 and t_1 denote the base period and second period of the study, respectively.

3.1.2. Mediation Effect Model

This paper brings precautionary savings into the study of the impact of social security on the upgrading of rural residents' consumption structure in rural China, and explores the relationship between the two from the perspective of precautionary savings; therefore, revealing what role precautionary savings plays in the two is an important objective of this paper. The Mediating Effect Model can explain how the influence of the independent variable on the dependent variable is realized through the mediating variable, and at the same time can reveal the process and mechanism of the influence of the independent variable on the dependent variable more intuitively, which has become an important statistical method for multivariate research. Compared with similar studies that simply analyze the influence of independent variables on dependent variables, the Mediating Effect Model not only has methodological advances, but also often yields more and deeper results. To clarify whether social security in China's rural areas affects the upgrading of rural residents' consumption structure through certain mediating transmission mechanisms, this paper draws on Baron and Kenny's [43] research method and constructs the following model to test the mediating effect and its occurrence mechanism.

$$CSU_{it} = \beta_0 + \beta_1 CS_{it} + \sum \beta_{Control_{it}} + \omega_{it} \quad (4)$$

$$Mediator_{it} = \gamma_0 + \gamma_1 CS_{it} + \sum \gamma Control_{it} + \varphi_{it} \quad (5)$$

$$CSU_{it} = \theta_0 + \theta_1 CS_{it} + \theta_2 Mediator_{it} + \sum \theta Control_{it} + \delta_{it} \quad (6)$$

where $Mediator_{it}$ is the mediating variable and refers to precautionary savings (Save). The regression coefficient β_1 of Equation (4) is the effect of independent variable CS_{it} on dependent variable CSU_{it} ; the regression coefficient γ_1 of Equation (5) is the effect of independent variable CS_{it} on the mediating variable $Mediator_{it}$; the regression coefficient θ_2 of Equation (6) is the effect of $Mediator_{it}$ on CSU_{it} after controlling for the effect of CS_{it} , and the coefficient θ_1 is the effect of CS_{it} on CSU_{it} after controlling for the effect of $Mediator_{it}$. ω_{it} , φ_{it} , and δ_{it} denote the residuals, which are assumed to follow a normal distribution and be independent of each other.

3.2. Variable Selection

3.2.1. Explanatory Variables

Engels [44] divided the consumption structure into means of subsistence, means of development, and means of enjoyment. In this paper, combining this division criterion and the CFPS database, we define survival consumption as clothing, food, and housing consumption expenditures; development and enjoyment consumption is defined as travel, furniture, and durable goods, beauty care, culture, education, and entertainment, household equipment, and daily necessities, health care, transportation, and communication, and other consumer spending. For consumption structure upgrading (CSU), the most obvious feature is the shift from subsistence consumption to development and enjoyment consumption [45], so this paper defines consumption structure upgrading as the increase in the ratio of development and enjoyment consumption relative to subsistence consumption. To control for extreme values and to mitigate the effect of heteroskedasticity on model estimation, the above variables are taken as logarithmic values in the model regression.

3.2.2. Core Explanatory Variables

China's rural social security covers several levels, including pension, medical, and social assistance systems, among which the new rural social pension insurance is widely distributed, effective, and is easy to obtain data from. Therefore, this paper combines the question of the CFPS questionnaire, "What kinds of pension insurance programs have you participated in?" The dummy variable "whether or not you participate in the new rural social insurance" is generated as the core explanatory variable (CS).

3.2.3. Control Variables

With reference to the available literature, combined with data availability and following the principle of exogeneity, the following control variables were screened at the individual and household levels: age (Age), gender (Gender; 1 = male; 2 = female), marital status (Marriage; 1 = unmarried; 2 = married; 3 = cohabiting; 4 = divorced; 5 = widowed), health status (Health; 1 = very healthy; 2 = healthy; 3 = comparatively healthy; 4 = generally healthy; 5 = unhealthy), household registration (Register; 1 = agricultural; 2 = non-agricultural), years of education (Edu), and net household income per capita (Income; taking its logarithm).

3.2.4. Mediating Variables

In this paper, the response to the question "Total amount of cash and savings in your household (¥)" in the CFPS questionnaire is selected as the mediating variable "Total amount of cash and savings" (Save) representing precautionary savings. In order to suppress the heteroskedasticity of the sample and improve the goodness-of-fit of the model regression, this variable is logarithmically treated in this paper.

3.3. Data Source and Description

The data in this paper come from the China Family Panel Studies (CFPS) implemented by the Institute of Social Science Survey. Since 2010, the CFPS has been tracked every two years, and the database has been updated to 2020, covering various types of economic income and consumption expenditure, individual basic information, and the insurance participation of 16,000 households in 25 provinces. The sample size of the database is large enough and the survey content is sufficient to support the needs of this study.

Considering that the full implementation of China's new rural social pension insurance only gradually began in 2012, this paper uses data from two years, 2012 and 2018, for matching and comparison. Finally, panel data are formed covering the two phases before and after the policy implementation to facilitate the analysis of the policy implementation effect, while the time span also allows the measuring of the long-term impact of the new rural social insurance policy.

This paper preprocessed the data before the empirical analysis. Firstly, the data of the variables needed for this paper in the CFPS household economy and adult database in 2012 and 2018 were screened. Secondly, in order to ensure that the assessment of the effect of the new rural social pension insurance policy was not affected by other types of pension insurance and to ensure the accuracy of the data, individuals who participated in other pension insurance schemes were excluded, and only those who participated in the new rural social pension insurance were included. Subsequently, the consumption structure upgrading index was calculated, that is, $(\text{enjoyment expenditure} + \text{development expenditure}) / \text{survival expenditure}$. At the same time, continuous variables such as per capita net household income were logarithmically processed to avoid the influence of extreme values; finally, invalid data and samples with missing main variables were excluded. After preprocessing the data, this paper finally obtained 15,562 valid samples, including 3759 samples for the insured group and 11,803 samples for the non-insured group, and the specific descriptive statistics are shown in Table 1.

Table 1. Descriptive statistics.

Variable	Mean	Std. Dev.	Min	Max	Description
Age	43.892	16.689	16	93	Actual age at the time of interview
CS	0.242	0.428	0	1	1 = insured; 0 = non-insured
Gender	1.507	0.5	0	1	0 = male; 1 = female
Register	1.238	0.426	0	1	0 = agricultural; 1 = non-agricultural
Marriage	2.064	0.914	1	5	1 = unmarried; 2 = married; 3 = cohabiting; 4 = divorced; 5 = widowed
Health	3.072	1.228	1	5	1 = very healthy; 2 = healthy; 3 = comparative healthy; 4 = general; 5 = unhealthy
Edu	7.405	5.051	0	23	Respondents' years of education in that year
Income	9.183	1.368	−1.099	15.549	Taking its logarithm
Save	7.745	3.740	0	15.425	Taking its logarithm
CSU	1.565	0.495	0.180	6.212	$\frac{\text{enjoyment} + \text{development}}{\text{survival}}$

4. Analysis of Empirical Results

The empirical process of this paper is divided into four main parts. The first part matches the propensity scores of the experimental and control group samples and tests the matching effect; the second part performs DID benchmark regression using the matched samples; the third part performs the mediating effect test; and the fourth part adopts the placebo test and the replacement matching method to test the robustness of the empirical results, and also performs the heterogeneity test according to region and age.

4.1. Analysis of PSM-DID Model Results

In this paper, the sample was divided into farmers who participated in the new rural social pension insurance (experimental group) and farmers who did not participate in the new rural social pension insurance (control group) based on whether the farmers participated in the new rural social pension insurance or not. To enhance the comparability of the experimental and control groups before and after the occurrence of the policy, and to reduce the errors caused by omitted variables and other factors, the propensity-score matching method was chosen to match the experimental and control group samples. Since the sample size is large enough, to improve the accuracy of the experimental results, this paper uses K-nearest neighbor 1:1 matching.

To ensure the matching quality of the sample data, the kernel density function plots were further plotted to examine the common support domain after matching after obtaining the propensity scores. The results are shown in Figures 2 and 3. Before the propensity score matching, the kernel density curves of the experimental group and the control group were different, and after the matching, the overlap range of the propensity scores of the experimental and control group samples was expanded, and most of the samples were within the common range. Therefore, it is concluded that the matched samples satisfy the common support hypothesis condition, and the experimental and control groups are well matched.

To ensure the reliability of the propensity-score matching results, this paper further conducted a balance test on the covariates to assess whether the propensity-score matching results could better balance the variability of the data. The results are shown in Table 2. The standardized deviations of the covariates between the experimental and control groups after matching were significantly smaller than the values before matching, and the absolute values were less than 10%. Meanwhile, according to the *t*-value, none of the covariates rejected the original hypothesis of “no systematic bias in the values of covariates between the two groups”. Therefore, it is proved that the matching quality is good and the results are credible, the assumption of equilibrium is satisfied, and the subsequent analysis of double difference can be carried out.

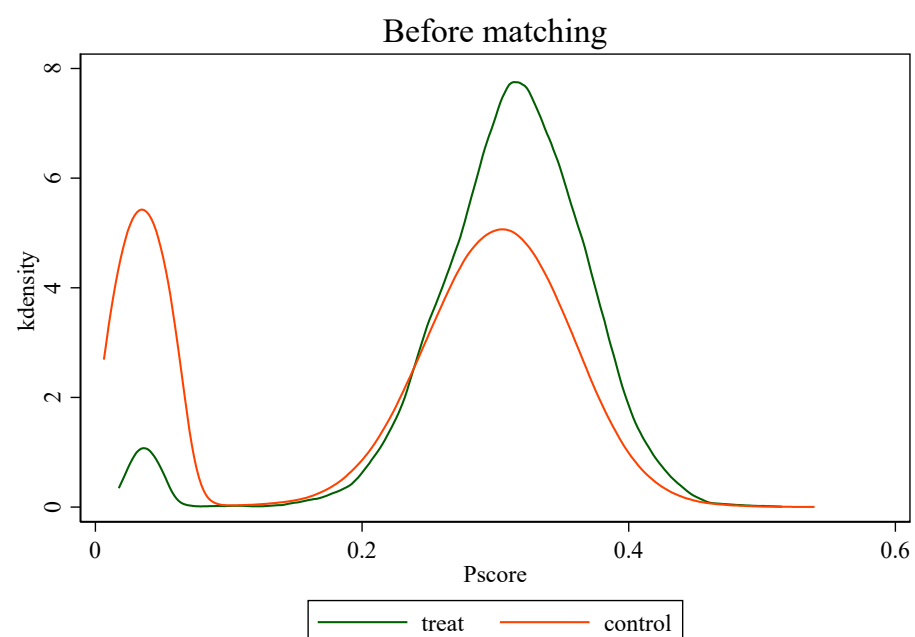


Figure 2. Kernel density profile before matching.

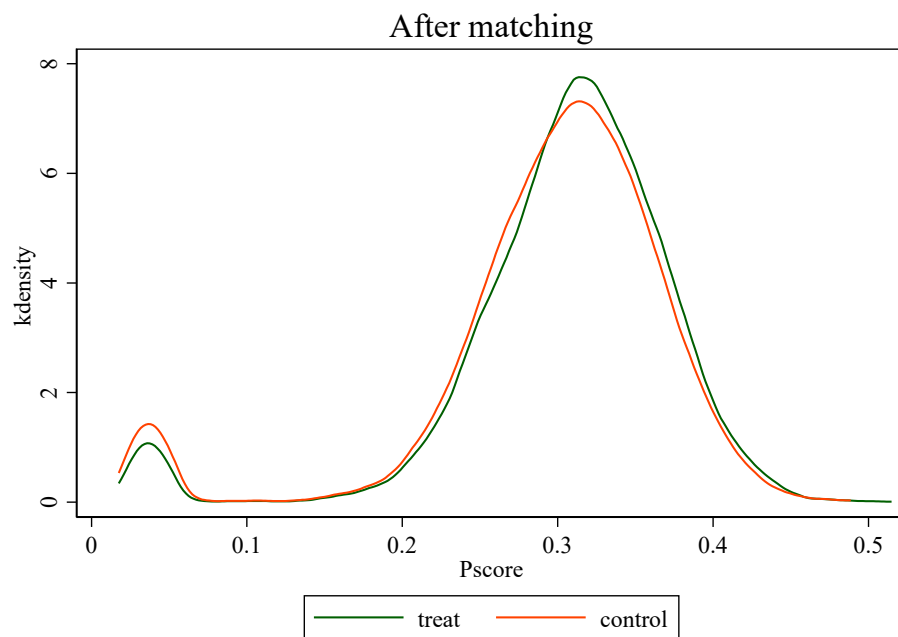


Figure 3. Kernel density profile after matching.

Table 2. Matching results.

Variable	Unmatched Matched	Mean		Bias (%)	Reduct Bias (%)	<i>t</i>	<i>p</i>
		Treated	Control				
Region	U	40.315	37.385	18.9	83.2	10.35	0.000
	M	40.315	39.824	3.2		1.38	0.167
Gender	U	0.4738	0.49945	−5.1	77.2	−2.74	0.006
	M	0.4738	0.46794	1.2		0.51	0.611
Age	U	45.043	43.525	10.0	60.9	4.86	0.000
	M	45.043	45.636	−3.9		−1.67	0.095
Register	U	1.0692	1.6066	−76.8	100.0	−34.97	0.000
	M	1.0692	1.0692	0.0		0.00	1.000
Marriage	U	2.0992	2.0525	5.5	63.0	2.73	0.006
	M	2.0992	2.1165	−2.0		−0.85	0.395
Health	U	3.1242	3.0557	5.6	80.6	2.98	0.003
	M	3.1242	3.1375	−1.1		−0.46	0.644
Edu	U	6.5084	7.6908	−24.7	89.2	−12.56	0.000
	M	6.5084	6.3804	2.7		1.18	0.237

Substituting the matched samples into the DID model, the DID estimation results of the impact of China's rural social security on the upgrading of rural residents' consumption structure are shown in Table 3. Columns (1) and (2) show the estimation results of OLS regression without and with control variables, respectively, and columns (3) and (4) show the estimation results of two-way fixed effects of panel data without and with control variables, respectively. According to the estimation results, it can be found that the implementation of China's rural social security policy significantly improves the upgrading of rural residents' consumption structure.

Therefore, Hypothesis H_1 is verified, that China's rural social security can significantly affect the upgrading of rural residents' consumption structure.

Table 3. DID estimation results.

Variables	(1)	(2)	(3)	(4)
CS × Time	0.202 *** (0.014)	0.154 *** (0.014)	0.176 ** (0.080)	0.161 ** (0.082)
Age		−0.003 *** (0.001)		−0.006 (0.069)
Gender		0.046 *** (0.013)		
Marriage		−0.008 (0.008)		−0.034 (0.059)
Health		0.012 ** (0.005)		−0.018 (0.029)
Register		0.047 (0.030)		0.307 (0.272)
Edu		0.013 *** (0.002)		−0.035 * (0.020)
Income		0.072 *** (0.005)		0.017 (0.029)
-Cons	1.482 *** (0.008)	0.773 *** (0.064)	1.410 *** (0.021)	1.518 (2.912)
Individual fixed effects	NO	NO	YES	YES
Time fixed effects	NO	NO	YES	YES
N	5159	5159	5159	5159
R ²	0.158	0.127	0.182	0.199
Prob > F	0.000	0.000	0.000	0.000

Note: ***, **, and * refer to statistics significant at the 1%, 5%, and 10% levels, respectively. Inside the regression brackets are the standard errors of the coefficients.

4.2. Analysis of Mediation Effect Model Results

In this paper, the model is tested for mediation effects using precautionary savings (Save) as a mediating variable, and the empirical results are shown in Table 4 below. The results in Table 4 show that China's social security can increase precautionary savings, which in turn promotes the upgrading of the consumption structure of rural residents. The results of regression (5) show that the direct effect of China's social security on the upgrading of the consumption structure of rural residents is significantly positive. The results of regression (6) show that the effect of China's social security on precautionary savings is negatively significant, and when China's social security is increased, precautionary savings are significantly reduced. The results of regression (7) show that both China's social security and precautionary savings are significantly positively correlated, which indicates that the mediating effect is significant, and the share of the mediating effect in the total effect is $ab/c = 0.2193 \times 0.0042/0.0515 = 0.0179$, which indicates that 1.79% of the significant effect of China's social security on the upgrading of the consumption structure of rural residents nationwide is through the mediating effect of precautionary savings. Thus, Hypothesis H_2 is verified, that China's rural social security can indirectly contribute to the upgrading of the consumption structure of rural residents through precautionary savings.

Table 4. Regression results of mediation effects.

Variables	Benchmark Regression	Mediation Effects	
	CSU (5)	Save (6)	CSU (7)
CS	0.0515 *** (0.0125)	−0.2193 ** (0.1037)	0.0524 *** (0.0125)
Save			0.0042 ** (0.0017)
Age	−0.0031 *** (0.0005)	−0.0047 (0.0044)	−0.0031 *** (0.0005)
Gender	0.0431 *** (0.0130)	0.2277 ** (0.1082)	0.0421 *** (0.0130)
Marriage	−0.0057 (0.0081)	−0.1485 ** (0.0679)	−0.0050 (0.0081)
Health	0.1010 * (0.0054)	−0.1141 ** (0.0451)	0.0106 * (0.0054)
Register	0.0523 * (0.0304)	0.7181 *** (0.2537)	0.0493 (0.0305)
Edu	0.0136 *** (0.0016)	0.0144 (0.0137)	0.0136 *** (0.0016)
Income	0.0826 *** (0.0052)	0.3262 *** (0.0437)	0.0812 *** (0.0053)
-Cons	0.6745 *** (0.0649)	4.3204 *** (0.5402)	0.6565 *** (0.0652)
N	5159	5159	5159
R ²	0.1202	0.0261	0.1213

Note: ***, **, and * refer to statistics significant at the 1%, 5%, and 10% levels, respectively. Inside the regression brackets are the standard errors of the coefficients.

4.3. Analysis of Robustness Test Results

4.3.1. Robustness Test Based on Matching Method

To ensure the reliability of the empirical results, the experimental and control group samples were re-matched by changing the matching method using 1:4 K-nearest neighbor matching, radius matching, and kernel matching. The estimation results are shown in Table 5. The results show that the ATT (average treatment effect) after matching for the four different matching methods passes the 1% significance level test with small differences and consistent signs. Therefore, the results obtained from the PSM-DID-based approach in this paper can be considered robust.

Table 5. Robustness test results based on the matching method.

Matching Method	Unmatched Matched	Experimental Group	Control Group	ATT	S.E.	t
K-nearest neighbor matching (K = 1)	U	1.572	1.562	0.010	0.009	1.06
	M	1.572	1.519	0.053	0.013	4.13
K-nearest neighbor matching (K = 4)	U	1.572	1.562	0.010	0.009	1.06
	M	1.572	1.522	0.05	0.01	4.9
Radius matching (R = 0.01)	U	1.572	1.562	0.010	0.009	1.06
	M	1.572	1.527	0.045	0.009	4.82
Kernel matching	U	1.572	1.562	0.010	0.009	1.06
	M	1.572	1.524	0.048	0.009	5.22

4.3.2. Robustness Test Based on Placebo Approach

Although the findings suggest that the effect of China's rural social security on the upgrading of rural residents' consumption structure is statistically significant, in order to exclude other random factors that affect the upgrading of rural residents' consumption structure, this paper draws on Cantoni's [46] method to construct a placebo test to examine

whether the policy effect of China's rural social security is influenced by other unobserved random factors. The experimental group of 2577 farmers who participated in the new rural social security was randomly generated and repeated for 1000 regressions, and the t -values of the policy effects of the new rural social security with 1000 regression feedbacks were counted to generate kernel density distribution plots. The results show that the t -values are distributed around "0" with high probability, indicating that there are no other factors that significantly interfere with the upgrading of the consumption structure of rural residents, and the significant effect of China's rural social security on the upgrading of consumption structure of rural residents is robust. The specific results are shown in Figure 4.

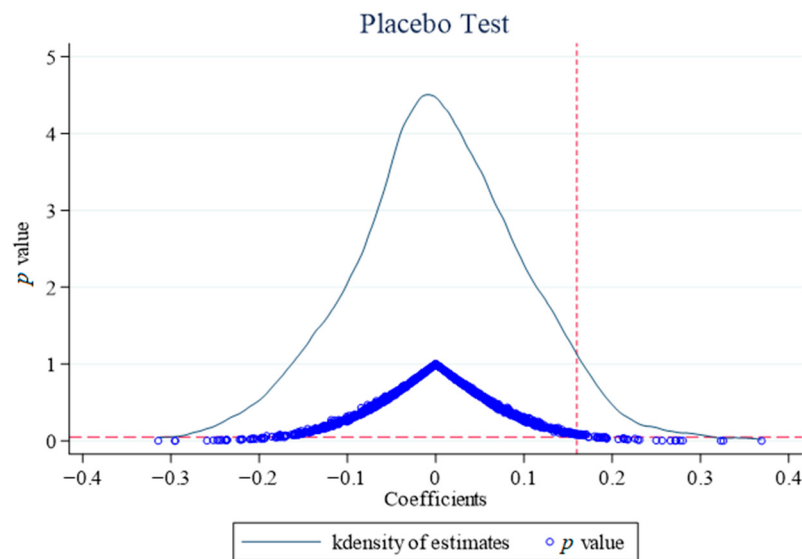


Figure 4. Placebo test.

5. Heterogeneity Discussion and Analysis

5.1. Age Heterogeneity Discussion

Since the participation in social security varies by age group, the resulting upgrading of the consumption structure of rural residents also varies. Therefore, this paper divides the sample into groups older than 60 years old and under or equal to 60 years old according to age. By exploring the impact of China's social security on the upgrading of the consumption structure of rural residents in different age groups, we can reveal the heterogeneous impact of the upgrading of consumption structure brought about by age. The specific results are shown in Table 6 below.

The results show that China's rural social security has a significant positive effect on the upgrading of the consumption structure of rural residents, whether they are over, under, or equal to 60 years old. The participation of groups younger than or equal to 60 years old in social security as a labor-age group has a direct impact on the upgrading of the consumption structure. For the group older than 60 years old, the positive effect of social security on consumption structure upgrading is higher than that of the other sample group, probably because population aging increases medical and health care consumption in old age, as well as increasing the demand for service-oriented consumption and entertainment, education, and cultural consumption.

Table 6. Analysis of age heterogeneity results.

Variables	≤60 (8)	>60 (9)
DID	0.1673 * (0.0897)	0.5688 * (0.2593)
Age	−0.0049 (0.0702)	0.0285 (0.0493)
Gender		
Marriage	−0.0591 (0.0764)	−0.0713 (0.0941)
Health	−0.0149 (0.0321)	−0.1131 (0.1311)
Register	0.3224 (0.2778)	
Edu	−0.0304 (0.0226)	0.4337 (0.2902)
Income	0.0181 (0.0309)	0.0059 (0.1640)
-Cons	1.1495 (2.6681)	−1.279 (2.3420)
Time fixed effects	YES	YES
Individual fixed effects	YES	YES
N	4386	773
R ²	0.0264	0.0052

Note: * refer to statistics significant at the 10% levels, respectively. Inside the regression brackets are the standard errors of the coefficients.

5.2. Regional Heterogeneity Discussion

Due to the objective regional differences in China's social security levels, the driving effect of China's rural social security on the upgrading of rural residents' consumption structure may also vary significantly due to different regional development conditions. Drawing on the explanation of China's National Development and Reform Commission, this paper divides the sample into an east–central–west sample according to the provinces and cities where they are located, among which the regions in eastern China include: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan, a total of eleven provinces (cities). The regions in central China include Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan, a total of eight provincial administrations. The regions in western China include Sichuan, Chongqing, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Guangxi, and Inner Mongolia, for a total of twelve provincial-level administrative regions. From the perspective of economic development, the development of different regions in China shows obvious differences. By exploring the impact of China's social security on the upgrading of consumption structure in different regions, the impact of regional differences on the upgrading of consumption structure is revealed. The specific regression results are shown in Table 7 below.

The results in Table 7 show that social security in western China significantly affects consumption structure upgrading, while social security in eastern and central China does not have a significant impact on consumption structure upgrading. The reason for this is that due to the different levels of economic development in east, central, and western China, western China has a lower per capita income compared to east and central China, and the increase in social security expenditures will lead to a large change in consumption structure. In contrast, rural residents in east and central China have higher household disposable income, and an increase in social security will not cause a large change in the consumption structure. Therefore, Hypothesis H_3 is verified—there is some heterogeneity in the impact of China's rural social security on the upgrading of rural residents' consumption structure.

Table 7. Analysis of regional heterogeneity regression results.

Variables	East (10)	Central (11)	West (12)
DID	0.1438 (0.1291)	0.0707 (0.1754)	0.2840 * (0.1542)
Age	0.2579 (0.6114)	0.0455 * (0.0241)	−0.0049 (0.0720)
Gender			
Marriage	−0.0608 (0.1000)	0.0542 (0.1034)	−0.0161 (0.1159)
Health	−0.0085 (0.0435)	−0.0517 (0.0615)	−0.0021 (0.0567)
Register		0.3069 (0.4426)	0.0951 (0.3709)
Edu	−0.0124 (0.0302)	−0.0305 (0.0642)	−0.0167 (0.0353)
Income	−0.0042 (0.0462)	0.0648 (0.0627)	0.0734 (0.0536)
-Cons	−9.3226 (26.2546)	−1.2198 (1.0644)	1.0158 (3.0050)
Time fixed effects	YES	YES	YES
Individual fixed effects	YES	YES	YES
N	1778	1425	1956
R ²	0.0958	0.0387	0.0602

Note: * refer to statistics significant at the 10% levels, respectively. Inside the regression brackets are the standard errors of the coefficients.

6. Conclusions and Policy Implications

This paper first clarifies the theoretical mechanism between social security, precautionary savings, and the consumption structure of rural residents from a theoretical perspective, and proposes corresponding research hypotheses. Then, using the China Family Panel Studies (CFPS) data, a PSM-DID model and a mediating effects model are developed to test the research hypotheses proposed in the theoretical part, and robustness tests and age- and region-specific heterogeneity tests are conducted. The results show that: first, the participation in China's new rural social pension insurance can significantly improve rural residents' consumption structure, and there is a significant positive relationship between China's rural social security policies and rural residents' consumption structure upgrading. Second, China's rural social security can affect the upgrading of rural residents' consumption structure by influencing precautionary savings, and 1.79% of the significant effect of social security on the upgrading of rural residents' consumption structure is mediated by precautionary savings across China. Third, China's rural social security significantly affects the upgrading of rural residents' consumption structure for both groups older than 60 years old and those younger than or equal to 60 years old, and the effect is greater for groups over 60. By region, the effect of rural social security on the upgrading of rural residents' consumption structure is only significant in western China, but not in east or central China.

Based on the findings of this paper, the following policy recommendations are proposed. The first is to further expand the breadth and depth of social security coverage in China's rural areas and ensure the healthy and stable development of rural social security, thereby promoting the continuous improvement of rural residents' consumption level and the optimization of consumption structure, ultimately promoting the sustainable and healthy economic development of China's rural areas.

Second, raising the level of social security scientifically and reasonably raises farmers' expected propensity to consume, since social security can effectively reduce rural residents' precautionary savings motives and increase rural residents' consumption level. Therefore, by raising the level of social security scientifically and reasonably so as to reduce rural residents' precautionary savings and increase their expected propensity to consume, the consumption structure of rural residents will eventually be upgraded.

Third, China's social security policies should be formulated according to local conditions to better promote the upgrading of the consumption structure of rural residents. According to the development characteristics of different regions, different social security policies are constructed to give full play to the development advantages of social security and promote the continuous upgrading of the consumption structure of rural residents.

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