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## ABSTRACT

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# Does Social Pension Insurance Increase the Efficiency of Household Financial Portfolios?

This study investigates the impact of social pension insurance on the efficiency of household financial portfolios, utilizing data from the 2019 wave of the China Household Finance Survey. Our findings indicate that social pension insurance significantly enhances the efficiency of household financial portfolios, partly through the channels of risk attitude and precautionary savings.

**JEL Classification:** G59, J24, I28

**Keywords:** social pension insurance, household portfolios, sharpe ratio, efficiency

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## I. Introduction

In an aging society, social pension insurance serves as a crucial system for providing basic income to the elderly. Thus, understanding its effects on household economic decisions is increasingly important. Recent studies have explored various dimensions of social pension insurance, including its influence on household savings, poverty alleviation, wealth accumulation, consumption, and labor supply (Attanasio and Agar, 2003; Barr and Diamond, 2006; Bottazzi et al., 2006; Unnikrishnan and Imai, 2020). However, the impact of social pension insurance on the management of household financial portfolios remains underexplored, with limited research available, such as that by Bottazzi et al. (2011). This paper aims to fill this gap, and focuses on the impact of social pension and efficiency of household portfolios.

Social pension insurance may enhance the efficiency of household portfolios through two main channels. First, risk attitude plays a critical role in determining portfolio efficiency. By improving families' risk-taking capabilities, social pension insurance can reduce risk aversion, thereby increasing portfolio efficiency. Second, social pension insurance mitigates background risk (Gormley et al., 2010) and lowers the need for precautionary savings (Hubbard and Judd, 1987), encouraging families to engage more actively in financial markets, which in turn increases the efficiency of household financial portfolios (Calvet et al., 2007).

The remainder of this paper is structured as follows: Section 2 describes the data and outlines methodological approach, Section 3 presents the main results and analyzes mechanisms, and Section 4 concludes the discussion.

## II. Data and Model

**Data.** This study utilizes data from the 2019 wave of the China Household Finance Survey (CHFS). The CHFS is a nationally representative household survey that provides detailed information, including household assets, income, social insurance participation, and demographic characteristics. We specifically focus on the urban household sample due to the significant disparities between rural and urban areas in China. Our analysis includes only those households with heads aged between 16 and 60 with positive incomes and not retired, as retirees do not face decision regarding participation in social pension insurance. Additionally, we exclude observations with missing key variables, resulting in a final sample of 8,912 urban households. Detailed variable definitions and descriptive statistics are in Appendix Table 1.

**Methods.** To measure portfolio efficiency, we calculate the Sharpe ratio of household financial portfolios. Due to the left-censored nature of Sharpe ratios, we employ the Tobit model as our benchmark regression.

$$Sharpe\ Ratio^* = \alpha_1 + \beta_1 insurance_i + \gamma_1 X_i + \varepsilon_i \quad (1)$$

$$Sharpe\ Ratio_i = \max(0, Sharpe\ Ratio^*)$$

while  $insurance_i$  is the key explanatory variable that indicates whether the household participates in social pension insurance. There are two primary types of social pension insurance for urban households: (1) urban employees' basic pension insurance (UEBPI), (2) residents' social pension insurance (RSPI). If the household head participates in any of these programs,  $insurance_i$  takes the value of 1, otherwise, it is 0. The variable  $X_i$  encompasses other control variables that may influence portfolio efficiency.<sup>1</sup> Participation in social pension insurance may be influenced by unobservable factors that could also affect household portfolio efficiency, potentially leading to endogeneity. To address this potential endogeneity bias, we adopt an Instrumental Variable (IV) approach. The participation rate in social pension insurance at the city level serves as an instrument, as it is likely correlated with individual household participation but does not directly influence portfolio efficiency. Our main model is IV-Tobit model, and we apply a conditional mixed process (CMP) for endogenous analysis (Roodman, 2011) to implement the empirical estimation. In our context, the CMP estimation comprises two equations: the first estimates the relationship between the IV and the endogenous variable, while the second incorporates these results into the benchmark model. The parameter  $atanhrho\_12$ , similar to  $\rho$  in Heckman Model, serves as an endogeneity test; if it is significantly different from zero, this indicates an endogeneity concern.

### III. Results

**Main results.** The main findings of this study are presented in Table 1. Panel A reports the marginal effect results from the Tobit and IV-Tobit models. In Columns (3) and (4), the parameter  $atanhrho\_12$  is significantly different from zero, indicating endogeneity issue. The marginal coefficient for social pension insurance in Column (4) indicates that the Sharpe ratio of household financial portfolios for participants is

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<sup>1</sup> Detailed variable definitions and descriptive statistics are available upon requested (enclosed in the submission for review purpose only)

0.0818 higher than that for non-participants. Panel B is the first stage, and our IV is strongly correlated with participating in social pension insurance or not.

-----Table 1-----

According to the National Bureau of Statistics, as of 2023, urban employees received an average monthly pension of 3,743 yuan from UEBPI, whereas urban and rural residents received only 223 yuan per month from RSPI, with over tenfold disparity. It is reasonable to study them separately. The results are displayed in Table 2. UEBPI significantly enhances the efficiency of household financial portfolios, whereas the effect of RSPI is statistically insignificant. This discrepancy may arise from the substantial disparities in benefits provided by UEBPI compared to RSPI. Participation in UEBPI is associated with higher expected retirement income, significantly reducing family precautionary saving, and thereby enhancing investment efficiency; the inadequate guarantee level of RSPI leads to negligible effects. These results suggest that the precautionary saving is an important channel.

-----Table 2-----

**Mechanism analysis.** We examine two potential mechanisms: risk attitude and precautionary savings.

To analyze the role of risk attitude, we define risk aversion based on the responses to the CHFS questionnaire provided by the respondents. Specifically, risk aversion is a dummy variable that takes the value of 1 if respondents select either “no willing to take any risk” or “low risk, low return” when asked which kind of investment they would make if they had funds, and 0 otherwise.

To investigate the role of precautionary savings, we follow existing literature and utilize the saving-to-income ratio (defined as the savings account balance divided by total income) as a measure of precautionary saving motives (Pan and Wu, 2021).

Column (1) in Table 3 is baseline result from Column (4) in Table 1. The results in Columns (2) and (4) in Table 3 suggest that social pension insurance effectively reduces risk aversion and diminishes precautionary saving. The findings in Columns (3) and (5) show that the coefficient of social pension insurance on the Sharpe ratio is smaller after controlling for risk attitudes or precautionary savings, respectively. Additionally, the results in Column (6) indicate that the coefficient of social pension insurance becomes significantly smaller after jointly controlling all mechanism

variables. These empirical results imply that social pension insurance can enhance the Sharpe ratio of household financial portfolios, partly through the channels of risk attitude and precautionary savings.

-----Table 3-----

## **V. Conclusion**

This research provides a novel analysis of the impact of social pension insurance on the efficiency of household financial portfolios. The findings demonstrate that social pension insurance positively influences the efficiency of household financial portfolios. Further analysis reveals that risk attitude and precautionary savings are two important channels.

## **Acknowledgment**

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**Table 1** The effect of social pension insurance  
on the efficiency of household financial portfolios

	Panel A. Dependent variable: Sharpe Ratio			
	Tobit		IV-Tobit	
	(1)	(2)	(3)	(4)
Social pension insurance	0.0364*** (0.0022)	0.0143*** (0.0023)	0.1464*** (0.0101)	0.0832*** (0.0127)
Controls	No	Yes	No	Yes
atanrho_12			-0.6025*** (0.0422)	-0.4113*** (0.0646)
Observations	8,912	8,912	8,912	8,912
Panel B. Dependent variable: Social pension insurance				
Instrumental variable			0.8191*** (0.0251)	0.5376*** (0.0266)
Controls			No	Yes
Observations			8912	8912
First-stage F-statistics			1063.46	408.65
Endogeneity Test (p-value)			0.0000	0.0000

- Notes:**
1. Robust standard errors are presented in parentheses.
  2. The IV-Tobit model is estimated by CMP of Roodman (2011).
  3. Statistical significance is denoted as follows: \*p<0.1, \*\*p<0.05, \*\*\*p<0.01.

**Table 2** The effect of different pension types  
on the efficiency of household financial portfolios

	Dependent variable: Sharpe Ratio			
	Tobit		IV-Tobit	
	(1)	(2)	(3)	(4)
UEBPI	0.0413*** (0.0022)	0.0160*** (0.0024)	0.1377*** (0.0087)	0.1164*** (0.0162)
RSPI	0.0139*** (0.0030)	0.0103*** (0.0029)	0.0161 (0.0195)	0.0098 (0.0196)
Controls	No	Yes	No	Yes
atanrho_13			0.2758*** (0.0745)	0.2858*** (0.0899)
atanrho_23			-0.5747*** (0.0096)	-0.5736*** (0.0103)
First-stage F- statistics			116.17	83.63
Observations	8,912	8,912	8,912	8,912

- Notes:**
1. The IV-Tobit models are estimated by CMP of Roodman (2011).
  2. Robust standard errors are presented in parentheses.
  3. Statistical significance is denoted as follows: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .
  4. The results reported reflect marginal effects.
  5. Details of the first-stage regression and the tests for instrumental variables (IVs) are available upon requested from the corresponding author.

**Table 3** Mechanism analysis

	Sharpe ratio	Risk attitude	Sharpe ratio	Precautionary savings	Sharpe ratio	Sharpe ratio
	(1)	(2)	(3)	(4)	(5)	(6)
Social pension insurance	0.0832*** (0.0127)	-0.1988*** (0.0524)	0.0777*** (0.0124)	-0.5391*** (0.1911)	0.0786*** (0.0124)	0.0740*** (0.0121)
Risk attitude			- 0.0180*** (0.0018)			- 0.0169*** (0.0018)
Precautionary savings					- 0.0048*** (0.0007)	- 0.0043*** (0.0007)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
atanrho_12	-0.4113*** (0.0646)	0.2293*** (0.0637)	- 0.3871*** (0.0650)		- 0.3860*** (0.0646)	- 0.3656*** (0.0650)
First-stage F-statistics	408.65	408.65	407.77	408.65	416.07	475.94
Observations	8,912	8,912	8,912	8,912	8,912	8,912

**Notes:** 1. Robust standard errors are presented in parentheses.  
2. Statistical significance is denoted as follows: \*p<0.1, \*\*p<0.05, \*\*\*p<0.01.

## Appendix Table

**Table A1** Descriptive statistics (N=8,912)

<b>Variables</b>	<b>Definition</b>	<b>Mean</b>	<b>S. D.</b>
<b>Dependent Variable</b>			
Sharpe Ratio	Sharpe ratio of household financial portfolios	0.047	0.074
<b>Independent Variable</b>			
Insurance	Equals 1 if the household head participates in social pension insurance, otherwise 0	0.739	0.439
UEBPI	Equals 1 if the household head participates in urban employees' basic pension insurance, otherwise 0	0.577	0.494
RSPI	Equals 1 if the household head participates in residents' social pension insurance, otherwise 0	0.162	0.369
<b>Mechanism Variables</b>			
Risk-averse	Equals 1 if the household head is risk-averse, otherwise 0	0.650	0.477
Saving-to-income ratio	the savings account balance divided by total income	-0.723	2.238
<b>Control Variables</b>			
Gender	Equals 1 if the household head is male, otherwise 0	0.736	0.441
Age	Age of the household head	44.377	9.484
Health status	Equals 1 if the self-rated health of the household head is very good and good, otherwise 0	0.551	0.497
Education	Number of years of schooling of the household head	11.994	3.535
Marital status	Equals 1 if the household head is married, otherwise 0.	0.863	0.344
Child dependency ratio	Number of children under 16 divided by family size	0.138	0.178
Aged-dependency ratio	Number of people aged 65 and above divided by family size	0.036	0.104
Family size	Total number of family members	3.190	1.278
Income	Total annual household income (RMB)	141,237.1	297,745.7
Central Region	Equals 1 if the household is located in the central region, otherwise=0	0.191	0.393
Western Region	Equals 1 if the household is located in the western region, otherwise 0	0.277	0.448
Northeast Region	Equals 1 if the household is located in the northeast region, otherwise 0	0.129	0.335
GDP	GDP per capita in the province where the household is located (RMB)	73,545	33,305