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Research Article

An Empirical Study of the Effect of Pension Insurance Expenditure on the Savings Rate of Residents

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Abstract

Objective: Lowering the savings rate is a reflection of China's economic structure moving further toward equilibrium. The aim of this study is to explore how to unleash residents' consumption potential and lower the savings rate, a crucial challenge for the high-quality development of China's economy. The pension insurance system may be a positive factor in addressing this issue.

Methods: The study selects panel data from 31 provinces, autonomous regions, and municipalities directly under the central government in mainland China from 2014 to 2022. A two-way fixed-effects model is constructed for an empirical analysis of the impact of the basic pension insurance system on residents' savings rate.

Results: The results indicate that the level of pension insurance coverage has a significant negative impact on residents' savings rate. In other words, increasing the level of pension insurance coverage will reduce residents' savings.

Conclusion: This study helps the government to formulate more accurate and sustainable pension insurance policies and promote the optimization of China's economic structure.

Keywords: basic pension insurance; residents' saving rate; consumption

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1 INTRODUCTION

Saving is the balance of disposable income after it is used for final consumption, and the saving rate is the ratio of saving to disposable income. Savings is the basic element to support capital deepening and economic growth. At the same time high investment return creates the motivation to save and high speed economic growth creates the source of saving. Since the reform and opening up, along with the rapid economic growth, China's savings rate has also continued to be at a high level, and although it has declined after 2008, it is still much higher than the world average. Changes in the mode of economic growth should be matched by trends in the savings rate, and China cannot continue to rely on the growth model of high savings and high investment. Consumption has become the "main engine" driving China's economic growth. A high savings rate may have a negative impact on the dynamics of economic growth by squeezing consumption. Therefore, lowering the savings rate is a step

towards a more balanced economic structure in China.

Structurally, gross national savings include the savings of residents, enterprises and the government. Residents' savings account for the largest proportion of China's gross national savings and have the greatest impact on the gross national savings rate. Life cycle theory suggests that an individual's consumption behavior is related to his or her age. Therefore, the age structure of a country's population has an important impact on the residential savings rate. China is facing a growing trend of aging, and the number of elderly people has shown significant growth.Data released by the National Bureau of Statistics (NBS) showed that by the end of 2022, China's population aged 65 or older stood at 21,487,770 thousand people, accounting for 21.83% of the population. Compared with the previous year, the population in this age group increased by 24.58 million, highlighting the trend of population aging.

While China's aging trend will further drive down the savings rate, aging poses equally significant challenges to economic development. How to further unleash the consumption potential of the population is an issue that must be faced on the road to high-quality development of China's economy. In the process of stimulating consumption, the pension insurance system is highly expected. Its mechanism of operation is to reduce the risk of survival in old age through the establishment of an income-related pension system, and to reduce precautionary savings in order to increase immediate consumption. China's pension insurance system has three pillars, the first of which is the basic pension insurance consisting of basic pension insurance for urban workers and urban and rural residents, which covers a wide range of people and is underwritten by the government so that retirees can obtain the most basic pension protection. As the trend of population aging intensifies, pension insurance expenditures are also on the rise. According to China's Human Resources and Social Security Development Statistics Bulletin, by the end of 2023, China's total expenditure on basic pension insurance amounted to 6,836.9 billion yuan, a year-on-year increase of 4.83%.

Can the social insurance system inhibit residents' saving behavior? Scholars in the past have conducted rich research on this question. Deng et al found that the social security system has a positive effect on consumption by reducing the income gap and income uncertainty based on evidence from China[1]. Among the various categories of social security, the existing literature focuses on the effects of health insurance and pension insurance on household saving and consumption behaviors[2,3]. Chen et al empirically test the effect on household saving and consumption of the pension option in labor insurance in China Taiwan Region[4]. The study suggests that regions that implement pension benefits have household savings are lower.Empirical studies using the provincial panel data of the Chinese mainland show that social pension insurance reduces residents' savings[5,6].

Discussing the determinants of China's savings rate in the context of structural factors and shock events that have occurred or are being faced is important for understanding the interrelationships between China's savings rate and other factors of economic development. Therefore, based on previous studies, this paper empirically investigates the impact of the level of pension insurance coverage on the savings rate of residents using inter-period data from 2014-2022 in each province. This study helps to more accurately recognize the advantages and disadvantages of pension security strategies, more effectively encourage citizens to change their saving habits, improve and strengthen China's social security system, and optimize China's economic structure.

2 MATERIALS AND METHODS

2.1 Theoretical Analysis and Research Assumptions

Precautionary savings theory is a useful extension of the traditional life cycle theory, emphasizing the precautionary motivation. Leland[7] included the precautionary behavioral motivation of savings into the concept of consumption savings theory to start the analysis, and through the study confirmed that people's consumption behavior will be greatly changed because of the uncertainty factors affecting income in the future. In the face of uncertainty and risk, precautionary savings theory suggests that people can cope with future emergencies or unanticipated expenditures by growing their savings. The theory asserts that individuals and families who may encounter adverse situations in the future will carefully consider and implement strategies to avoid these risks, one of which is to enhance savings to provide financial stability. This type of saving can be used as a tool to deal with unexpected situations, such as unemployment, health problems, or urgent financial needs of the family. In addition, the precautionary savings strategy also involves the consideration of the possible costs of saving behavior, which is the abandonment of short-term consumption strategies for the sake of future security. Thus, while ensuring that people can consume the necessities of life, they may save a certain amount of money to cope with possible contingencies. In short, with increased uncertainty, people's willingness to save becomes stronger due to risk and they are more willing to keep savings for the long term in the future consumption process.

The aging challenge facing our society is becoming more prominent, which leads to a rise in people's uncertainty about the future, prompting an increase in the habit of precautionary savings. The two effective responses that residents can make when faced with the presence of uncertainty about future income, longevity, and healthcare expenditures are precautionary savings or the purchase of insurance, respectively[8,9]. Of these, purchasing insurance is less costly, especially social insurance. Improving the system of pension insurance may reduce the incentive of the general public to

save for preventive purposes. As a result of the government's introduction of pension insurance policies, some people may feel that they no longer need to rely on their personal savings to support the expenses of old age. Such a mindset may encourage people to focus more on consumption rather than simply accumulating savings. The minimum consumption support provided by the development of basic old-age insurance may ease the expenditure uncertainty faced by consumers, provide a form of security to the public and reduce their concern about future uncertainty, thus reducing the precautionary saving incentive of households and easing their wealth accumulation behavior, and thus boosting consumption. Thus, for the savings rate of the population, basic pension insurance may have a crowding-out effect, i.e., the development of basic pension insurance induces a decline in the savings rate of the private sector.

In addition, the pension insurance system may also affect residents' saving and consumption behavior through income. China's current pension system combines a pay-as-you-go system with a fund accumulation system, and a unified account payment method. This system regulates residents' saving behavior through income redistribution and welfare effects. The redistributive function of pension insurance helps to balance the consumption level of people of all ages; while in the process of accumulating pension insurance funds in individual accounts, corresponding insurance premiums need to be paid, leading to a decrease in the disposable income of the residents, in which case, their savings will decrease in order to maintain the level of consumption.

In summary, this paper puts forward the following research hypothesis: pension insurance expenditure has a negative impact on residents' savings rate, the higher the pension insurance expenditure, the lower the residents' savings rate.

2.2 Research Design

2.2.1 Model Construction

In order to examine the impact of the level of pension insurance protection on the residents' savings rate, this paper constructs the following econometric model:

$$SR_{i,t} = \beta_0 + \beta_1 Pebsion_{i,t} + \beta_2 DR_{i,t} + \beta_3 GRI_{i,t} + \beta_4 AGDP_{i,t} + \beta_5 CPI_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

Where i denotes the province and t denotes the year. sr denotes the residents' saving rate, which is the explanatory variable of this paper. pension is the core explanatory variable, which denotes the level of pension insurance protection of the ith province, in year t. The coefficient measures the impact of the level of pension insurance protection on residents' saving rate. The coefficient β_1 measures the effect of the level of pension insurance coverage on the residents' saving rate. DR, GRI, AGDP, and CPI are control variables, denoting the dependency ratio, income growth rate, gross domestic product per capita, and consumer price index, respectively. μ_i and λ_t are province and year fixed effects, respectively, and $\varepsilon_{i,t}$ are random disturbance terms.

2.2.2 Description of Variables

The explanatory variable residential savings rate refers to the proportion of an individual's income that is used for savings after income, reflecting the individual's risk tolerance for future uncertainty and the degree of planning for future consumption. It is calculated as follows: residents' savings rate = (disposable income - consumption expenditure)/ disposable income. Where disposable income and consumption expenditure are the national per capita level of residents.

The core explanatory variable in this paper is the level of pension insurance protection Pension.To guarantee the robustness of the conclusions, this paper adopts two indicators to measure the level of regional pension insurance protection respectively. The first is the basic pension insurance expenditure Expenses, including both urban workers' basic pension insurance expenditure and urban and rural residents' basic pension insurance expenditure. The second is the pension replacement ratio, which is calculated from the ratio of the total amount of basic pension expenditure to the number of pensioners in each province in the past years, and the amount of per capita pension in the province in the current year. Taking the ratio of the per capita pension amount to the per capita disposable income, the pension replacement rate in the macro sense can be obtained.

In this paper, the dependency ratio DR, income growth rate GRI, per capita GDP AGDP, consumer price index CPI are selected as control variables. The specifics of the indicators selected in this paper are shown in Table 1 below.

2.2.3 Data Sources

China's basic pension insurance consists of two parts: urban workers and urban and rural residents' basic pension insurance, of which urban and rural residents' pension insurance was merged by the new rural social pension insurance and urban residents' social pension insurance in 2014, and the relevant data are available for the time interval from 2014 to 2022. In addition, since 2013, the NBS has carried out the survey on income and expenditure and living conditions of urban and rural integrated households, and the relevant data on per capita disposable income and consumption expenditure are also available from 2014 to 2022. In summary, the data used in this paper are available from 2014 to 2022.

This paper conducts an empirical study based on the annual panel data of 31 provinces, autonomous regions and municipalities directly under the central government in mainland China from 2014 to 2022. The data for the above variables come from the China Statistical Yearbook and other data released by the NBS in each year.

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Table 1. Meaning and Calculation Method of Each Variable

Variable Type	Variable Symbol	Variable	Meaning and Calculation Method
Explanatory Variables	SR	Household Savings Rate	The difference between disposable income and consumer spending as a percentage of disposable income
Explanatory variables	Expenses	Basic pension insurance expenditures	The natural logarithm of the basic pension fund expenditure
	PRR	Pension replacement rate	The ratio of the amount of pension to income
Control variables	DR	Total dependency ratio	It is composed of two parts: the child dependency ratio and the elderly dependency ratio
	GRI	Revenue growth rate	The rate of change in income relative to the previous period
	AGDP	GDP per capita	The natural logarithm of GDP per capita
	CPI	Consumer Price Index	Summary of the urban and rural consumer price indexes

Table 2. Descriptive Statistical Analysis Results of Variables

Variable	N	Mean	Sd	Min	Median	Max
SR	279	29.324	5.436	12.308	29.475	44.864
Expenses	279	4.240	0.876	1.818	4.267	6.106
PRR	279	4.800	3.493	1.852	4.125	42.666
DR	279	40.282	7.097	23.020	40.490	57.786
GRI	279	7.137	2.873	-2.847	7.951	20.364
AGDP	279	10.999	0.417	10.172	10.940	12.156
CPI	279	101.876	0.646	100.100	101.887	103.716

Table 3. Regression Results Were Analyzed

Variable	(1)	(2)
	SR	SR
Expenses	-4.03**	
	(-2.07)	
PRR		-0.17*
		(-1.80)
DR	-0.02	-0.01
	(-0.24)	(-0.09)
GRI	-0.16**	-0.15**
	(-2.24)	(-2.11)
AGDP	-3.31*	-3.85**
	(-1.91)	(-2.24)
CPI	-0.14	-0.14
	(-0.34)	(-0.35)
_cons	93.54**	85.15*
	(2.04)	(1.86)
Control	Yes	Yes
Indi_FE	Yes	Yes
Year_FE	Yes	Yes
N	279	279
r2	0.573	0.571
F	24.25***	24.06***

Notes: t statistics in parentheses. *p<0.1, **p<0.05, ***p<0.01.

3 RESULTS

3.1 Descriptive Statistics

Descriptive statistics of all variables are reported from Table 2. Among the 279 samples processed with data, the mean value of the residents' saving rate is 29.324, with a significant range of fluctuation, ranging from a low of 12.308 to a high of 44.864. The standard deviation is 5.436, showing a large degree of dispersion. This difference may stem from the differences between provinces and cities in the degree of aging, the level of economic development and the level of pension insurance protection. The differences in basic pension insurance expenditures and pension replacement rates are more significant, reflecting the differences in the implementation of the pension insurance system among provinces. In the subsequent empirical part, this paper will further explore the specific impact of this regional variability on the residents' saving rate.

3.2 Regression Analysis

The regression results are shown in Table 3. Where Control indicates whether provincial-level characteristic variables such as the dependency ratio DR, income growth rate GRI, per capita GDP AGDP, and consumer price index CPI are controlled for, Indi_FE indicates whether individual fixed effects are controlled for, Year_FE indicates whether year fixed effects are controlled for, and N indicates the sample size. The results show that the coefficient of basic pension insurance expenditure is negative 4.03, which is significant at the 5% level. The coefficient on the pension replacement rate is negative 0.17 and significant at the 10% level. Therefore, it can be concluded that the level of pension insurance protection has an inverse relationship with the savings rate of residents. In other words, raising the level of pension insurance protection will suppress residents'

savings. The reason, as analyzed earlier, is that on the one hand, pension insurance can effectively reduce the financial pressure of unexpected accidents and ensure that retirees enjoy stable pensions, which in turn reduces people's demand for future preventive storage funds and lowers the residents' saving rate. On the other hand, the pension insurance system regulates the saving behavior of residents through income redistribution and welfare effects, thus reducing the saving rate of residents.

4 DISCUSSION AND CONCLUSION

In order to study the impact of China's basic pension insurance on residents' savings rate, this paper selects the panel data of 31 provinces, autonomous regions and municipalities directly under the central government in mainland China from 2014 to 2022, and constructs a two-way fixed-effects model to carry out empirical research. The results of the study show that the level of pension insurance coverage has a significant negative impact on the residents' savings rate, i.e., raising the level of pension insurance coverage will inhibit residents' savings.

Based on the findings of this paper, we put forward several policy recommendations. First, in the process of reforming the basic pension insurance system, it should be fully aware of its impact on residents' saving behavior. It is necessary to ensure that the pension funds of the elderly group are basically guaranteed without excessively suppressing the general public's willingness to save; a differentiated retirement protection plan should be formulated; in order to strengthen the continued stability and long-term liquidity of the pension insurance system, it should be carried out through the formulation of appropriate fund-raising strategies and investment guidelines; the government should enhance public awareness of the pension insurance policy in order to enable the general public to have a pension insurance system The government should enhance public awareness of pension insurance policies so that the public can have a deeper understanding of and fuller trust in the pension insurance system.

Second, optimize financial services. In order for residents to efficiently manage their financial expenditures for old-age insurance and family savings, the structure of financial services needs to be optimized and strengthened to ensure that efficient and timely financial support services are provided to the public. In order to enhance society's knowledge and practical ability in the financial field, residents' awareness in financial education should be strengthened through publicity and other means. It is also important to help residents make more effective use of the savings channels associated with pension insurance.

Third, improve the level of social security. In order to make people feel more secure in participating in pension insurance activities, the government needs to raise the standard of social security and improve the service level of basic public services such as medical care and education, thereby enhancing their trust and security. Increased funding for the public sector, such as health care and education, will continue to optimize these services and reduce the public's financial burden in this area; and emergency relief strategies need to be constructed and optimized in order to ensure that residents in emergency situations have rapid access to assistance and to reduce the pressure on their savings.

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Not applicable.

Conflicts of Interest

The authors declared no conflict of interest.

Data Availability

All data generated or analyzed during this study are included in this published article and its supplementary information files.

Author Contribution

Yang F was responsible for conceptualization, funding acquisition, supervision, and review. Wang X contributed to data curation, formal analysis, and writing the original draft. Cai H and Yan P were involved in writing the review and editing the manuscript.

Abbreviation List

NBS, National Bureau of Statistics

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