Research on the Relationship between Social Security Fund Investment Yield and Social Security Level

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Abstract

This paper defines the methods of how measure social security level. Firstly, based on the contents of social security, the paper calculates the total expenditure of social security fund by years; secondly, processing data within the index system with the method of second exponential smoothing; thirdly, by using SPSS software to study the relationship between investment rate of return of social security and social security level. Empirical results show that there is cubic curve relationship between them.

Keywords: investment rate of return of social security; social security level; SPSS; empirical analysis

1 Introduction

With the deepening implementation and comprehensive development of the social security system in China, various related issues and challenges ensued, such as aging population, the risk of pension funds and investment, levels of social security. Along with the dynamic development of the structure of the world's population, China, the United States, Japan and some other countries of the world have studied the issue involved in maintenance and appreciation the values of social security fund. In China, you can often hear voices of that "whether social security fund should enter the market or not?", "the proportion and the way for it into the stock market?", and, "should enterprise annuity proceed fundamental annuities go into the market?"

Throughout the case, no matter what kind of voice, it is easy to see, under the background of population aging, all hope "social security fund[1]", the affordable and prospective reservoir, to be value and sustainable, and succeeded in facing difficulties and challenges.

Over the years, however, based on the investment principles and ROI perspective, we can't briefly come to the conclusion that it had the ability to cope with future risk, and we can't simply conclude that today's fund returns are able to meet the moderate level of social security.

Based on this idea, this paper studies the relationship between investment rate of return of social security and social security level. By empirical research and analysis, understand and study the dynamic effects between them.

2 Data Sources and Index System Establishment

2.1 Data sources

The data used in this article include rate of social security fund investment reture, the GDP, the expenditures of the social security funds, etc. Data mainly comes from China Statistical Yearbook 2002-2012, as well as calendar year statistics NSSF public data and Human Resources and Social Security Ministry of Public Statistics Annual Data.

2.2 Index system

Indicator variables used in the text are:

[1] Here refers to the National Social Security Fund, the same below.

S : Social security level;
Sa : Total expenditure of social security;
G : GDP;
R : Rate of social security fund investment return;
$S(2)/R(2)$: Data obtained after the second smoothed;

$O/E/Z/J/M$:Namely social insurance expenditure on various projects, including: basic pension insurance, urban basic medical insurance, unemployment insurance, work injury insurance and maternity insurance;

T : Social security and employment, health, housing security, social security benefits and other items of expenditure.

3 Measurement Method of the Level of Social Security

The social security level is an important factor of the social security system, which has great influence on the sound development of the social economy and the social stability. With the dynamics of social security level, observing and analyzing the security system can help us analyze whether the existing social security level is able to meet the needs of people. The social security level offers us a measure to estimate the degree of social members enjoy social security, as well as refers to the total amount of social security expenditure accounts for the proportion of gross domestic product (GDP).

According to China's current social security system, this paper defines social security expenditure, include of pension, medical, unemployment, work injury and maternity social insurance expenditures as well as social relief, social special care and other social security benefits expenditures.

That is to say:

$$Sa = O + E + Z + J + M + T \quad (1)$$

Depending on the selected Measurement method of the level of social security, the calculating formula of the level of social security can be achieved easily.

That is:
Social security level = total of social security expenditure / GDP.

$$S = \frac{Sa}{G} \quad (2)$$

4 Empirical Analyses

4.1 Data analysis

Table 1 related data of the social security fund investment returns and social security level[2]

Year	R(%)	G(RMB/0.1billion)	Sa(RMB/0.1billion)	S(%)
2001	1.73	109655.17	4735.41	4.32
2002	2.59	120332.69	6107.72	5.08
2003	3.56	135822.76	6672.31	4.91
2004	2.61	159878.34	7743.78	4.84
2005	4.16	184937.37	9099.66	4.92
2006	29.01	216314.43	10839.16	5.01
2007	43.19	265810.31	15324.92	5.77
2008	-6.79	314045.43	19486.39	6.2
2009	16.12	340902.81	24629.39	7.22
2010	4.23	401202.03	31130.22	7.76
2011	0.84	472881.6	39414.3	8.33

2 Data source: China statistical yearbook from 2002 to 2012, and over the year's public data of the national social security fund council and human resources and social security public statistical yearbook data.

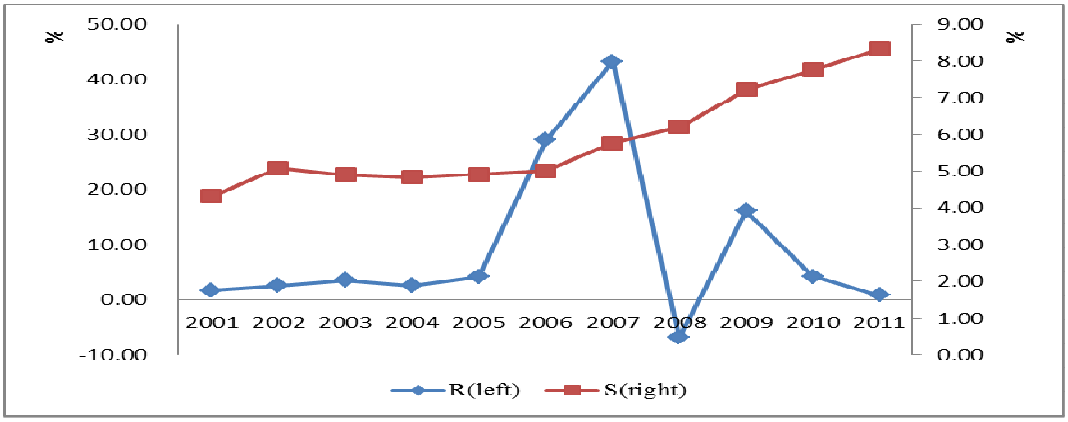

Figure 1 trend chart of social security fund investment returns and social security level[3]

Descriptive statistics for the selected variables, the result is shown in figure 1.

Based on the above, the relationship between the rate of social security fund investment return and social security level is not very significant. Meanwhile, the analysis of the data shows that data in 2008, the social security fund investment return, is negative. This data belongs to the particularity, mainly due to the 2007 global economic crisis.

Therefore, this article is mainly adopting the method of the secondary exponential smoothing to the data respectively.

Its model is:

$$S_t(2) = \alpha S_t(1) + (1-\alpha) S_{t-1}(2) \qquad (3)$$

Among the model, t represents the current year; T represents years that from the current year to predict year. Mathematical model for prediction is:

$$\hat{x}_{t+T} = a_t + b_t T \qquad (4)$$

In the formula (4) ， $a_t = 2S_t(1) - S_t(2)$， $b_t = \frac{\alpha}{1-\alpha}(S_t(1) - S_t(2))$。

Data of the rate of social security fund investment returns and social security level after the secondary exponential smoothing is shown in the following table 2.

Table 2 after the second exponential smoothed data

Year	R(2)	S(2)
2001	——	——
2002	——	——
2003	1.73	4.32
2004	1.81	4.39
2005	2	4.47
2006	2.15	4.54
2007	2.41	4.61
2008	4.93	4.68
2009	9.6	4.81
2010	10.42	5
2011	11.33	5.3

[3] Graph data sources: the data in table 1.

4.2 Empirical analysis

Since the rate of social security fund investment return is economically cyclical, and the social security fund itself is economy and supportability, social security level will change along with the social security fund investment return changes. When the social security fund investment yield is high, the level of social security will also go for perfect and improve, however, even if the return on investment of social security is reduced, due to the economic development, social security level may also rise. Therefore, make the following assumptions:

Assumptions: There is non-linear relationship between social security fund investment rate(R) and the level of social security(S).

This article carries on the regression analysis by SPSS software, and a variety of curve estimation results are as follows.

Table 3 Model Summary and Parameter Estimates

Dependent variable: S(2) Independent variable: R(2)

Equation	Model Summary					Parameter Estimates			
	R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
Linear	.862	43.877	1	7	.000	4.315	.071		
Logarithmic	.843	37.664	1	7	.000	4.202	.355		
Quadratic	.871	20.304	2	6	.002	4.418	.015	.004	
Cubic	.983	97.784	3	5	.000	3.636	.599	-.105	.006
Growth	.866	45.187	1	7	.000	1.465	.015		
Exponential	.866	45.187	1	7	.000	4.327	.015		

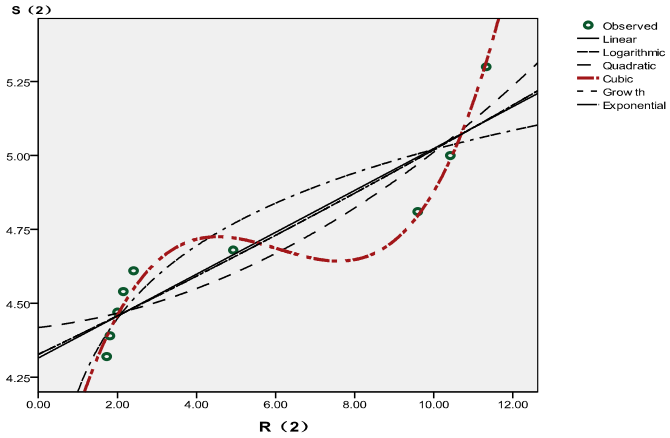

Figure 2 Regression analysis results (the definition of the upper and lower limits)

Social Security Fund as a reserve funds to response risk, the investment rate of return will undoubtedly become the focus of attention. This paper, through the empirical analysis, mainly based on the real data of the social security fund investment yields, macroscopic to grasp the relationship between the two.

5 Conclusions

The empirical results show the following conditions :(1) there is no standard linear correlation between social security fund investment yield and social security level, that is to say there is curve-correlation between them;(2) when the relationship between them is shown as a cubic curve (Cubic), the empirical results is best, as the coefficient of correlation R2=0.983, and according to P values, which is the most significant correlation;(3)the empirical result shows that when the investment yields lower than a certain value, and reaches a certain value, the relationship between them is obvious positive correlation, however, when investment yields between the two numerical, shows the negative correlation relationship;(4) on the whole, you will find a cyclical process like that "rapid development - slow growth - rapid development ".

By considering the reasons that cause changes in the level of social security, you can know social progress and economic development is another internal reason. However, It is well known that the NSSF doesn't implement the national plan as a whole in China, some provincial overall planning caused retention and waste of money to a certain extent. Therefore, under the condition of accommodate the steps of economic development, upgrading the provincial capital investment way, as well as broaden social security funds investment channels, steady return on investment are a key to the safety development of the social security funds chain.

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