

Study on Adjustment Mechanism of Contribution Rate of China's Individual Account Pension

Zhang Jinfeng

Department of Social Security, Hebei University of Technology, Tianjin, P.R.China, 300401

(E-mail: zhangjinfeng_sy@126.com)

Abstract: Based on the quantitative method, this study employs a contribution rate model, calculates the upper bound and lower bound of the CRIAP by the increasing LEAR during the years 2000-2050 and analyzes the economy bearing capacity of employees at this contribution rate. The paper finds that the lower bound of the CRIAP under LEAR is lower than 8%, the upper bound of that ranges from 8% to 12%, and China's employees have the bearing capacity to shoulder that. Through the feasibility analysis of the adjustment to the CRIAP by LEAR, this study proposes some reasonable policy suggestions for the improvement of pension reform in China.

Keywords: Life expectancy at retirement; Contribution rate; Individual account pension; Economy bearing capacity

1 Introduction

Life expectancy at retirement (LEAR) is one of key factors related closely with contribution rate of individual account pension (CRIAP). According to China's pension policy published in 2006, current contribution rate of individual account pension can only secure the basic life of the retired for 16.25 years (195 months) at most. The statistics yearbook's data in 2000 showed the life expectancy at retirement (LEAR) of the male at 60 years old is 16.8 years and the female at 55 is 23.3. Furthermore, the predicted data show the LEAR of the male at 60 years old will be 19.9 and the female at 55 will be 28.2 in 2030. These data may reach 21.8 and 30.6 respectively in 2050. This means as the life LEAR increases gradually in China, the individual account pension under current contribution rate will not meet the payments demand or guarantee the basic life of the retired. If the CRIAP were not properly adjusted by the LEAR, the retired facing longevity risk will fall into poor state. The low level of current CRIAP will also make the safety net function of social insurance perform inefficiently and will enable it not to coordinate with pension reform under the trend of aging population. Thus, it has theoretical value and practical significance to study the adjustment of the CRIAP based on the LEAR.

Schwarz and Vittas reviewed different contribution rates employed by the system of PAYG and Funded pooling, respectively (World Bank, 1994). Martin Feldstein, with quantitative method, predicted the contribution rate that individual account system established by America would demand (Feldstein, 1974). The research report from the World Bank held that the increase of retirement age could reduce the contribution rate in the complete funding pooling system (World Bank, 1994). The studies in China mainly discussed that the balance equation of incomes and expenses as well as its relevant variables under the combination system of PAYG and Funded pooling (Li Zhen, 1998). Some scholars put forward that the contribution rate could reach 5.8% from the scheme of substitution shift (Chen Jiagui, 2004). Others discussed fundraising mode of old-age insurance according to the operation effect of the certain contribution rate (Mu Huaizhong, 2003).

From the above relevant researches, we find that small amount of deep quantitative researches in the contribution rate of individual account according to considering average life expectancy. This study, from the point of the average life expectancy gradually increasing, calculates reasonable contribution rate of individual account pension by the construction of a balance model. Meanwhile, individual employee's bearing capacity with the rate is analyzed. Through the feasibility analysis of the adjustment to the CRIAP by LEAR, the paper seeks to provide reasonable suggestions for the improvement of pension reform in China.

2 Method

This study is mainly based on the quantitative analysis. Statistical analysis is performed with SPSS and Excel computer software.

2.1 A contribution rate model of individual account pension

It was used to calculate the CRIAP under the increasing LEAR. Here are some assumptions of the model. Firstly, all employees retire at the same age. Secondly, the employees contribute a fixed percent

of wage each year. Thirdly, the administrative cost of individual account pension is zero.

The individual account pension runs by the fully funded model. If an employee worked at “a” years old, retired at “b” years old, his average working time would be “n” years ($n = a - b$). Let his average wage be “w”, the CRIAP be “t”, the investment return rate of the pension be “r”, the growth rate of wage be “g”. Then the final value of his individual account pension may be expressed as:

$$F = tw [(1+r)^n + (1+g)(1+r)^{n-1} + \dots + (1+g)^{n-1}(1+r)] \quad (1)$$

Let “s” stand for the replacement rate of the individual account pension. During the period of LEAR (“m” years), the present value of the individual account pension may be expressed as:

$$P = sw (1+g)^n [1 + (1+g)/(1+r) + \dots + (1+g)^{m-1}/(1+r)^{m-1}] \quad (2)$$

Under the fully funded model, the individual account must be kept balance, namely, $F = P$. When “r = g”, the contribution rate model of individual account pension may be:

$$t = s (m/n) \quad (3)$$

When “ $r \neq g$ ”, let “ $d = (1+g)/(1+r)$ ”, then here is

$$t = s d^n (1-d^m) / (1-d^m) \quad (4)$$

According to the contribution rate model of individual account pension, the upper bound of CRIAP by LEAR depends on the maximum of “s”, “g”, and the minimum of “r”. While the lower bound depends on the minimum of “s”, “g”, and the maximum of “r”.

2.2 Parameters

To calculate the upper bound and the lower bound of CRIAP by the increasing LEAR during the years 2000-2050, the parameters mentioned above should be set.

2.2.1 Original work age and retirement age

Many countries provision retirement age at 60-65 in order to correspond to the new development trend of life expectancy and population aging. In most industrial countries, the legal retirement age of male is 65 and female is 60. Most organizations and scholars in China view the extension of the retirement age as a general trend according to the reality of Chinese population’s health and pressure of pension expense (Song Xiaowu, 2001). Some of them argue that the retirement age of male and female should be 60 before 2005 and 65 before 2010. Some hold that the retirement age should be 65 since 2011. Some experts calculated the original work age of male is 19.2 and female is 19.1 according to census materials of China in 1990 (Zheng Gongcheng, 2002). Here, if we suppose the retirement age of Chinese male and female employees is 60 and original work age is 20, work time would be 40 years.

2.2.2 Average life expectancy

For the sake of precision and authority of calculation results, we quote directly research data about population life expectancy at 60 in Chinese during the years 2000-2050 from Census Office of America as reference.⁵

2.2.3 Replacement rate level of individual pension account

According to international practice, pension should not be equal to wage of working labor and should be 60% of it at most (Mu Huaizhong, 2003). International Labor Organization regulated in Social Security (Minimum standard) Pact in 1952 that pension replacement rate should be 40% at least. To the sharp contrast, the pension replacement rate in Chinese state-owned enterprises averagely exceeds 80%. Under current economy in China, if we suppose the maximum of basic pension replacement rate is 55%, the minimum is 50%, the upper and lower bound of individual pension account replacement rate are 20% and 15%, respectively on the basis of basic pension replacement rate of 35%.

2.2.4 Average wage increased rate and investment yield

With the increased perfection of Chinese capital market, social security fund investment yield will gradually increase and 4%, 6% and 8% would be supposed reasonable if only no serious economy depression appears (Zhu Qing, 2002). We predict conservatively that the future investment yield would not lower than 3.32% which is actual yield of the whole social security fund in 2004 and the maximum would be 4%. Here, if we suppose the minimum is 3% and maximum is 4%, the wage increase rate and individual account yield corresponding to the minimum of individual account contribution rate would be 3% and 4%. Whereas, the long-term practical experience of some countries approves that capital yield is higher than wage rate though the difference exists in wage rate of different periods and investment yield in some fields. Therefore, according to long-term average level, the individual account investment yield should be equal to wage rate at least if the former is not higher than the latter. We suppose they are equal.

⁵ International Programs Center. International Data Base. <http://www.census.gov/ipc/www/idbnew.html>.

Based on the contribution rate model of individual account pension and the parameters mentioned above, the CRIAP under the increasing LEAR can be calculated.

2.3 A formula of economy bearing capacity

It was used to analyze the level of CRIAP employees can shoulder. Under current pension policy, the individual account pension contributed by employees. Suppose the total wage of employees (“y”) were divided into the current consumption expenditures (“C”) and the savings. If the whole savings were used to contribute the individual account pension (“b”), the CRIAP (“t”) which employees can bear reach the maximum, namely,

$$t = b/y = (y-C)/y = I-C/y \tag{5}$$

The function of consumption in Economics is

$$C = C_0 + cy \tag{6}$$

Then here is the formula of economy bearing capacity:

$$t = I-C/y = I-(C_0+cy)/y = I-c-C_0/y \tag{7}$$

Adopting the per capita annual living expenditures for consumption and the average wage of staff and workers during 1993-2009 in the statistics yearbook, utilizing the SPSS software to conduct the regression analysis with the function (6), the outcome may be gained as follows.

$$C = 704.81 + 0.607y \tag{8}$$

$$\begin{aligned} t &= (1.931) - (5.960) / y & Ad. R^2 &= 0.726 \\ p &= 0.077 & p &< 0.001 & df &= 14 \\ F &= 35.517 & (P < 0.001) & & DW &= 1.981 \end{aligned}$$

Then a new formula is

$$t = 0.393 - 704.81/y \tag{9}$$

Considering the average wage vary with the economy vibration, use 4% as the higher level of the growth rate and 3% as the lower level. Based on the average wage in specific year, the higher level and the lower level of the economy bearing capacity can be gained.

3 Results

As the LEAR increases, the CRIAP goes higher and higher. The following data show the lower bound of the CRIAP during 2000-2050 ranges from 4.76% to 7.11%, the upper bound ranges from 8.4% to 13.1%. Because the female survive longer than the male, the CRIAP under LEAR of the female is higher than that of the male.

Table 1 The Upper Bound and the Lower Bound of the CRIAP under LEAR during 2000-2050

year	the lower bound (%)			the upper bound (%)		
	male	female	average	male	female	average
2000	4.76	5.36	5.06	8.4	9.55	8.98
2010	5.05	5.81	5.43	8.95	10.45	9.7
2020	5.33	6.26	5.8	9.5	11.35	10.43
2030	5.56	6.53	6.05	9.95	11.9	10.93
2040	5.81	6.82	6.32	10.45	12.5	11.48
2050	6.04	7.11	6.58	10.9	13.1	12

This means if the CRIAP were adjusted by the LEAR of the female, the basic life after retirement of all employees can be secured. But if the CRIAP were adjusted by the LEAR of the male or the average level, the basic life after retirement of the female can't be met sufficiently. Under this condition, some allowance and the life assistance should be provided for the female.

Though comparing the CRIAP under the LEAR and that under the economy bearing capacity of employees, the data below shows that the CRIAP employees can bear is higher than that under the LEAR (showed in Table 1 and Table 2). What's more, the gap between them is becoming larger and larger as the time goes. This means employees have the bearing capacity to shoulder the CRIAP under the LEAR and their capacity is going stronger and stronger. In the real world, employees will also contribute 1% of wage for the unemployment insurance and 2% for the medical insurance. Even so, this doesn't impact the analysis outcome mentioned above.

Table 2 The Economy Bearing Capacity of Employees (%)

year	2000	2010	2020	2030	2040	2050
Higher level	31.79	36.145	37.169	37.86	38.327	38.643
Lower level	31.78	35.989	36.837	37.467	37.936	38.285

4 Conclusions

It is necessary and important to adjust the contribution rate of the individual account pension by the life expectancy at retirement. The adjustment is to secure the basic life of the retired. Through the analysis, this study draws some conclusions as follows. Firstly, it is feasible to adjust the contribution rate of individual account pension (CRIAP) by the life expectancy at retirement. Secondly, the lower bound of the CRIAP during the years 2000-2050 is lower than current contribution rate (8%), which shows the potential level for China's pension reform in the future. Thirdly, the upper bound of the CRIAP is a little higher, but China's employees have the bearing capacity to shoulder that.

From the point of both theory and practice, exorbitant contribution rate is not advisable. The choice of contribution rate should consider both basic life in average life expectancy of individual employees and avoiding aggravation of economical burden. With the technology development, life standard improvement and Medicare development, the fact that life expectancy of the retired would prolong is unchangeable.

To make the adjustment perform effectively, some relevant coordinated reforms must be done. The accessorial policies should include: prohibiting early retirement, enhancing retirement age in proper time, developing the new multi-pillar pension system, reducing the replacement rate of basic pension step by step, strengthening the investment and management of pension fund and improving public finance policy for pension subsidy, and so on.

Reference

- [1] The World Bank. *Averting the Old Age Crisis*[M]. Oxford: Oxford University Press, 1994:78-94
- [2] Martine Feldstein. *Social Security, Induced Retirement and Aggregate Capital Accumulation*[J]. *Journal of political Economy*, 1974, 82(5):905-926
- [3] Li Zhen. *Social Security System and Economic Development*[M]. Wuhan: Press of Wuhan University, 1998:184 (In Chinese)
- [4] Chen Jiagui. *Report on China's Social Security Development (2001-2004)*[M]. Beijing: Press of Social Science, 2004:224 (In Chinese)
- [5] Mu Huaizhong. *National Wealth and Social Security Income Redistribution*[M]. Beijing: Press of Labor and Social Security, 2003:44 (In Chinese)
- [6] Song Xiaowu. *Report on China's Social Security System Reform and Development*[M]. Beijing: Press of People's University of China, 2001:35 (In Chinese)
- [7] Zheng Gongcheng. *Development and Evaluation of China's Social Security System*[M]. Beijing: Press of People's University of China, 2002:308 (In Chinese)
- [8] Zhu Qing. *Economic Analysis on Pension System and Operation*[M]. Beijing: Press of People's University of China, 2002:16 (In Chinese)