



## **COMPONENT ONE**

# **The Financial Sustainability of Urban Basic Old Age Insurance System in China**

Zheng Bingwen

(Centre for International Social Security, in Chinese Academy of Social Science)

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**Abstract:** According to the different employment sectors, China's urban basic old age insurance system can be divided into enterprises employee's old age insurance and government organs and public institutions pension system(hereinafter, GOPI pension).In 1997, Urban enterprise employees' old age insurance system has formally established the framework of social pooling and individual accounts. Social pooling is a pay-as-you-go pension system, while the individual account is fully funded. In 2005, some adjustments are made in the system, such as the adjustment of the proportion of individual account and the benefit formula. And the system has run up to now. Although the urban basic old age insurance system has made great contribution to reforming the economic system and constructing the harmonious society, the problems of the fairness and sustainability of old age insurance system are increasingly prominent. Currently, urban old age insurance system is in the period when pension benefits are increasing rapidly and the financial subsidies are in the largest amount, which has increased from 54.4 billion Yuan in 2005 to 471.6 billion Yuan in 2014. At the same time, China's urban old age insurance is still in the enormous pressure on how to adjust system parameter, reform the structure of the system and to establish some sub systems. As the "double track" of the urban basic old age insurance breaks down, the problem of system unfairness will be solved, then the sustainability of the system will become the main contradiction.

At present, there are six main problems existing in the financial sustainability of pension system. Firstly, the income ability of the system is low. Due to the negative incentive, the principle of "pay more and gain more" has not be established in the system, then the contributions and benefits disconnected with each other, resulting in the problems of real contribution rates lower than statutory contribution rates and smaller real contribution bases. All these factors are contributing to the low income ability. Second, the automatic balance mechanism to resist the aging is absent. The automatic adjustment mechanism has not been set up in the social pooling system financing on the pay-as-you-go basis. And the pension divisor in the individual account system has not adjusted dynamically with the increasing life expectancy. Third, due to the low pooling level, the sustainability of social pooling is increasingly highlighted. Low pooling level results in the large amount of financial subsidies, and it does not help to promote the establishment of pension fund investment system. Fourth, the design of individual account system is birth defects. The individual account system cannot live without government transfer. Social Insurance Law has provided that the assets in the account can be inherited. Otherwise, the people who live longer than life expectancy can receive the benefits until they die. Moreover, it is difficult to fully fund individual accounts. The scale of empty account has expanded to 3095.5 billion Yuan at the end of 2013, and the real account is only 415.4 billion Yuan. The goal of partial funded pension system has not achieved. The fifth is that the management system is not order, which affects the financial capacity of the system. The Interim Regulation on the Collection and Payment of Social Insurance Premiums in 1999 has provided that the social insurance premium should be collected by the tax authorities directly or by the social insurance agencies. Due to coexist of double system, the contribution incomes cannot reach its designated position. Besides, the social insurance agencies are administrated by the local administrators, which reduce the efficiency of the system. The six is that workers put excessive reliance on the basic old age insurance governed by the government. The retirement income coming from the market share is too low. The multi-level old age insurance system has not been set up.

To predict fiscal sustainability of basic old age insurance system, it should make some hypotheses to system parameters such as the long-term ROI (7%), accounting interest rate (equals to wage growth which is decline linearly from 10.01% in year 2015 down to 6.71% in year 2050), reasonable pension divisor (should be adjusted dynamically and be lower than the existing divisor at the same retirement age level) as well as population, economic growth, revenue growth, and then the conclusion is as follows: from 2015 to 2050, the Basic Pension revenue increases gradually. In 2020, the revenue growth rate will increase slower than before, accounting for 23.87% of homochronous fiscal revenue in 2035 down to 22.97% in 2050. Accordingly, before 2030, fund expenditures have expanded slowly. Thereafter, due to the increasing dependency ratio, the fund scale expands, accounting for 15.59% of homochronous fiscal revenue in 2030, and then up to 24.13% in 2050. At the same time, The prediction of the GOPI pension indicates that from 2015 to 2050, the Basic Pension revenue increases gradually, accounting for 4-5.5% of homochronous fiscal revenue; between 2015 and 2035 the Basic Pension expenditure will decrease slightly and after 2035 increase sharply, accounting for 4-9% of homochronous fiscal revenue; the current value of history debt accounts for 5 percent of fiscal revenue of the year, almost reducing 1 percent every 10 years. The Pension Divisor in the reform is too low, which will speed up the depletion of Basic Pension funds of GOPI.

In recent years, due to the aging and negative incentives, the costs of the system are rising. Thus, many EU countries reform their public pension systems. The major reform measures include: Firstly, reduce pension benefits via cutting down payment or strengthening the link between the contributions and benefits or introducing automatic adjustment mechanism; Secondly, Raise retirement age, gradually realizing the equal retirement age of men and female; Thirdly, establish the rewards and punishments linked with the retirement age, making the best use of human capital by punishing the early retirement and rewarding the later retirement. The fourth is to use actuarial technical to adjust the parameters and introduce the aging population factor under the double constrains of contribution rates and replacement rate. Fifthly, enhance the portability of basic old age insurance system by improving the pooling level. The six is to make full use of market mechanism and then to push the pension system from a single mode to multiple-level pension system.

In order to establish a more fair and sustainable basic pension system, it needs to be reformed as follows: Firstly, reduce the contribution rate of old age insurance and establish the reasonable contribution base. The contribution base should be public and under the supervision of employees. Secondly, advance the implementation of nation pooling to enhance the portability. Thirdly, enhance the financial sustainability of basic pension system via the principle of actuarial balance. The measures include: Develop a more dynamic and scientific pension divisor, and establish a normal and reasonable pension adjustment mechanism; all of these measures will promote basic pension system more scientific and more sustainable. The forth is to improve individual account, which helps to promote the incentive mechanism. It is suggested to expand the scale of individual accounts and promote the new form of hybrid social pooling and individual accounts; the fifth is to introduce the role of market mechanism and pay more attention to other pillars. It should set up a more independent investment institution to improve the investment performance of pension fund. Besides, make full use of the role of the second and third pillar via preferential tax policies and open the limited investment options.

**Key Words:** Urban Basic Old Age Insurance System; European Union; Financial Sustainability

According to different employment sectors, basic old age insurance system for urban workers can be divided into enterprise employees' old age insurance system and government organs and public institutions pension system (hereinafter, GOPI pension). These two systems have evolved from "unification" to "differentiation" and finally to "reunification". Enterprise Employees' old age insurance system has formally established its framework of social pooling and individual account in 1997. In 2005, some adjustments are made in the system, such as the adjustment of the proportion of individual account and its benefit formula. And the system has run up to now. The GOPI pension reform in 2015 has ended the double-track operation of these two systems. Basic old age insurance system for urban workers has made remarkable achievements in reforming the economic system and constructing the harmonious society. From the 21<sup>st</sup> century, urban basic old age insurance system has developed fast. However, the issue of the fairness and sustainability of old age insurance system is increasingly prominent, which has a big gap compared to the objective requirement of promoting national governance system and management ability.

## **1. The Background of Urban Basic Old Age Insurance System reform: Three Tasks Stacked**

China has proposed to establish a more equitable and sustainable pension system. Over the past decades, the fairness and sustainability of urban basic pension system become the most important problems. The issue of financial sustainability is currently in the most difficult and sensitive period. It embodies in the following two aspects.

### **1.1 The system is in the period of rising pension benefits and substantial financial subsidies**

From 2005 to 2015, the basic pension benefit has never stop to rise by 10% every year. Per capital pension in China has increased from 714 Yuan per month in 2005 to 2100 Yuan in 2014. At the same time, financial subsidies have grown fastest in the past 11 years from 54.4 billion Yuan in 2005 to 471.6 billion Yuan in 2015<sup>1</sup>. The public have high expectations on the pension system. Any tightening reform on the financial sustainability will be in a passive situation.

### **1.2 Urban basic pension system is under the great pressure of three stacked tasks**

China's urban basic old age insurance system is still under the great pressure, which needs to adjust system parameters, reform the system structure and to establish sub systems as soon as possible. The adjustment of system parameters means that some parameters need to be adjusted, such as rising the statutory retirement age and reducing social insurance contribution rate. Now the statutory retirement age is very low and the contribution rate is very high in China, which pose great threats on the sustainability of pension system. Reforming the system structure

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<sup>1</sup> Ministry of Human Resources and Social Security, Human Resources and Social Security Development Statistical Bulletin, Website: <http://www.mohrss.gov.cn/>.

means that individual accounts cannot be fully funded over the past 13 years. The size of empty account has expanded year by year, which has bad influences on the creditability of government. The establishment of sub systems means that the GOPI pension needs to be reformed together with the enterprises employees' pension system; the normal pension adjustment mechanism and pension fund investment system need to be set up as soon as possible. The absence of these sub systems has great impacts on the fairness and sustainability of the pension system. Three tasks are overlapped, making pension system reform difficult.

After the breakdown of double-track pension system, financial sustainability will become the main problem. Due to the trend of aging population, the implicit debts and the financial sustainability have become important issues in China.

## **2.The sustainability status quo of basic old age insurance system: Six problems**

The fund revenue of urban basic pension system is more than the expenditure, and the fund balance is as high as hundreds of billions Yuan. The scale of accumulated funds expands gradually. It seems that the financial status of pension system is good at present, which is mainly affected by the following three factors: firstly, the coverage expands unceasingly. The new hires are young workers who make contributions to the system and withdraw pension benefit in a few decades. The demographic dividends have covered the real situation of the system; secondly, financial subsidies have expanded year by year, which have increased from 2.4 billion Yuan in 1998 to 471.6 billion Yuan in 2015. The total amount of fiscal subsidies is up to 2.66 trillion Yuan from the year 1998 to 2015. Total fund balance is about 3.53 trillion Yuan at the end of the year 2015<sup>2</sup>. That is, more than two-thirds of the fund balance come from fiscal subsidies. Thirdly, the proportion of abnormal contribution revenues is rising. The supplementary contributions and the prepay account for 10 percent in all revenues<sup>3</sup>. These revenues are collected by the local governments, who allow the new retirees to participate in the system by one-time contributions. Therefore, if abnormal contribution revenues are removed, the incomes will not cover the expenditures.

The contribution rate of urban basic pension system is 28 percent and the dependency ratio is 0.33. In theory, the replacement rate should be 80 percent. But the real replacement rate is less than 50 percent<sup>4</sup>. All these indicate that the system parameter don't match with each other. The financial risks have been covered by the coverage expansion and large amount of fiscal subsidies. The problem of financial sustainability of urban basic old age insurance system is serious, which embodies in the following six aspects.

### **2.1 Low income ability of pension system**

As an insurance system, the urban basic old age insurance system inevitably involves the revenues and expenditures. Generally, the scale of pension expenditures and pension benefit are rigid. If the revenues can't cover the expenditures, it means that the income ability is poor. In

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<sup>2</sup> Ministry of Human Resources and Social Security, Human Resources and Social Security Development Statistical Bulletin, Website: <http://www.mohrss.gov.cn/>.

<sup>3</sup> Zheng Bingwen, China Pension Report. Beijing: Economy & Management Publishing House,2014.

<sup>4</sup> Calculate from the public data provided by the Ministry of Human Resources and Social Security.

China, the fund revenue consists of contribution incomes and investment return. Both of them are not good.

### 2.1.1 The negative incentive of pension system

The revenues of basic old age insurance system almost come from employer and employee’s contributions. The principle of “Pay more and gain more” has not been established in China’s urban basic old age insurance system, the contributions don’t link with benefits. The participants don’t know how much benefit they will receive when they retire. The employers, employees and the local governments are filled with moral hazard. They take all kinds of way to escape contributions into the system, causing a big gap between the real revenues and the expected. They are embodies in the following three aspects.

First, actual contribution rate is lower than the statutory contribution rate. Due to the mobility of workers, developed areas, such as Guangdong and Zhejiang, have accumulated a large amount of pension funds. They are favor of reducing contribution rate to attract foreign business and investments. Thus, it is difficult to enforce a flat rate throughout the country. For the sake of the local interests, the local governments in developed areas support the lower contribution rate to reduce the risk of fund devaluation.

Second, make the contribution base smaller than the real base. As we all know, the best way to reduce the burden of the enterprises and workers is to narrow the contribution base. The employers and the employees often conspired to narrow the contribution base. The social insurance agencies, tax authorities and local governments will not take any punitive measures. Now the wage base for contribution is only about 60 percent of real wages calculated from the contribution proportion of the national participants.

Third, social average wage of previous year is used to account contribution base. From the year 1995 to 2014, the social average wages of urban workers in China is higher than 12 percent. Using the last year’s social average wages will immediately reduce revenues. Overall, there are many problems in collecting revenues, which become the great threats of old age insurance system.

### 2.2 The absence of automatic balance mechanism to resist aging population

China is experiencing the aging population. The one-child policy will reverse the dependency ratio in the near future. The aging in the year 2021 of China is lower than any one of G8 country. However, in 2049, it will higher than most of developed countries, such as US, UK, France and so on.

**Table 1 Comparing the aging degree between China and most developed countries (population aged 60 years old and above)**

Year	China	US	UK	France	Germany	Italy	Canada	Spain
2010	12.3	18.4	22.6	23.0	26.0	26.5	19.9	22.3
2021	17.4	22.4	24.5	26.3	30.2	29.2	25.0	25.1
2049	33.9	26.6	29.6	30.5	37.5	38.4	31.0	38.3

Source: [http://esa.un.org/unpd/wpp/unpp/panel\\_population.htm](http://esa.un.org/unpd/wpp/unpp/panel_population.htm).



As the financing and benefit calculation methods are very different between social pooling and individual accounts in China, it needs to establish different balance mechanism to resist aging population.

### **2.2.1 The absence of automatic adjustment mechanism in the social pooling system**

The financing of social pooling is pay-as-you-go, which involves three important parameters: contribution rate, replacement rate and the retirement age. All these factors have not adjusted dynamically with the dependency ratio, which pose potential threats to financial sustainability. In addition, China has not established annual actuarial report system up to now, which don't help to short-term and long-term prediction of financial status. Now there are only three actuarial people in the Ministry of Human Resources and Social Security (MoHRSS). The pension reform and society propaganda in the future are lack of data support.

### **2.2.2 The pension divisor in the individual account system has not adjusted dynamically with the increasing life expectancy**

According to international experiences, countries which adopt the fully funded system will update their pension divisor with the increasing life expectancy to improve the financial sustainability. But in China, the pension divisors of individual account never change. The average life expectancy in China has changed significantly in the past ten years. The unchanged pension divisors will become the major financial risk.

## **2.3 The sustainability of social pooling is increasingly highlighted**

The total contribution rate of urban basic old age insurance system is 28 percent. The contribution rate of social pooling is 20 percent, which is the main part of the system. As the fund management level is hard to improve, which is still in the city and county level over the two past decades. It will do damage to pension system.

### **2.3.1 Low pooling level requires large amount of financial subsidies**

There is a large amount of fund balance in the developed areas due to the inflows of floating population, while the revenues in less developed areas don't cover the fund expenditures. Because the fund can't be used nationally, the less developed areas can only rely on the financial transfer to pay the pension benefits every year. The financial subsidies to social pooling system gradually expanded from 2.4 billion Yuan (accounting for 0.02% of GDP) in 1998 to 471.6 billion Yuan (accounting for 0.7% of GDP) in 2015<sup>5</sup>. However, more and more fund balances in developed areas are deposited in the bank, which is in the risk of depreciation. In the nationwide, large amount of fund balance indirectly comes from financial subsidies and they are deposited into the state-owned banks at the expense of low interest rates. If the system structure does not change, more financial subsidies are needed.

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<sup>5</sup> Subsidies Date comes from Human Resources and Social Security Development Bulletin; GDP Data comes from National Economic and Social Development Bulletin.

### 2.3.2 Low pooling level can't help to set up investment system

Because of the low pooling level, the pension fund investment system has not been established in China. The rate of return which the fund deposited in the bank is lower than 2 percent<sup>6</sup>. From 1993 to 2012, the average annual compound growth rate of CPI is as high as 4.8 percent<sup>7</sup>, and it is as high as 3.28 percent from 2003 to 2012. If it is measured by the rate of return of National Council for Social Security Fund in China, the loss is higher than 550 billion Yuan<sup>8</sup>. It is important that the rate of return is too low, which leads to the poor system credibility and reduces the enthusiasms of the workers.

### 2.4 The birth defects of individual account

Since the establishment of individual account, the design of the system has some defects, which lead to the result that the system can't live without government financial transfer. This is why the financial subsidies increase year by year.

#### 2.4.1 The individual account cannot live without government transfer

The individual account system operates openly. The fund gap can be paid out by the social pooling system. If the social pooling has fund gap, then it can be paid out by the fiscal subsidies. Therefore, the individual account is paid indirectly from the government. Actually, it is provided in the Social Insurance Law that if the participants die earlier, the fund assets in the individual account can be inherited. And if they live longer than the average life expectancy, they can receive the pension benefits to death. This provision violates the law of great numbers. It means that the greater scale of individual account, the greater scale of empty account, which is far from the principle of actuarial neutral. In order to implement the principle of "pay more and then gain more", it is urgent to amend the Social Insurance Law.

#### 2.4.2 It is difficult to fully fund individual account

China has been trying to fund the individual account fully since 2001. However, for various reasons, the governments and enterprises are not active to fully fund the individual account. The scale of empty account has expanded year by year. It has reached 3.09 trillion Yuan at the end of 2013 and the real account assets are 415.4 billion Yuan. The goal of partially funded system has not attained until now.

**Table 2 Change of assets in individual account from 2006 to 2014**

Year	Accounting Balance		Real Account Assets		Empty Account Assets		Pension Fund Balance	
	billion	%	billion	%	billion	%	billion	%
2006	999.4		—	—	—		548.9	

<sup>6</sup> Wang Yaping, "the accumulated funds of social insurance are 2.5 trillion Yuan and the rate of return is less than 2%", China Securities Journal, Nov 2008, A01-A02.

<sup>7</sup> Chinese Statistic Yearbook 2013.

<sup>8</sup> Zheng Bingwen, Research Report on Fund Investment Management Reform of China's basic Old Age Insurance, China Labour & Social Security Publishing House, Nov 2014.

2007	1174.3	17.5	78.6		1095.7	—	739.1	34.7
2008	1383.7	17.8	110.0	39.9	1273.7	16.0	993.1	34.4
2009	1655.7	19.7	156.9	42.6	1498.8	17.7	1252.6	26.1
2010	1959.6	18.4	203.9	30.0	1755.7	17.1	1536.5	22.6
2011	2485.9	26.9	270.3	32.6	2215.6	26.2	1949.7	26.9
2012	2954.3	18.8	349.9	29.4	2604.4	17.5	2394.1	22.8
2013	3510.9	18.8	415.4	18.7	3095.5	18.9	2826.0	18.1
2014	4097.4	16.7	500.1	20.4	3597.3	16.2	3180.0	12.5

Source: Zheng Bingwen, China Pension Report. Beijing: Economy & Management Publishing House.

## **2.5 Disorder Management System affects financial capacity**

The disorder management system in China has great influence on the financial capacity. The management loopholes make the pension system unable to maximize the revenues.

### **2.5.1 The coexist of double collection system leads to insufficient income**

In 1999, Interim Regulation on the Collection and Payment of Social Insurance Premiums provided that the contributions can be collected by the tax authorities or by the social insurance agency organizations. At present, both of them account for 50 percent. Besides, in the contribution process, some tax authorities collect contributions towards using the minimum threshold to reduce the mission in the next year.

### **2.5.2 Social insurance agency organizations are administrated by the local administrators, which reduce the efficiency of the system**

The overall pooling level has not improved since 1991; it is still in the county level, which makes the local interests more crystallized. Besides, Social insurance agency organizations are administrated by the local administrators. The personnel and administrative budget are administrated by the local authorities, which make it difficult to improve the pooling level.

## **2.6 workers put excessive reliance on the basic old age insurance governed by the government**

At present, urban basic pension system responsible by the government is the main income source of the retirees. The income from the market share is too low. That is, the revenues and expenditures of the first pillar's pension as a share of GDP increases year by year. The development of the second and third pillars is relatively lagged behind. The development of multi-level old age insurance system is imbalance. Although the amount of fiscal transfer increases year by year, China has not established a unified social pension system.

## **3. Prediction and Evaluation to urban basic Old Age Insurance System Operation**

This chapter we will make some assumptions based on the future population development

and the economic growth, and then predict the fiscal sustainability of enterprise employee s' basic pension system and GOPI pension system.

### **3.1 Prediction and Evaluation to urban Enterprise Employees' Old Age Insurance System**

#### **3.1.1 Hypothesis**

Before predicting the financial status of urban basic pension system, the article needs to make some hypothesis according to the population and economic conditions.

The average remaining life expectancy of the population aged 60 will gradually increase from 20.65 years projected by the sixth census in 2010 to 25.13 years in 2090.

The total fertility rate will gradually increase from 1.44 in rural areas and 0.98 in urban areas according to the sixth census in 2010, and will remain unchanged when it reaches the generation replacement standard of 2.1 for rural areas and 1.6 for urban areas in 2050.

Urbanization rate will gradually increase from the 53.7 percent to 75 percent in 2050 and it peaks at that point.

Assuming the actual GDP growth rate will drop from 7.5% in 2014 to 4.3% in 2050.

It is forecasted and assumed that the proportion of fiscal revenue accounting for GDP will gradually increase from 22.7% in 2013 to 25% in 2030, and then will remain stable afterwards, from which, it can be calculated that the fiscal revenue growth rate will drop from 10.15% in 2014 to 6.28% in 2050.

It is calculated and assumed that the growth rate of average salary of staff in post will drop from 9.36% in 2014 to 6.71% in 2050.

It is assumed that accounting interest rate of Individual Pension Account equals the growth rate of average salary of staff in post in the previous year, which will decrease from 10.01% in 2015 to 6.71% in 2050.

Increasing the retirement age from 2018, to delay the retirement age for female and male at the same time, increase the retirement age of female workers by 12 months every 2 years, and increase the retirement age of female cadres and all male workers by 12 month every 4 years; by 2037, the retirement age for female will reach 60 years old, and the retirement age for male will be 65 years old.

Assuming rate of return of accumulated balance of Urban Basic Pension system is 7%.

The contribution index (The ratio of contribution wages divided by average salary of staff) will increase from 74% in 2015 to 78.28% in 2050.

#### **3. 1.2 Demographics of enterprise employee s' basic pension system**

The calculation result shows that the total population in 2015, 2030 and 2050 is 1.37 billion, 1.41 billion and 1.35 billion respectively. Among them, the population aged 60 and above respectively accounts for 15.80%, 25.12% and 34.87%. The population aged 65 and above accounts for 10.15%, 17.10% and 26.25%. The town population in 2015, 2030 and 2050 is 770 million, 991 million and 1.02 billion respectively.

Under the scheme of delay retirement age, the participants covered by the enterprise employees' basic pension system in 2015, 2030 and 2050 are 330 million, 496 million and 550 million. The peak is 550 million in 2050. Among them, the contributors are 250 million, 385

million and 359 million respectively. The retirees are 80 million, 111 million and 191 million. Accordingly, the system dependency ratio is 0.324, 0.29 and 0.534.

The development trend of contributors is similar to the urban population, which increases firstly and then decreases during the prediction period. In the first 20 years, the total contributors grow rapidly due to the coverage expansion and delaying retirement age. In 2037, the number of contributors will peak at 392 million and then decrease gradually. The reasons are as follows: firstly, the population structure is aging; secondly, the urban employment population begins to decrease from the year 2030. However, the dependency ratio will gradually increase in the prediction period. Before the year 2024, the dependency ratio will decrease slightly due to the impacts of coverage expansion and delaying retirement age, and then it will rise rapidly from 0.27 in 2024 to 0.56 in 2050.

**Table 3 Dependency Ratio of enterprise employees' Pension system (prediction value, 2015 to 2050, %)**

Year	2015	2018	2020	2024	2030	2037	2040	2045	2050
Dependency Ratio	1:3.1	1:3.4	1:3.6	1:3.7	1:3.4	1:2.9	1:2.6	1:2.4	1:1.8

Note: National population dependency ratio equals to the amount of population aged 65 and over divided by the amount of population aged 15 to 64. The prediction value is based on medium rate of fertility.

Source: Zheng BingWen (ed.), *China Pension Development Report 2014*, Economic Management Publishing House, December 2014:p.139..

### 3.1.3 Financial Sustainability Prediction of Enterprise Employee s' Basic Pension System

#### (1)The sources of Enterprise Employee's Basic Pension System Revenue

The revenue of Enterprise Employee s' Basic Pension System comes from the following four parts:

Firstly, employers' contribution which is at the ratio of 20 percent bases on total payroll and is used to pay the benefit of current retirees.

Secondly, employees' contribution which is at the ratio of 8 percent bases on their wages. Employees' contribution is credited to their own Individual Pension Account which will be used to pay for Individual Account Pension in the future.

The third is investment return of accumulated funds.

The forth is fiscal subsidy in the case of deficit.

#### (2)The prediction of pension fund revenues and expenditures

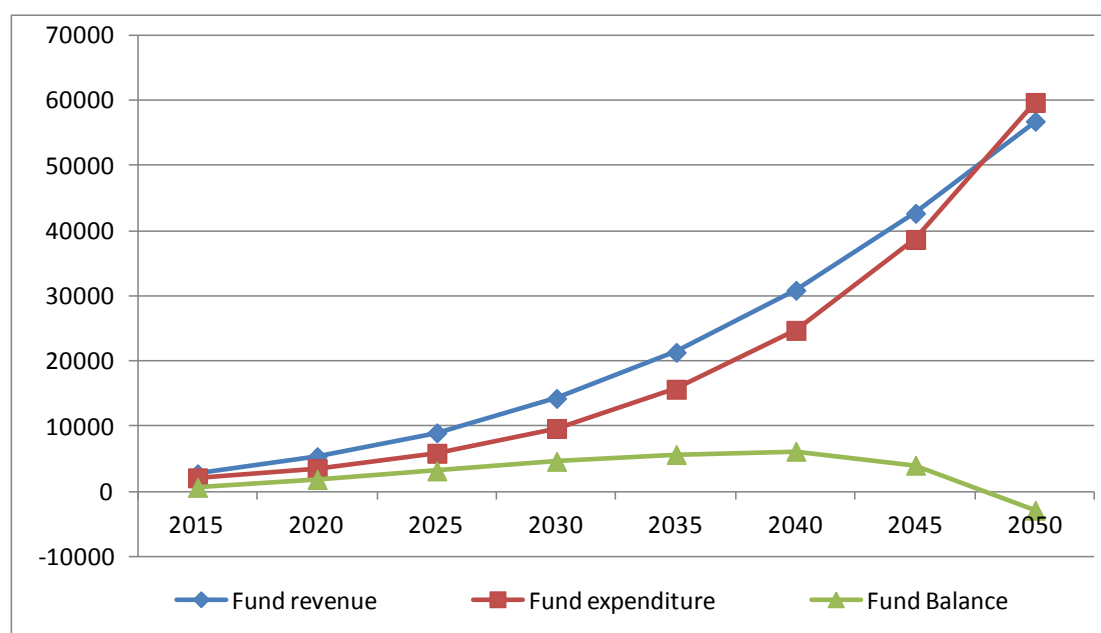
The calculation results are as follows:

**Revenue.** In the calculation period, the fund revenue will keep increasing. Before 2020, the growth rate of fund revenue will keep at 14% and then the growth is slow down. Fund revenue will account for 17% to 24% of homochronous fiscal revenue. The ratio will increase from 21.02% in 2020 to 23.87% in 2035, and then gradually decrease to 22.97% in 2050.

**Expenditure.** Fund expenditures will account for 13%~24% of homochronous fiscal revenue. Before 2030, the ratio increase gradually. And then the dependency ratio is at the high level, the fund expenditures begin to expand and the ration will increase to 24.13% in 2050.

**Current Fund Balance.** The ratio of current fund balance accounting for homochronous fiscal revenue will increase and then decrease. The ratio will increase from 4% in 2015 to 7.8% in 2025. As the dependency ratio continues to rise, the ratio will continues to decrease to 2.22% in 2045. Current gap between fund revenue and expenditure will appear in 2049. The ratio of gap

accounting for the fiscal revenue will reach 1.17% in 2050.



**Figure 1 Fund Revenue and expenditure of Enterprise Employee's Basic Pension System**  
(prediction value, 2015 to 2050, Billion Yuan)

Source: Data is provided by the Actuarial team.

### 3.1.4 Evaluation to Enterprise Employee s' Basic Pension System Operation

Before 2020, the dependency ratio will be diluted by the coverage expansion and delaying retirement age policy. The fund expenditures can be covered by fund revenues at present. However, after 2035, the fund expenditures will increase because of higher dependency ratio. The fund balance will shrink and then the problem of financial sustainability highlight.

## 3.2 Prediction and Evaluation to GOPI Pension System Operation

### 3.2.1 Demographics of GOPI

China's public sector has 37.91 million in-staff employees and 16.28 million retirees<sup>9</sup>. Assuming the staff amount of GOPI will not increase and be stable at 37.91 million in 2015-2024 and change in accordance with the overall demographic after 2025. It can be predicted that in-staff employees will reach 42.21 million and retirees will reach 25.51 million by 2050.

**Table 4 Demographic Prediction of GOPI (2015 to 2090, 10 thousand)**

	2015	2020	2025	2030	2035	2040	2045	2050	2060	2070	2080	2090
<b>Staff in post</b>	3791.0	3791.0	3848.3	4121.4	4173.6	4210.6	4228.8	4220.7	4011.2	3798.0	3606.0	3452.3
<b>retirees</b>	1628.3	1729.1	1799.7	1898.5	1971.1	2107.6	2308.0	2550.7	2572.4	2684.8	2872.5	2993.9

Source: Zhang, Yinghua, "Notional Defined Contribution Pension System of GOPI and Analysis on Its Long-term Fiscal Sustainability", *Research on Development*, No.3, 2015, p.8.

The average age of GOPI staff is higher than that of enterprise employees because GOPI

<sup>9</sup> Data is provided by the Ministry of Human Resources and Social Security.

staff has experienced longer period education in general, which results in higher dependency ratio in GOPI. Assuming retirement age is deferred gradually from 2015 to 2035 and reaches 65 years old for male staff and 60 years old for female staff by 2035. The dependency ratio in GOPI is 43% in 2015, reaching 50% in 2040, and in the whole prediction period 10 to 15 percentage points higher than dependency ratio of Urban Enterprise Pension system as well as 15 to 30 percentage points higher than dependency ratio nationwide (see Table 5).

**Table 5 Dependency Ratio of GOPI or Urban Enterprise Pension system (prediction value, 2015 to 2090, %)**

Year	2015	2020	2025	2030	2035	2040	2045	2050
<b>GOPI pension system</b>	43.0	45.6	46.8	46.1	47.2	50.1	54.6	60.4
<b>Urban Enterprise pension system</b>	32.2	27.5	27.0	29.1	32.9	38.3	44.6	53.4
<b>National Population</b>	13.7 <sup>10</sup>	18.0	-	25.6	-	38.1	-	44.0

Note: National population dependency ratio equals to the amount of population aged 65 and over divided by the amount of population aged 15 to 64. The prediction value is based on medium rate of fertility.

Source: Zhang, Yinghua, "Notional Defined Contribution Pension System of GOPI and Analysis on Its Long-term Fiscal Sustainability", *Research on Development*, No.3, 2015, p.7; Zheng Wei, "Characteristics of China's Aging Trends and the Potential Impact on Economic Growth", *Quantitative and Technical Economics Research*, No.8, 2014, p. 14.

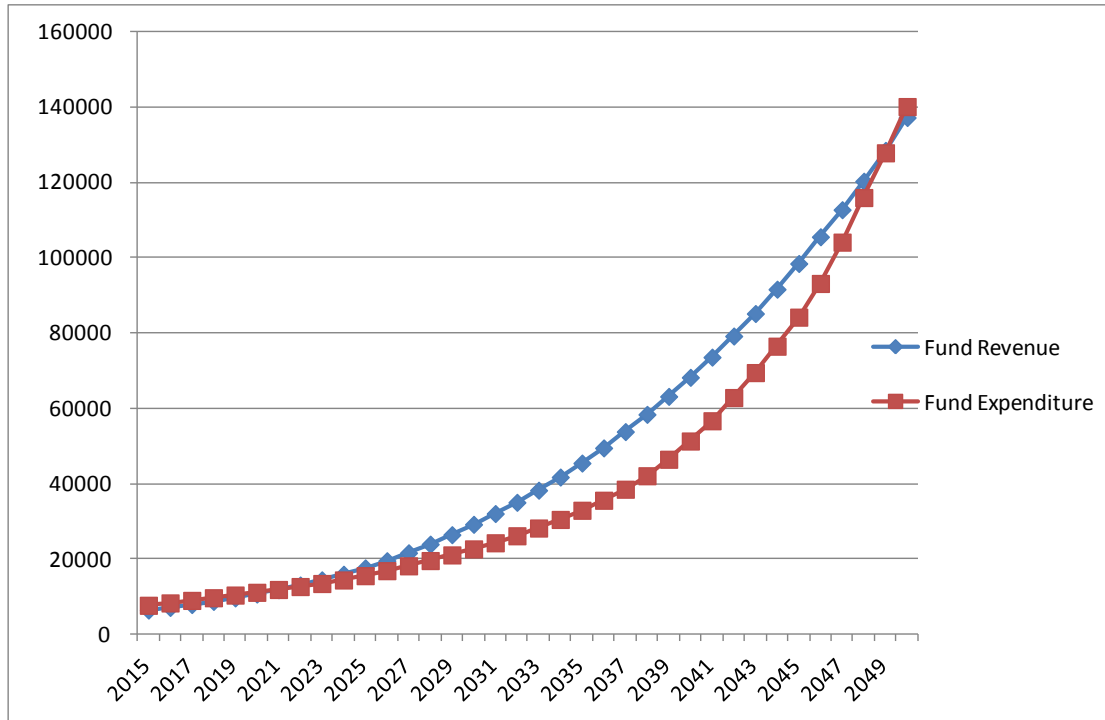
### 3.2.2 Financial Sustainability Prediction of GOPI Basic Pension System

The calculation results are as follows.

**Revenue.** In the calculation period, the fund revenue will keep increasing, but the growth rate will increase first and then decrease. The growth rate of fund revenue will be constant at 7% between 2040 and 2046, and it will decrease to 6.8% in 2050(see Figure 2). Besides, fund revenue will account for 4%~6% of homochronous fiscal revenue. Before 2050, the ratio will rise from 4% to 5.5%, after 2050, it will rise slightly from 5.5% to 6%, primarily as a result of expectation that the permanent staff of GOPI will increase first and decrease.

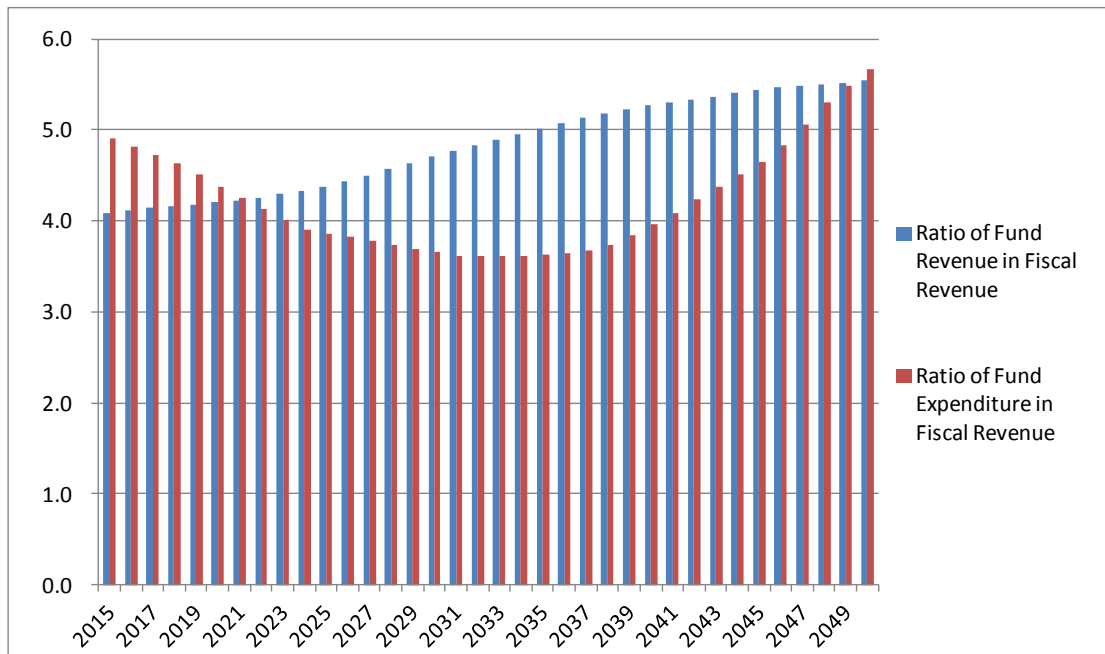
**Expenditure.** In the calculation period, fund expenditure will decrease first and then increase, which will account for 4%~9% of the homochronous fiscal revenue. The growth rate of fund expenditure will be about 7%, and after 2034, the rate will increase from 8.1% in 2034 to 11.4% in 2041. Before 2035, the delay retirement policy restrains the growth in the number of beneficiaries, and the ratio of fund expenditure to homochronous fiscal revenue drops; after 2035, the transition period of delay retirement will be over, and the dependency ratio will rise and remain high, the scale of the fund expenditure will begin to expand (see Figure3).

<sup>10</sup> Data comes from: National Bureau of Statistics, *National Economic and Social Development Statistics Bulletin2014*, February 2015.



**Figure 2 The fund revenue and fund expenditure of GOPI (%)**

Source: The data is provided by the actuarial team.

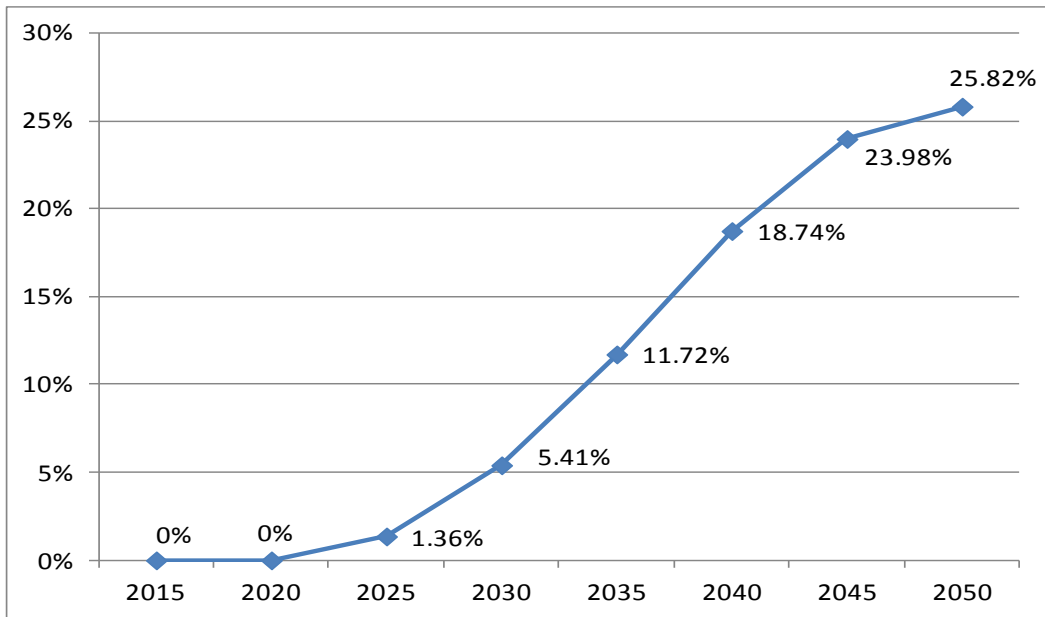


**Figure 3 The ratio of fund revenue and fund expenditure to homochronous fiscal revenue respectively (%)**

Source: Zheng Bingwen, China Pension Report 2014. Beijing: Economy & Management Publishing House.2014.

**Accumulated fund balance.** In 2015-2021, due to unbalanced contribution revenue and pension expenditure, there is no accumulated fund balance in the Basic Pension. After 2021, the accumulated balance will begin to increase, the ratio of which to homochronous fiscal revenue will increase from 0.1% to 26% in 2050.

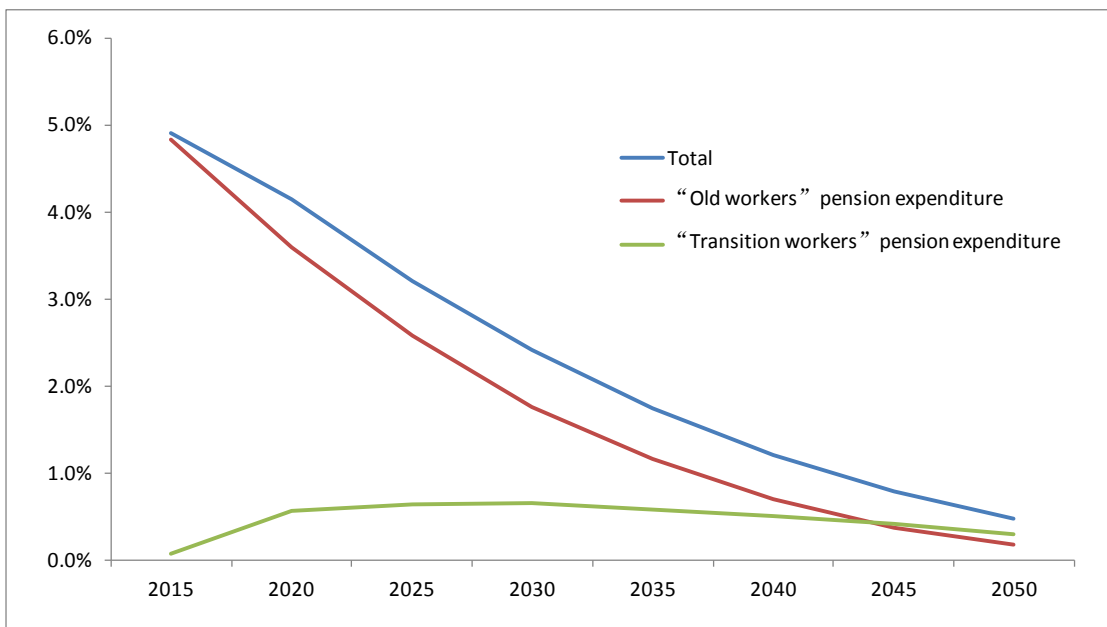




**Figure4 The ratio of accumulated fund balance to homochronous fiscal revenue**

Source: Zheng Bingwen, China Pension Report. Beijing: Economy & Management Publishing House.2014.

**History Debts of the system.** That is Transition Cost of pension system which equals to the current value of the pension rights and interests accumulated under the old system, including two parts of the “old workers” pension expenditure and “transition workers” pension expenditure which is corresponding to deemed contribution. The overall historic debts are expected to 60.6 trillion Yuan which accounts for 430% of fiscal revenue in 2014. The history debts will be shared year by year, which declines by one percentage point approximately every 10 year (see Figure 4).



**Figure5 The proportion of history debts in homochronous fiscal revenue (in 2015 to 2050, %)**

Source: Zheng Bingwen, China Pension Report 2014. Beijing: Economy & Management Publishing House.2014.

### **3.2.3 Evaluation to GOPI Pension System Operation**

Firstly, in the beginning period of GOPI pension system, the scale of accumulated OP fund is too small to raise the whole pension level. The staff of GOPI is aging, and the dependency rate has reached 40.7% in 2013. According to principle of PAYG system, the replacement rate must be 49.1% in the existing employers' contribution rate 20% to social pooling. This replacement rate 49.1% is much lower than before reform. For ensuring adequate pension of those "transition workers", fiscal subsidy is necessary.

Secondly, financial risk is amplified just because the existing Pension Divisor is too low. The dynamic divisors in prediction above are higher than those of existing system. The sixth census shows that the Chinese population life expectancy was 74.8 years in 2010 compared with 71.4 years in 2000. The dynamic divisor is 161 when retiring at 60 years old, which is much higher compared with 139 in existing system. Pension divisor must be adjusted periodically according to demographic change and economic growth. Explicitly, the existing divisor does not take the change of life expectancy into account, which means the Individual Pension Account fund will run out long before participants' death quite possibly. So, if the Pension Divisor is static, the pension system will suffer to longevity risk.

## **4. EU public pension system reform and its experiences**

In recent years, the costs of pension system continue to rise for the reason of the aging population and negative incentive. EU countries have reformed their public pension system<sup>11</sup>. The measures that they adopt include as follows<sup>12</sup>.

First, reduce the pension benefit of public pension system, including Finland, French, Germany, Italy, Portugal and Sweden.

Second, pension benefits are adjusted with dependency ratio of pension system, including Sweden, Germany and Spain;

Third, require strict conditions of early retirement. The legal retirement age should be adjusted with the extending life expectancy.

Fourth, introduce defined contribution into pension system. The role of private pension system is increasingly important, such as the pension reform of Germany.

### **4.1 EU public pension system reform**

#### **4.1.1 Germany**

Germany is the birthplace of modern social insurance system. Since Germany established old age and the disable insurance law in 1989, it has been more than 120 years. Germany has reformed its pension reform for many times, but German public pension system adheres to the principles of autonomy, risk-sharing and intergenerational equity. Since Germany has adopted a pay-as-you-go pension system, it has provided generous and stable benefits for the retirees.

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<sup>11</sup> Kings J., E. Turkisch and N. Manning, "Public Sector Pensions and the Challenge of an Ageing Public Service, OECD Working Papers on Public Governance, No. 2, OECD Publishing, 2007.

<sup>12</sup> Eduard Ponds, Clara Severinson and Juan Yermo, The International Comparison of Public Sector Implicit Pension Debt, Social Security Studies No.4, 2012:p.10.

German basic pension system is a point system. The benefits are not only related to the contributions, but they are adjusted with the retirement age. Retirees who have contributed 35 years can receive pension benefits from 63 years old to 65 years old.

With the aging and the change of labor market, German pension system is facing huge financial pressure. Since 1992, German pension system has experienced several reforms. The main reform measures include: one is to delay the legal retirement age. Germany has passed delay retirement age policy. It regulates that the retirement age will increase from 65 year old to 67 years old from 2012 to 2029. It extends one month every year from the year 2012 to 2023, and then extends two months every year from 2024 to 2029; Second, pension benefit calculation adheres to the principle of actuarial fairness. Workers who receive their benefits ahead of the legal retirement age, their benefit will decrease 3.6%, while workers who delay their retirement age will increase 6% every year<sup>13</sup>; Third, adjust the method of pension benefit calculation. Germany has reformed its pension benefit indexation for many times since 1992, which reduce its benefit indirectly. It introduced the net wage growth into benefit indexation to replace gross wage growth. In 2003, Rerup introduced “sustainable factor”, which links the pension benefit with dependency ratio. Thus, the replacement rate of basic pension system will decrease from 70% to 68% or so<sup>14</sup>. Fourth, realize the single mode to the multiple-level pension system. In 2001, Germany has made innovative reforms to the system. Government encourages the old to save for retirement by financial subsidies. Fifth, given the slide of replacement rate, Germany decided to introduce the minimum pension system based on means test. The fund of minimum pension comes from general revenue. When pension benefit is lower than the poverty line, individuals can apply for it, which provide a safe net for the poor. The minimum pension is regressive.

#### 4.1.2 Sweden

Sweden is the window of western welfare state. Sweden has provided national safety net to citizens from the cradle to grave. After pension reform in 1998, Sweden has established the three-level public pension system<sup>15</sup>: the first level is guaranteed pension system based on means test, which provides minimum pension for low income workers. It is funded by the government revenues. The second level is notional defined contribution system. The third level is fully funded system. The double account pension system in Sweden provides a new paradigm for the world.

Non-financial Defined Contribution and the fully funded pension system are the main part of the public pension system. The feature of the new system is to combine defined contribution with defined benefit by a clever form. In the process of contributions, Income-related pension system is financed from the payroll tax, shared by the employers and employees equally. Now the total contribution rate is 18.5%, of which 16% goes into the NDC pension system and the remaining 2.5% into the fully funded pension system. In the NDC pension system, the accumulated pension funds are used to pay pension benefit for the current retirees. When participants who are unemployed, raising children, disabled, sick or on active service, the government will make contributions for them and the fund will enter into nominal individual

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<sup>13</sup> Axel Börsch-Supan and Christina B. Wilke, “The German public pension system: how it was, how it will be” [J], *National Bureau of Economic Research Working Paper 10525*, May 2004:p.17.

<sup>14</sup> Axel Börsch-Supan and Christina B. Wilke, “Shifting Perspectives: German Pension Reform”[J], *Intereconomics* ISSN 0020-5346, 2005: p.249. This Version is available at: <http://hdl.handle.net/10419/41881>.

<sup>15</sup> Website: <http://www.government.se/sb/d/15473/a/183496>.

account.

Initial pension benefit of the NDC pension system is calculated by the formula that the accumulated pension funds are divided by the pension divisor. Pension benefit will be adjusted annually according to the specific rule. Pension divisor is the function of the average life expectancy of retirees aged 65 years old, the retirement age and the real rate of return (1.6%). If the legal retirement age is unchanged, pension benefit will reduce gradually when the life expectancy increases. Pension divisor uses unsex life expectancy, contributing to the redistribution between the male and female. The contributions of NDC pension system in Sweden are closely linked with pension benefits. If workers born in 1990 want to get the same benefit as those born in 1930, then they are required to delay one year and eight months. The design of Sweden NDC pension system makes individuals deciding on when to retire. Now the retirees can receive full pension at 65 years old. If workers chose to retiree at 61 years old, their pension benefit is only 72% of the standard retiree. Accordingly, if workers retire at 70 year old, their pension benefit will be 157% of the standard retiree<sup>16</sup>. Besides, Sweden public pension system has introduced the automatic balance mechanism, which link the pension benefit with the long term solvency. If the costs increase due to the aging population in the future, then it requires reducing the pension benefit gradually.

#### **4.1.3 France**

According to different employment groups, French pension system can be categorized into four types: general system, special system, independent workers system and agricultural worker's system. French government increases the universality of old age Insurance system by repairing the blank. Due to the effects of declining economy, low birth rate and increasing dependency ratio, France is forced to reform its public pension reform. The measures taken by pension reform are as follows: first, French government created pension reserve funds in 2001 to make up for the deficits. From 1999 to 2011, the accumulated pension funds reached 35.1 billion Euros<sup>17</sup>. Second, France has provided the minimum pension system, financing from the tax revenue. Third, Nicolas Sarkozy government reformed the special system, and he put forwards to extend contributions periods and to abolish early retirement in 2007. Forth, in 2010, France government increase the age of receive full basic pension from 65 to 67, and the legal retirement age will be delayed from 60 to 62. Fifth, France has announced to retirement reform act in 2013, which provides that increase the contribution rate of employers and employees gradually before 2020 and extend contribution periods afterwards without changing the minimum retirement age (62 years old). Early in 2003, France advocated that the participants can receive their full pension after contributing for 160 quarters, and it will be extended to 42 years old in 2020<sup>18</sup>.

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<sup>16</sup> Goran Normann and Daniel J. Mitchell, Pension Reform in Sweden: Lessons for American Political makers, The Heritage Foundation Background Executive Summary, June 2000:p.4.

<sup>17</sup> Chen Tianhao, The enlightenment of France Pension Reform on China, Administration Reform, April 2013: p.52.

<sup>18</sup> Bernhard Ebbinghaus, Promoting Funded Pensions in Bismarckian Corporatism? In book: The Varieties of Pension Governance: Pension Privatization in European, Oxford: Oxford University Press, March 2011:pp.10-37.

#### 4.1.4 Spain

The Spanish parliament has passed old age insurance law in 1990, which stipulated that workers who aged 65 years old or the disable can receive pension benefit. The basic pension is calculated by the contribution periods. Workers who contribute 15 years can receive 50% of basic pension. If workers contribute 16 years to 25 years, pension benefit will increase 3% with every extra contribution for one year. If they contribute more than 26 years, pension benefit will rise 2%. If they contribute for 35 years, they can receive full pension. If pension benefit cannot meet the minimum pension, the gap will be made up by the government<sup>19</sup>.

Spanish pension system has confronted long-term financial solvency pressure because of the aging population since the 21st century. Spanish government has reformed its pension system in 2011 and 2013. The reform measures in 2011 include: first, raise the retirement age gradually from 65 years at present to 67 years; second, increase contribution periods to calculate pension benefit; third, introduce the automatic balance mechanism (ABMS) in 2027. In 2013, Spain has put forward the concrete design of ABMS, which required that pension benefits are not linked with inflation. Pension benefits will be adjusted according to the life expectancy and solvency ability of the system. In 2013, the law of Spain pension system requires to set the upper and lower limits of the adjustment indexation<sup>20</sup>.

#### 4.2 The Experiences of EU public pension system reform

EU public pension system reform indicates that no single measure can make public pension system sustainable and stable. Reforming public pension system needs combined measures. It requires to adjust DB pension and to introduce DC pension, which help to realize the financial sustainability. Under the aging pressure, pay-as-you-go pension system needs to increase the contribution rate to keep the current pension benefits, which will influence the economic growth and enterprise competitiveness. Therefore, the experiences of EU public pension system show that the measures to financial balance include two aspects as follows: one is that pay-as-you-go pension system needs to adapt to the change of economy and the population structure under the constraints of contribution rate; the other is to introduce defined contribution pension system.

##### 4.2.1 Benefits of DB plan will reduce gradually

According to the report released by EU policy committee, it states that the amount of benefit reduction accounted for -2.7% of GDP in 2012, which was -2.9% in 2009<sup>21</sup>. DB pension benefit are reduced by three methods: first, cut the pension benefit directly; second, strengthen the link between contributions and benefits, for example, France requires to increase the contribution periods of receiving the full pension from the 160 quarters at present to 42 years in 2020. Portugal has required its contribution periods to extend to 40 years starting from 2005.

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<sup>19</sup> Alfonso R. Sánchez Martín, Endogenous Retirement and Public Pension System Reform in Spain, *Economic Modelling* 27, 2010: p.338.

<sup>20</sup> Alfonso R. Sanchez, The Automatic Adjustment of Pension Expenditures in Spain: An Evaluation of the 2013 Pension Reform, 2014:p.7.

<sup>21</sup> Natali David, Pension Reform in Europe: What has happened in the Wake of the Crisis? DICE Report, Summer 2015: pp.31-35.

Luxemburg and Finland have extended from 30 years to 40 years. Third, introduce the automatic balance mechanism to control fund expenditures in the future, which will reduce the pension benefit indirectly, for instance, Denmark, Ireland, Italy and Finland has linked their pension benefit to life expectancy.

#### **4.2.2 Raise retirement age, gradually realizing the equal retirement age of male and female**

Denmark, Finland, Greece and Holland have made the early retirement conditions strict. In the past ten years, rising the retirement age has become the common pension reform method. Spain will delay its legal retirement age from 65 to 67, and UK will increase it from 65 to 66. Romania has delayed its retirement age to 65 for male and 60 for female. Male who contribute for 35 years and female who contribute for 30 years will get full pension. Now the retirement age of developed countries in Europe is almost 61 years old. Besides, it is common that female's legal retirement age will be close to the male. At present, the retirement age of male and female is equal in most developed countries. The legal retirement age in Iceland and Norway is 67 years old, while legal retirement age in Sweden, Denmark, Finland, Ireland, German, Netherlands, Spain and Portugal is 65 years old<sup>22</sup>.

#### **4.2.3 Establish the Rewards and Punishments Mechanism linked with Retirement Age**

If linking the benefits with contributions can encourage workers to delay retirement indirectly, the Rewards and Punishments Mechanism will play the direct role. Many countries, such as France, German, Italy, Netherlands, Finland, Portugal, Greece, Luxembourg and Hungary, have provided that early retirement will reduce some percent of pension benefit. France has provided that workers retire every one year in advance, the pension will reduce 5% annually, and using the date of birth replaces the time they participating in the work. Luxembourg stipulated that retiring late for every one year; the pension benefit will increase 2.3% of the final salary till the replacement rate reaching 110%. In Hungary, if workers retire late for every one year, their pension benefit will increase 0.5% of final salary. If workers retire after 55 years old in Finland, pension benefit will increase 2.5% every one year. After 2005, workers who retired between 53 years old and 62 years old, pension benefit will increase 1.9%. workers who retired between 63 years old and 68 years old, it will increase 4.5%<sup>23</sup>. The design of rewards and punishments mechanism can effectively raise the real retirement age and then improves the dependency ratio. The rewards and punishments mechanism ensures the relative fairness of benefits. As we all know, raising retirement age is facing great political resistance in some voting countries. Linking the benefits with retirement age is an important option to reform public pension system.

#### **4.2.4 Establish Financial Balance Mechanism via introducing the aging population factor**

Since the 21st century, due to the economy recession and population aging, parts of

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<sup>22</sup> Zheng Bingwen, The Pension Reform under the Debt Crisis: lessons from the Welfare State to Debt Countries. Chinese Journal of Population Science, 2011:p.7.

<sup>23</sup> Monika Queisser and Edward Whitehouse, "Neutral or Fair: Actuarial concepts and Pension-system Design", OECD Social, *Employment and Migration Working Paper No.40*, OECD Publishing, 2006:pp.29-33.

developed countries have reformed their public pension system by fixing the contribution rate, which is different from the traditional method by increasing contribution rate. Both of Germany and Sweden put more emphasis on the close link between contributions and benefits. The sustainability factor introduced by Germany and the automatic balance mechanism created in Sweden are under the context of increasing financial burden. The benefit adjustment has considered the factor of population aging and the change of macroeconomic, enhancing the independence of pension system. In addition, the practices from Poland and Spain state show that introducing population and economy factors into pension benefit calculation will automatically realize the long-term financial balance.

#### **4.2.5 Enhance the portability of basic old age insurance system**

EU Social Security Law provides that the common goal of solving the issue of international transfer is that the benefit of transnational flow population is not poor than persons who always live or work in one country. For example, Belgium implemented one reform in 2003, if the pensioners delegate to international organizations, the pension rights and interests can work with the mobilization and transfer. Firstly, pension rights and interests must be one-time settlement in the country, and then the funds can transferred to the new pension system in the workplace. The previous provision is subrogation mechanism without the transfer of one-time financial transfer. Enhancing the portability of basic old age insurance system will contribute to rational flow of labor resources.

#### **4.2.6 Make full use of market mechanism to push the pension system from a single mode to multiple-level pension system**

Most of EU countries will introduce the minimum pension, basic pension or DC plan to support pension reform. The design of multi-level pension system helps to reduce the reform resistance and risk diversification, and then to safeguard the retirees. Therefore, the establishment of multi-level pension system is a good way to build up a national basic living standard safety net.

### **5. Policy proposals on improving Urban Basic pension insurance system**

The overall goal of urban basic pension system in China is to pay more attention to the fairness and financial sustainability. The fairness is embodied in the horizontal and vertical aspects. Horizontal fairness means resolving the problem of privilege system between different groups and departments. The GOPI pension system should be reformed synchronously with the enterprise employees' pension system. The longitudinal fairness requires establishing a normal pension adjustment mechanism. Financial sustainability means that the fund revenue should be matched with fund expenditures. Fund expenditures put emphasis on the self-adjustment mechanism to realize the balance of fund revenue and expenditure. The income ability of the system is directly related to the system parameters. Therefore, the parameter adjustment is an effective way to solve the problem of financial sustainability.

### **5.1 Reduce the contribution rate of old age insurance and establish the reasonable contribution base**

At present, urban basic old age insurance system in China operates in low efficiency, which has fallen into the vicious circle. The higher the contribution rate, the lower the contribution base. Given that the nominal contribution rate is high, it will have great influences on the economic development and labor market. Reducing the contribution rate means that the normal contribution revenues will decrease, it may expand the income gap. Recently, Chinese government has proposed to reduce the contribution rate gradually, which may further reduce the fund revenue under the current pension structure, so the government should provide funds to make up for the temporary gap. Besides, use the actuarial technology to make the contribution base real, which requires the strict audition. At present, social insurance agencies in China have not set up a professional audit department. China should construct a stable and professional audit team equipped with professionals. In the same time, give full play to audit supervision, especially pay more attention to audit the large and advantage enterprises. Moreover, standardize enterprises' contribution behaviors to enhance the sense of contribution, which contributing to ensure the full collection of the contributions. Therefore, reducing the contribution rate and making the contribution rate real is helpful to avoid adverse selection.

### **5.2 Implement the national pooling as soon as possible to reduce financial risks and enhance the portability of the system**

It is provided that if the insured leaves the original work unit, and continues to insure in the new unit, the pension contribution periods can be accumulated; the transfer of pension relationship can be divided into two types: First, flows within the same areas, only transfer pension relationship, without transferring pension funds; second, the overall range of flow between different areas, both transfer pension relationship and fund, with all fund in personal accounts of the basic pension insurance and 12% of the social pooling fund according to actual wages for each year to transfer. According to the operation, local governments, especially those areas of fund deficits, are unwilling to transfer the funds due to the local protectionism and vested interests groups.

Improving the pooling level is still the different task. At present, the dependency ratio, contribution pressure and fund balance are divided in different areas. More than half of the fund surpluses are concentrated in the eastern provinces. Some Midwest provinces need fiscal subsidies from the central governments to ensure the pension payment. Improving the national pooling level helps to expand the regulating range and gradually changes the regional fund balance. The financial conditions and benefits are different all over the country, which restricts pension relationship transfer between provinces. Therefore, we should break the interest barrier to realize the national pooling of basic pension system. Unifying the policies of basic pension system in the national regions contributes to solve the problem of relationship transfer and rights protection issues. The key to implement national pooling is to divide the financing and payment responsibility between central and local governments. It should allocate the rights and obligations clearly. With the realization of national pooling, it is useful to make pension system adapting to the fairness and labor liquidity, promoting the sustainable development of pension



system.

### **5.3 Enhance the Financial Sustainability of Basic Pension System via Actuarial Balance**

Insisting on the principle of actuarial balance is not only an ideological problem, but also a realistic problem. It provides measurement tools to ensure the healthy development of pension system and to cross over the middle income trap. Meanwhile, it will provide a basic principle to evaluate the quality of pension system. Actuarial Balance is a useful tool to measure sustainability.

#### **5.3.1 Taking long-term actuarial technology and use reasonable system parameters**

Recently, with the economy entering into the new normal, the situation of fund revenues and expenditures are reserved. During the period of the 11th five-year plan, fund revenues growth rate were 20.9%, 24.5%, 23.4%, 18.9% and 16.5% respectively. The fund revenues growth rate is 25.6% in 2011, and then it decreased from 18% in 2012 to 13.2% in 2013. And it fell into the single digits for the first time in 2014. The growth rate of fund expenditure has decreased a little and the financial subsidies rose slightly from 16.3% in 2011 to 12.5% in 2014<sup>24</sup>. In the above, the financial sustainability of urban basic pension system is directly related to the system parameters. Similar to NDC pension system, the individual account is defined contribution. The pension divisor, accounting rate and the pension adjustment rate have significant impacts on financial sustainability.

Pension insurance actuarial is a relatively mature subject, which has been widely used by the governments. According to the foreign experiences, it should make full use of actuarial technology to determine the reasonable pension calculation formula. At present, the accounting rate is the one-year deposit interest rate, which is only higher than CPI. It will make the actual purchasing power declining. We can establish a guaranteed rate of return. When the market rate of return is lower than the guaranteed rate of return, we adopt the guaranteed rate of return. Moreover, under the current regime, the number of personal accounts of payment months of basic pension insurance is fixed, such as 60-years-old, the count number of months is 139. This means that for people retired at 60-years-old, the amount of personal savings accounts can only be distributed to 71.6 years, thereafter it will be a long-term risk system that individual account pension needs full financial subsidies. It is recommended to use dynamic counting of months, considering changes in demographic trends, the wage growth and changes in market interest rates in the payment number of months.

#### **5.3.2 Establish Normal Pension Adjustment Mechanism adapting to China's New Normal**

Enterprises employees' pension system in China has adjusted its pension benefit at the rate of 10% for eleven years since 2005, which put great pressure on the pension funds. For the social pooling and individual accounts pension system, using the unified pension adjustment rate makes the actuarial neutral factor of individual account vanished. The link between the contributions and benefits weakens, and the incentive degree has fallen into a minimum level.

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<sup>24</sup> Zheng Bingwen, Comprehensive thinking on deepening the old age insurance system, Human Resources Development, March 2016:p.24.

Many retirees are trying to retire earlier, which erode the fund revenues and expenditures. Besides, the unified benefit adjustment rate has widened the gap between the high income retirees and low income retired. The long-term external intervention adjustment method is a supplementary means, which helps to curb declining pension replacement rate. But it has damaged the credibility of the system and increased the financial pressure. Therefore, this article suggests that given the aging population and the economy entering into the new normal in China, it is urgent to establish automatic adjustment mechanism considering the CPI, wage growth rate, economic growth rate and dependency ratio. Linking the benefit with the change of economy and population structure helps to provide a stable and safe expectation for the public.

### **5.3.3 Delay Legal Retirement Age and Construct Rewards and Punishment Mechanism**

China has put forward delay legal retirement age policy in the Third Plenary Session of the 18th Central Committee. China should put the policy into practice as soon as possible, gradually adapting to the extension of education periods and life expectancy. The policy of delay retirement age and the abolishment of early retirement require a solid labor market, especially the elderly labor market. It is wise to make the flexible retirement age policy. Besides, the benefit should put more emphasis on the fairness and then set up rewards and punishments mechanism as a supplement. For example, the United States has not stipulated the legal retirement age. Workers can choose to retire from 62 years old to 70 years old. In order to encourage delay retirement, pension benefit will increase 0.25% working for extra one month after 65 years old. When workers choose to retire between 62 years old and 65 years old, pension benefit will reduce by 0.56% for early one month. The legal retirement age stipulated by Czech Republic is 63 years old. If workers choose to retire between 60 and 63, the pension benefit will reduce 5.6% for one year, and if they choose to delay retirement, their benefit will increase by 8.1% for one year<sup>25</sup>. The link between pension benefit and retirement age helps to reduce the distortions of labor market.

### **5.4 Reform the system structure and improve individual Accounts**

The formulation of improving the individual account is to redefine the pension system of social pooling and individual account. The traditional formulation of trials to fully funded individual account emphasized since 2001 has been replaced, which solved the empty account problems caused by the huge transition cost and low pooling level. Improving individual account means to insist on incentive mechanism of “pay more and gain more”. The key to incentive mechanism is to strengthen the connection between the contributions and benefits. But the problem lies in how to determine the implementation path. In the current system, expanding the individual account scale (at the same time to reduce the social pooling scale) helps to realize the goal. The article suggests that the principle of NDC can be used into the current basic pension system. In order to maintain the policy stability and continuity, it is useful to change the current pension system into hybrid social pooling and individual accounts. The policy implications are as follows.

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<sup>25</sup> Monika Queisser and Edward Whitehouse, “Neutral or Fair: Actuarial concepts and Pension-system Design”, OECD Social, *Employment and Migration Working Paper No.40*, OECD Publishing, 2006:pp.29-33.

First, 8% of employee's contribution and 20% of enterprises' contribution are delimited into individual account, which can eliminate the obstacles of improving national pooling. Then it also helps to overcome the unbalanced development among regions and moral hazard.

Second, in the benefit payment period, improving individual account is based on DC, which embodies actuarial neutral relations by linking the contributions and benefits.

Third, the central government adopts centralized investment management system to diversify and internationalize the pension funds.

Forth, the accumulated pension fund in the individual account can be converted to a lifetime annuity products after retirement. The funds finance from the current worker's contributions. The actuarial neutral design can really make the enterprises employees' pension system and GOPI unified.

### **5.5 Give full use of market mechanism and pay more attention to other pillars**

According to the EU experiences, urban basic pension system should make full use of market mechanism to cope with the challenge of aging population. According to the current operation, the funds of social pooling and individual account are together used to pay the benefits. The current gap should be covered by the financial subsidies from the central government. In 2015, the total fund balance of enterprise employees' basic pension system has reached 3.53 trillion Yuan<sup>26</sup>. Due to the low pooling level, the central government should fund for the deficit provinces and then the surplus provinces have accumulated some funds balance. Then it will face the problem of fund investment. Second, improve the second and third pillar to move the single system model towards multiple-level pension system. Now the development of the second pillar lags behind. Make full use of preferential tax policy to promote the development of the second and third pillar pension reform. For example, establish specialized pension management companies and reduce the market barriers by providing the integrated trust products. Meanwhile, it is helpful to give the participants some limited investment options and to introduce fund products such as life cycle to improve the rigidity of investment system.

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<sup>26</sup> Ministry of Human Resources and Social Security, Human Resources and Social Security Development Bulletin 2015, 2016.