

Model Design and Calculation of New Three-pillar of the overall Planning of Urban-Rural Pension Insurance in China

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Abstract

Overall planning of urban and rural social pension insurance system is vital in perfecting basic social endowment insurance system and in promoting the process of urban and rural overall planning and urbanization in China. By analyzing the content of urban-rural overall planning on pension insurance system, the writer designs an overall planning model of three new levels which is based on national public pension, subjected by foundation platform and supported by supplementary insurance. In addition, this thesis predetermines the individual contributions and payment of rural endowment insurance of Shanghai in China, and comes to a conclusion that the national public pension platform can be founded if rural residents contribute annually 5% while being paid monthly 3% of their PCDI (Per Capita Disposable Income) of last year on endowment insurance.

Keywords: pension insurance, urban and rural overall planning, model design, calculation, three-pillar

1. Introduction

Overall planning on urban and rural social endowment insurance is a process to integrate rural-urban in pension insurance in China, foundationally aiming at enabling every national to enjoy the national treat on pension insurance (Zheng Gongcheng, 2008).

Under the principles of filling the vacancy between urban and rural areas, integration, coordination and unified development, co-ordination on urban and rural social endowment insurance is to break the binary structure of urban-rural in designing and operating the endowment insurance system and build a unified endowment insurance system for both urban and rural residents (He Junmin, Yang Bin, 2013), so that such right for those people can be protected with no difference. This thesis defines the content with the following points:

(1) In terms of the coverage, pension insurance system should cover all the residents, and the overall planning of urban-rural should guarantee an equal protection for both of them. Right for pension insurance ought to be equally enjoyed by any citizen, regardless of status and regions.

(2) In terms of the payment, pension insurance system based on the overall planning of urban-rural should guarantee a fair baseline, which means a basic national treatment needs to be conducted comprehensively. Payment has to play an important role in at least two aspects. On one hand, the minimum payment for all the nationals embodies the equal social security rights for citizens and the government's performance on social security. On the other hand, minimum pension payment should consider horizontal fairness and vertical fairness of different people and regions. Payment should be orderly guaranteed according to economic standard of different regions and categories from the point of diminishing the gap in pension insurance development (Wang Xiaodong, 2014).

Payment in pension insurance system with urban-rural overall planning narrows gradually and finally converges. It is unrealistic and impossible to totally remove the difference caused by binary structure of urban-rural in a short time. The gap resulted from the economic development of urban and rural and the income level and consumption ability of residents will definitely affect the contribution ability and related pension payment level as well. However, co-ordination on urban and rural social endowment insurance aims at diminishing the gap of endowment insurance level between urban and rural areas, finally equalizing the payment level.

(3) In terms of the management system, co-ordination on urban and rural social endowment insurance system should make unified decisions and overall plans in terms of management system, and at the same time, guaranteed social security services and a quick and efficient transfer of endowment insurance relations with the movement of the insured are necessary for building a unified labor market of urban and rural areas.

2. Model Design for the Overall Planning of Urban-Rural Social Endowment Insurance

On the basis of the analysis on the content of overall planning on urban and rural social endowment insurance system, it is unrealistic to set up a basic endowment insurance system with a totally same security level and an absolutely fairness between urban and rural areas. To build such a model, a unity with difference should be agreed. Different level of security should be established according to various occupational groups and their characteristics, which means, the model is unified but discriminatory. This endowment system has to follow these principles as working step by step and hierarchical propulsion in stages.

In accordance with the current situation of economic development and the development of two basic endowment systems, a transitional model should be set up and gradually a pension system with the unification of urban and rural areas can be formed. In the transitional period, government could establish a universal national public pension platform to connect the basic platforms of the two basic pension systems, so that a multi-level basic pension system will be established to meet the higher needs of the insured. On one hand, national pension platform can connect the current basic pension systems. On the other hand, a multi-level basic pension platform can afford a platform for those expecting higher insurance level. This system breaks the gap between the basic pension platforms and connects them, since residents under this system can participate in the insurance regardless of their regions, census registers and employment (Ding Jianding, Zhang Xiao, 2014).

2.1 National Public Pension

A national public pension platform should be established, so that residents under this system can participate in the insurance regardless of their regions, census registers and employment. Since the income of urban and rural residents is lower than that of urban employees, and the level of financing and compensation is lower than the basic pension insurance of urban employees, thus the financing level of public pension platform should meet the lower level. When comes to compensation, government should take the rigid growth of social insurance into consideration, and think about the larger gap between the compensation from pension insurance of urban employees and other basic pension insurances, so the establishment of the public pension platform should pay attention to the compensation level of a new type of rural pension insurance and urban-rural residents' pension insurance and calculate the corresponding compensation level (Yang Yifan, 2009).

2.2 Basic Platform

On the basis of the national public pension platform, a multi-level basic public pension platform can be established to meet the higher needs of residents.

Such basic platform should be open to all the residents and they can participate if they can afford. On the national public pension platform, those original insured of urban-rural resident pension insurance can improve their standard of payment by contributing more, and as the same, those original insured of basic pension insurance of urban employees can go on to participate in the basic pension insurance platform, so that a platform free to go forward and back out is formed under the principle of equity of right and duty, which operate with the total amount of funding of the national public pension platform. This platform provides more if one contributes more and sets various contribution levels for selection. The financing level of this platform should not be higher than the highest level of that of basic pension insurance for urban employees. In terms of the payment, the highest payment should not be higher than the highest compensation of basic pension insurance of urban employees. above system just divides the level of contribution and payment without changing their actual level of the insured of the basic pension insurance for urban employees after the establishment of national public pension platform

and the multi-level basic platform. The original contribution is divided into two parts and flows into the pooling account of national public pension platform and basic platform account, and the payment is also divided into two parts. For those urban and rural residents, they can properly increase their contribution if they can afford, so that their payment will be improved and the gap of income before and after retirement will also be diminished.

Some provinces and cities in China have adopted such kind of plan. First, all the urban and rural residents can equally participate in this national public pension platform and enjoy the pension payment. Second, they can choose the proper level of insurance according to their own situation. Finally, the two basic pension insurance systems will be operated mutually. They will connect closely with each other and gradually finally homogenize with the perfection of each system, which will create more benefit conditions for a unified basic pension insurance system of urban and rural areas.

2.3 Supplementary Pension

One is that a special insurance for enterprise workers that the enterprise should not only contribute the basic pension insurance premium but also pay an additional insurance for workers besides the national agreed pension premium in line with their economic power. Another one means that the company or individual can buy the commercial insurance to receive the supplementary pension after they have contributed the pension premium for at least one year

3. Contribution and Payment Calculating upon Resident's Pension Insurance Fund --Set Shanghai as an Example

By the establishment of the above target pattern, pension insurance can be integrated of urban and rural areas in China. It still needs proving that whether the above pattern can be promoted efficiently and the ability of payment of rural residents. Since the basic pension platform provide different pension level according to the willing of companies and individuals, so there is no need to do some calculation on its level of contribution and payment. However, the national public pension adopts a nationwide unified standard, it is necessary to calculate the contribution and payment ability of rural residents. Since the statistics can be achievable and the social insurance policy in Shanghai is always the first to try and carry out, this thesis will set Shanghai as an example to calculate the contribution and payment ability of rural residents.

3.1 Pension Payment Calculating

3.1.1 Minimum Pension Payment Model

Pension payment is the main income of the old to maintain their daily life, the amount of which will definitely have a certain effect on their daily expenditure as well as their basic and daily living standard including necessities of life as food, clothing, transportation and living. The minimum pension payment of urban and rural areas means the lowest security standard to meet the minimum needs of the old in rural areas. We assume that this life security involves only the daily expenditure on food, not on other higher needs in life including clothing, transportation, house, and medical care and so on. Thus this thesis regards Per Capita Annual Food Expenditure of rural residents as the minimum living standard of rural residents, which is the minimum payment from national public pension platform. The following is the table of Per Capita Annual Food Expenditure of rural residents (Table 1).

In order to measure whether the minimum pension payment can meet the minimum pension demand of rural residents, i.e. to meet their demand in food expenditure, this thesis predicts the future per capita annual food expenditure of rural residents in Shanghai. It is going to make a regression analysis on the statistics of per capita annual food expenditure of rural residents in Shanghai from 2003 to 2012, and predicts the result of this expenditure through following equation.

We regard $C_{minimum}$ as Per Capita Annual Food Expenditure of rural residents in Shanghai and t as the time. By analyzing the statistics of per capita annual food expenditure of rural residents from 2002-2012, we can get the trend model of $C_{minimum}$ and t , and make a prediction upon this trend model about the future per capita annual food expenditure of rural residents in Shanghai.

Results are listed in Table 2 after imputing the statistics into corresponding software:

Known from the regression analysis, $C_{minimum}$ and t are positively correlated with the correlation being 0.985; they are better fit with each other. The equation is:

$$C_{\text{minimum}} = 301.527t - 601974.400$$

C_{minimum} and t are higher correlated ($R=18.705$) and better fit with each other. The two are in linear trend, which shows that there is a linear correlation between C_{minimum} and t . So the minimum per capita annual food expenditure of rural residents shows in table 3.

Thus, we can predict the value of future per capita annual food expenditure of rural residents in Shanghai, which is the minimum standard of compensation level of national public pension platform.

3.1.2 Maximum Pension Payment Model

The maximum pension payment of national public pension platform means the security standard to meet the basic needs of the old in rural areas. We assume that this life security involves the daily expenditure on food, clothing, transportation and communication and so on, not on other higher needs in life including house, and medical care and so on. Thus this thesis regards Per Capita Annual Expenditure of rural residents on food, clothing, transportation and communication as the living standard of rural residents, which is the maximum payment of compensation level (Table 4).

We regard C_{maximum} as Per Capita Annual Expenditure of rural residents on food, clothing, transportation and communication and so on in Shanghai and t as the time. By analyzing the statistics of per capita annual expenditure of rural residents from 2003-2012, we can get the trend model of C_{maximum} and t , and make a prediction upon this trend model about the future per capita annual food expenditure of rural residents in Shanghai.

Results are listed in Table 5 after imputing the statistics into SPSS:

Known from the above table, C_{maximum} and t are positively correlated with the correlation being 0.996; they are better fit with each other. The equation is:

$$C_{\text{maximum}} = 684.236t - 1364741.8$$

C_{maximum} and t are higher correlated ($R=22.683$) and better fit with each other. The two are in linear trend, which shows that there is a linear correlation between C_{maximum} and t . So the maximum per capita annual expenditure of rural residents shows in table 6.

Thus, we can predict the value of future per capita annual expenditure on food, clothing, transportation and communication of rural residents in Shanghai, i.e. the maximum standard of compensation level of national public pension platform.

In all, on the national public pension platform, the range of payment should be $301.527t - 601974.400$ to $684.236t - 1364741.800$, and t represents the time from the year 2013 to 2022

3.2 Calculating Individual Contribution of Pension Fund

Assuming that contribution level set by national public pension platform is 5% of PCDI of last year, we can predict the value of individual contribution from the year of 2013 to 2021 by analyzing the rural residents' annual PCDI from the year of 2003 and 2012 (Table 7).

Results are in table 8.

Known from the above Tables, the annually PCDI (Table 9) of Shanghai rural families is positively correlated with the time trend t , whose correlation was 0.977, and they are better fit with each other. The equation and the predicted values are as follows:

$$\ln(Y) = 7.536 + 0.096x$$

We can get the result of individual contribution level by predicting the PCDI, and get the contribution appropriateness by the relationship of the individual contribution level, PCDI and CONSP (per capita consumption expenditure). Details are in Table 10:

We can see that in the year of 2013 the per capita contribution of national public pension insurance accounts for 13.04% of per capita net income.

The ratio will keep going down in the future decade and it will be 7.19% in 2021. So the increase pace of CONSP is much slower than that of PCDI, and it is proper to take 5% of the PCDI as the contribution level. On one hand, such level will not burden the rural residents too much.

On the other hand, according to statistics, we calculate that the individual contribution is about 900 RMB in recent two years (2013 and 2014) which matches the fact that most of the insured of new-pattern rural social-old age insurance contribute 900 RMB per year. Thus we presume that it is reasonable rural residents to contribute 5% of their PCDI of last year.

3.3 Calculating Personal Compensation for Pension Fund

The above part analyses the maximum and minimum living expenditure of urban and rural residents from the personal point of view, i.e. the maximum and minimum pension payment.

We assume that the compensation ratio of national public pension fund accounts 3% of PCDI of last year, then this ratio should be between the minimum level and maximum level of pension (Table11, Table12, Table13).

4. Results

National public pension system aims at providing a platform of minimum protection, while the protection level of the new rural social-old age insurance is lower between the two basic pension insurances, so the calculation of contribution and compensation level should take the actual situation of rural residents in order to take rural residents in this platform. We can know from the Table 11 and Table 12 that the compensation level of the national public pension platform is between the maximum and minimum per capita consumption, which can afford the basic expenditure. Many scholars believe that the replacement ratio of rural residents' pension should be no less than 30%. We are informed from Table 13 that the replacement ratio under this compensation level is between 31%-32%, so the calculation is reasonable.

5. Conclusions

5.1 In order to ordinate urban and rural pension insurance, the three new pillars can be established in China. The first pillar is the national public pension, which can guarantee the basic life of nationals. The second pillar is an optional basic platform to meet different living standards, which pays more if contributing more and allows different contributing level for urban residents and employees. The third pillar is the complementary insurances including Enterprise annuity and commercial insurance, which can meet higher needs of the old.

5.2 Key of the ordination of urban and rural pension insurance is the ability of contribution and payment of rural residents, so it is of great importance to calculate the contribution ability of rural residents in China. Results show that rural residents can annually contribute 5% of PCDI of last year and monthly receive the payment at 3% of PCDI of last year, so that a national public pension platform can be established.

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Table 1: Rural Per Capita Annual Food Expenditure (UNIT: RMB)

year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Per Capita Annual Food Expenditure	2004	2191	2676	3024	3259	3732	3639	3807	4517	4837

Table 2: Related Statistics of $C_{minimum}$ and t

model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	standard deviation			
1 (Constant)	-601974.400	37551.231		-16.030	.000
year	301.527	18.705	.985	16.120	.000

Table 3: Predicted Value of Per Capita Annual Food Expenditure of Rural Residents (UNIT:RMB)

year	predicted value
2013	4999.451
2014	5300.978
2015	5602.505
2016	5904.032
2017	6205.559
2018	6507.086
2019	6808.613
2020	7110.140
2021	7411.667
2022	7713.194

Table 4: Per Capita Annual Expenditure of Rural Residents (unit:RMB)

year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
per capita annual expenditure	5670	6329	7265	8006	8845	9115	9804	10225	11272	12096

Table 5: Related Statistics of $C_{minimum}$ and t

model	Unstandardized Coefficients		Standardized coefficients	t	Sig.
	B	standard deviation			
1 (Constant)	-1364741.800	45535.987		-29.971	.000
year	684.236	22.683	.996	30.165	.000

Table 6: Predicted Value of Per Capita Annual Expenditure of Rural Residents (unit: RMB)

year	predicted value
2013	12625.27
2014	13309.50
2015	13993.74
2016	14677.98
2017	15362.21
2018	16046.45
2019	16730.68
2020	17414.92
2021	18099.16
2022	18783.39

Table 7: Rural Residents' Annual PCDI (UNIT: RMB)

year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
PCDI	6212	6658	7337	8342	9213	10222	11385	12324	13746	15644	17041

Table 8: Goodness of Fit Tests, Analysis of Variance and Correlation AnalysisModel Summary^b

R	R Square	Adjusted R Square	Std. Error of the Estimate
.989 ^a	.977	.974	436.36600

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.549	1	6.549	313.932	.000 ^a
	Residual	.391	8	.032		
	Total	6.701	9			

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.
		B	Std. Error	Beta			
1	(Constant)	7.536	.963			118.451	.000
	year	0.096	.042	.989		18.545	.000

Table 9: Rural Residents' Annually PCDI (UNIT: RMB)

year	PCDI (predicted value)	individual contribution (5%)
2013	18948	852.05
2014	21098	947.4
2015	23908	1054.9
2016	26508	1195.4
2017	29894	1325.4
2018	33976	1494.7
2019	37216	1698.8
2020	41795	1860.8
2021	46724	2089.75

Table 10: 5% of PCDI to the Net Income

year	PCDI	CONSP	per capita net income	individual contribution (5%)	ratio of individual contribution
2013	18948	12415.61	6532.39	852.05	0.1304
2014	21098	13069.11	8028.89	947.4	0.118
2015	23908	13722.61	10185.39	1054.9	0.1036
2016	26508	14376.11	12131.89	1195.4	0.0985
2017	29894	15029.61	14864.39	1325.4	0.0892
2018	33976	15683.11	18292.89	1494.7	0.0817
2019	37216	16336.61	20879.39	1698.8	0.0814
2020	41795	16990.11	24804.89	1860.8	0.075
2021	46724	17643.61	29080.39	2089.75	0.0719

Table 11: Compensation Level of 3% (UNIT:RMB)

year	PCDI	compensation level /month (3%)
2013	18948	508.02
2014	21098	568.44
2015	23908	632.94
2016	26508	717.24
2017	29894	795.24
2018	33976	896.82
2019	37216	1019.28
2020	41795	1116.48
2021	46724	1253.85

Table 12: Compensation Limit of 3%

year	minimum compensation/month	maximum compensation/month
2013	401.14	1034.63
2014	423.8	1089.09
2015	446.45	1143.55
2016	469.1	1198.01
2017	491.75	1252.47
2018	514.41	1306.93
2019	537.06	1361.38
2020	559.71	1415.84
2021	582.37	1470.3

Table 13: Replacement Ratio of Pension under the Compensation Level of 3%

year	PCDI /month	compensation level/month (3%)	pension replacement ratio (%)
2013	1579	508.02	32.17
2014	1758.17	568.44	32.33
2015	1992.33	632.94	31.77
2016	2209	717.24	32.47
2017	2491.17	795.24	31.92
2018	2831.33	896.82	31.67
2019	3101.33	1019.28	32.87
2020	3482.92	1116.48	32.06
2021	3893.67	1253.85	32.20