Journal of Scientific Research & Reports

14(5): 1-11, 2017; Article no.JSRR.33533
ISSN: 2320-0227

Tax Incentives, Resource Allocation and Efficiency-Sustainable Development of Chinese Enterprise Annuity Plan

Xiaowei Li[1], Zengwen Wang[2,3*] and Xiaodi Liu[1]

[1]School of Mathematics and Physics, Anhui University of Technology, Ma'anshan, Anhui 243002, China.
[2]School of Government, Nanjing University, Nanjing, Jiangsu 210023, China.
[3]Researching Center of Social Security, Wuhan University, Wuhan, Hubei 430072, China.

Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JSRR/2017/33533
Editor(s):
(1) Mahmoud Nasr, Sanitary Engineering Department, Faculty of Engineering, Alexandria University, Egypt.
Reviewers:
(1) Ahmadu Abubakar, Federal University Dutsinma, Katsina State, Nigeria.
(2) B. N. Swami, University of Botswana, Gaborone, Botswana.
Complete Peer review History: http://www.sciencedomain.org/review-history/19697

Original Research Article

Received 19th April 2017
Accepted 12th June 2017
Published 25th June 2017

ABSTRACT

At present, China's enterprise annuity system by the government tax preferential policies, bringing different economic and social effects. In this paper, according to the actual economic and social conditions of different cities and regions in Jiangsu Province, through the introduction of tax preferential policies, we put forward the actuarial model of preferential tax policy. At the same time, through theoretical and empirical models, we put forward some reasonable suggestions to maximizing the rational allocation of resources to promote China's sustainable development of enterprise annuity system.

Keywords: Enterprise annuity; empirical analysis; tax preferences; actuarial model.

**Corresponding author: E-mail: wzwnjing@163.com;*

1. INTRODUCTION

Basic pension insurance, enterprise annuity and individual pension savings constitute the endowment insurance of the China's "three pillar system". Endowment insurance plan which is a supplement to the basic pension insurance system is a kind of retirement schemes linked with occupation, and it is also a voluntary enterprise annuity schemes which are based on the enterprises and workers who participate in basic pension insurance according to law and state policies. And it is the national implementation of major multilevel old-age security system arrangement and an important part in the social pension insurance system and also an important component of enterprise welfare programs. The fund mode of operation used is a longitudinal personal income adjustment mechanism. From the government's perspective, it has gradually become an important means to alleviate financial distress on social basic pension insurance. At present, the China's pension insurance system's development-oriented is to deal with the shock from the aging society, as the second pillar, the pension insurance system plays an irreplaceable role on the spread and transfer national basic pension insurance risks, and it also can promote the development of financial services and capital markets, stabilize labor relations and improve the living standards of retirees from enterprises and so on. Since 2005, China's enterprise annuity business has been developing rapidly. However, according to statistics[1], at the end of 2012, China's total scale of enterprise annuity market exceeded 500 billion yuan, but it is far less than the expected development——1 trillion yuan, then the ambiguous tax preference is one of important factors which caused the result. Enterprise annuity scheme has a strong correlation with government tax policy [1,2]. Tax preference system is related to the sound of enterprise annuity system and its key constraints about the sustainable development. The experience of developed countries shows that the establishment of supplementary pension insurance schemes and its sustainable development are also closely related with the taken preferential tax policy. The main responsibility of the government is to promote the supplementary pension insurance system in the healthy and sustainable development path through tax relief (or deferred taxes) [3]. Almost all governments of developed countries have adopted an incentive measures to inspire enterprises to establish enterprise annuity plans. In general, it reflects in three aspects: need not to pay taxes during enterprise annuity payment; enterprise annuity contributions at "before tax"; the income from the fund investment obtained tax-exempt (or tax-deferred). Tax benefits from the three aspects can be derived from a variety of tax and duty-free preferential type of taxes. Research field of International Social Welfare about tax preference mainly launched around two concepts: One is the contributions and investment income tax-free to the recipient paying tax mode (EET); another is the contributions being in charge of paying taxes to investment income and payment recipient duty-free mode (TEE). From the research direction of view, at present, the contributions and investment income tax-free to the recipient paying tax mode (EET) is the mainstream-oriented [2,4]. Among the developed countries, such as the United States, Britain, France, Canada mostly have adopted this tax preferences mode to encourage the development of enterprise annuity system [5].

2. THE CURRENT SITUATION OF ENTERPRISE ANNUITY IN CHINA

Enterprise annuity scheme on the preferential tax policy which has been implemented in the developed countries have provided us with practical experience. With the development of enterprise annuity system, the preferential tax policy is an incentive mechanism to encourage employers and employees to participate in an enterprise annuity scheme; World Bank gave a forecast[2] that the scale of China's enterprise annuity will up to 1.8 trillion dollars, about 15 trillion yuan, then it will become the third largest enterprise annuity market in the world by 2030. However, there are many problems that may not be ignored in enterprise annuity on the preferential tax policy. Currently, for the aspects of corporate tax payment of the tax preferential issue, according to local conditions, provinces make the policies about the annuity tax preferential policy for the aspects of corporate tax payment. However, the Ministry of Finance has not yet implemented a unified tax preferential

[1] *Jiabao Wen: Some problems about the development of social undertakings and improving people's livelihood, Seeking Truth. 2010.3*

[2] *Yang Feisheng、Shen Tuqingnan: In the first half, the corporate pension plans add 260 and forecast the scale of the enterprise annuity up to the trillion yuan by 2010, China Securities Journal, October 25, 2006.*

policy. From the above-mentioned three aspects of the tax issue (contributions, investment income and enterprise annuity payments received), now there is still no announcement of any tax preferential policies, specifically in the following areas:

Tax preference mode is lack of the rationality; preferential tax rates are low, and the incentive effect is poor. In the process of formulating the preferential policies of enterprise annuity, the policy makers are not clear about the differences in the level of economic and social development, resulting in the same treatment, leading to a lack of rationality. This vague tax system looks fair, but it is just the superficial fairness. The superficial fairness has become the obstacles to Jiangsu Province enterprise annuity system for the sustainable development. At present, enterprises tax preferential in Jiangsu Province take the contributions tax-free, investment income and the recipient paying tax mode (ETT), that is to say, companies pay a pre-tax payroll deduction limit of only 4%, the limitation of the tax preference means the ratio of the pre-tax payment accounts for the gross payroll. Compared with developed countries, 4% of revenue was significantly lower, and the incentive effect is difficult to occur. In the long run, it may be likely to cause the system becoming rigid and has no deferred tax benefits to individuals [6].

The tax preference of enterprise annuity is single, poor operability. Enterprise annuity on the preferential tax policy in China taxi is only at the stage of the contributions, while other aspects are without a corresponding tax preference. So enterprise annuity business model for individual is the contributions, investment income and the recipient paying tax mode (TTT). However, this mode is quite not propitious to mobilize the individual workers' initiative to participate in the scheme. So far, there is still not existing one clearly defined enterprise annuity tax rules, and the current tax preference policy only reference "Enterprise Income Tax Implementation Regulations (draft)", which it was formulated by the State Council executive meeting on November 28, 2007. Based on the regulation, it require enterprises to pay part of the amount of 4% of payroll deduction, while the relevant enterprise annuity payment stage investment and tax incentives problem remains the lack of detailed provisions.

There is lack of the joint and coordination mechanisms with the basic pension insurance on the tax preference. The existing basic pension insurance adopts the mode of the contributions, investment income and the recipient tax-free (EEE). For the individual, enterprise annuity takes the mode of TTT taxation [7]. For the enterprises, enterprise annuity takes the mode of ETT, and the limit of the preferential tax rate is only 4%. From the vertical perspective, they both are in a far cry on the preferential tax policy, and at the same time, they will not generate incentive effects for the enterprise employees.

There is a lack of supervision in the implementation of preferential tax policies and the lack of standardization in operation, supervision and other concrete operations. There are also few provisions of censorship and restrictions for main body of the preferential taxation, and the implementation of tax policy is not in place. When giving enterprise annuity contribution rate of 4%, it has not any provisions of censorship and restrictions, which lead the enterprise annuity plans to become business executive special benefits. Due to its own operation reason, the small and medium enterprises which implement the enterprise annuity plan are quite difficult to achieve their expected revenue targets, so they often avoid enterprise annuity scheme through tax evasion on contributions [8].

In view of this, we will establish an empirical model of the preferential tax policy of enterprise annuity, and on the basis of the research on the current tax policy of enterprise annuity plan, we will study the problem of enterprise annuity. According to economic and social development situation in different cities, we adopt the actuarial science and econometrics methods to study regionalization difference in various provinces about enterprise annuity plan on the preferential tax policy, and then we base on the results to find the improvement initiatives.

3. THE TAX PREFERENTIAL POLICY MODEL OF THE ENTERPRISE ANNUITY

3.1 The Taxation Mode for Enterprise Annuity

Enterprise annuity is a kind of deferred payment corporate welfare programs, and it needs three links during its operation of the process: fees, investment income and benefits paid. Moreover, corresponding to it, enterprise annuity tax policies also exist three corresponding links.

Types of taxes involved in the three aspects are also different. In the payment session, it involved two types of taxes, such as corporate income tax and personal income tax. In the investment income session, it involves four types of taxes, which respectively are the income tax, business tax, stamp duty and tax on interest. In the benefits paid session, it only involved one tax that is personal income tax. Assuming the tax department has two actions for the three links, payment, investment income and benefits, namely tax and duty-free, then during the entire operation of the tax, our analysis to enterprise annuity will be the following modes [9,10].

Among the 8 kinds of taxes modes, there are more serious double taxation condition among the TTT mode and TET mode, which result in a lower appreciation rate of enterprise annuity. In the long run, it also will lead to lower levels of employee's benefit levels [4]. In the end, enterprise annuity system can't be sustainable. However, the ETE mode and EEE mode both led to the lack of national revenue and the excessive supply of welfare so that they will bring greater pressure on finance. From the preferential tax mode of enterprise annuity scheme in the developed countries, the mode is not very common; reference the experience of developed countries and China's development of enterprise annuity, EET model can help to promote the sustainable development of enterprise annuity system than the other seven kinds of taxation models. Although the EET model can largely reduce the government's tax revenue, it also will contribute to bring more social benefits though the accumulation of the supplementary pension insurance: (1) Almost all developed countries will adopt a progressive personal income tax rate to levy, while the level of pension is obviously not as good as the income level of employees on the job, so the marginal tax rate applicable for the pension is much lower than the operating income, which makes employees gained a lot from personal income tax; (2) During the early stage of operating the supplementary pension scheme, tax relief will make players truly feel the benefits from the supplementary pension plan, thereby it will be easy to make the players identify with the supplementary pension insurance scheme. Based on these, it will increase the participation.

3.2 Model of Tax Preferential Policy to Enterprise Annuity

W_i: staff salaries with the age i, g: average growth rate of average wage, π: inflation rate, β: return on investment, δ: discounting factor; T: the contribution rate on enterprise annuity, C: contribution rate (including the enterprise and individual), for short the contribution rate, N: Enterprise annuity is required to pay the tax when it is received, ${}_tQ_x$: the probability of death in t year when he is x years of age, ω: the limit of the survival workers ages, $I_{x,a}$: the person who is a years old now can get the enterprise annuity benefit amount when he is up to x years old.

Now a employee starts from x retired, and the jth year payment amount is that the one year pre-retirement wage $W_i(1+g)^{(x-a)}$ multiplied by the contribution rate on enterprise annuity T, starting from x retired, the jth year pension payment amount is as fallows:

$$I_{x+j} = TW_a(1+g)^{x-a}(1+\pi)^j,\ j = 0,1,2,\cdots \tag{1}$$

According to the three aspects of taxation, namely payment link, investment income link and treatment payment, according to the principle of balance of payments, we can get the following equation:

$$\frac{\sum_{j=0}^{x-a-1} CW_a[\delta(1+g)]^j(1-{}_jQ_a)}{\delta^{x-a}({}_{x-a}Q_a)} = \sum_{j=0}^{\omega-x}(1-T)I_{x+j}\delta^j(1-{}_jQ_x) \tag{2}$$

After simplifying, we can obtain:

$$C = \frac{\delta^{x-a}(1-{}_{x-a}Q_a)T(1+g)^{x-a}(1-{}_jQ_a)\{\sum_{j=0}^{\omega-x}[\delta(1+\pi)]^j(1-{}_jQ_x)\}}{\sum_{j=0}^{x-a-1}[\delta(1+g)]^j(1-{}_jQ_a)}(1-N) \tag{3}$$

Table 1. The 8 tax preference modes in the operating progress of enterprise annuity

Link	EET	TEE	ETE	ETT	TTE	TET	TTT	EEE
Payment	E	T	E	E	T	T	T	E
Investment income	E	E	T	T	T	E	T	E
Treatment payment	T	E	E	T	E	T	T	E

According to (3), we know that the contribution rate C, tax rate N and wages N are not correlated with each other. However, they are related with the average wage growth rate g, interest rates β, employee mortality ${}_tQ_x$, inflation rate π and other factors. During setting the model, we take into account the effect on the contribution rate from the wage growth rate and probability of survival, moreover, we also think about the impact of the inflation rate and the mortality rate for enterprise annuity payment;

We give the presumption of conformity EET tax model which the investment income from enterprise annuity fund is tax-free (at least it is deferred payments, and during the receiving phase of enterprise annuity, the rate is borne by the individual). The wage growth rate g mainly expresses the annual wage growth, which also explains that the wage growth rate has included the inflation rate. Only the wage growth rate and mortality have been brought into the model in the payment link. Owing to the current supplementary pension insurance scheme is undergoing reform phase, there are not be and predict too much in the investment income link on the supplementary pension insurance fund, and its mode of operating the fund has not been finalized. Therefore I assume that it is the average yield growth during the investment income link on the supplementary pension insurance fund.

Table 2. Jiangsu provinces' tax rate under different investment rate of return and the replacement rate

Investment rate of return and the replacement rate	Age	Male		Female		Equilibrium value $\frac{C}{1-N}$ (%)
		proportion (%)	$\frac{C}{1-N}$ (%)	proportion (%)	$\frac{C}{1-N}$ (%)	
β=5%, T=10%	20	9.95	7.86	13.63	8.48	25.32
	30	12.04	11.67	15.89	12.07	
	40	11.31	16.98	12.32	19.87	
	50	14.74	60.81	10.45	66.54	
β=9%, T=10%	20	9.95	4.26	13.63	5.28	19.68
	30	12.04	7.66	15.89	7.91	
	40	11.31	14.57	12.32	14.08	
	50	14.74	44.51	10.45	51.10	
β=5%, T=20%	20	9.95	8.30	13.63	11.88	36.29
	30	12.04	14.32	15.89	16.09	
	40	11.31	25.57	12.32	26.11	
	50	14.74	77.09	10.45	88.03	
β=9%, T=20%	20	9.95	6.85	13.63	6.65	23.84
	30	12.04	9.56	15.89	11.33	
	40	11.31	17.35	12.32	19.56	
	50	14.74	61.59	10.45	69.27	
β=5%, T=30%	20	9.95	12.31	13.63	17.81	49.36
	30	12.04	22.74	15.89	25.07	
	40	11.31	39.93	12.32	42.08	
	50	14.74	109.27	10.45	120.00	
β=9%, T=30%	20	9.95	8.67	13.63	9.23	37.23
	30	12.04	13.86	15.89	15.07	
	40	11.31	26.07	12.32	29.76	
	50	14.74	89.17	10.45	98.34	

During the research process, we add the inflation coefficient during the payment stage. Since the substitution rate is the ratio for weighing salary after retirement which base on a year's salary before retirement and it can't fluctuate with the level of economic development. It will lead enterprise annuity payments after retirement benefit not to reflect the real life needs level. In general, the international community believed that the best ratio of the enterprise annuity scheme's target replacement rate is 30%. However, from the China's data, the true ratio is much lower than this target ratio. The study from Social Insurance Institute of the Ministry of Human Resources and Social Security shows that the basic old-age insurance, enterprise annuity and individual saving pension insurance's target replacement rate in Chinese multi-level old-age security system respectively was 60%, 20%, 10%; From the developed countries' experience, the basic old-age insurance, enterprise annuity and individual saving pension insurance's replacement rate respectively was 40%, 30%, 10%. Due to the developing stage of China and the influence from the current economic restructuring, if given China's enterprise a full tax exemption at the phase of implementation, it might bring a significant fiscal deficit to China [11,12]. At the same time, referring to the experience of developed countries, it is not realistic for the completely free of charge of the enterprise annuity payment.

In view of this, we set tax incentives implementing under meeting the 15% replacement rate. Due to the current average life expectancy in China gradually extended, and the current statutory retirement age is the reference to the retirement age when China was founded (male 60 years old, female 55 years old), so I assume that the retirement age will be gradually increasing to 60 years of age. Therefore, we assume the retirement age $R = 60$. According to the inflation rates over the years, we assume the inflation rate $\pi = 4\%$ and the wage growth rate $g = 6\%$. On the basis of the investment yield condition in the current financial capital markets and in order to make the study more flexible, we assume that the intended yield rate is 5% and 9% and the substitution rates are 10%, 20% and 30%. So we can respectively analyze the three situations. Since $\frac{C}{1-N}$ is related with the age of initial payment, we should take into account the problems about the age structure of the overall population. Might as well, we select age group of 20, 30, 40 and 50 to represent the mean of the age range $\frac{C}{1-N}$. And then we calculate the value of the age range respectively. After doing this, we calculate equilibrium value within the range based on all ages in the proportion of the population (measurement results are shown in Table 2). Under the other exogenous variables remaining unchanged, as we can see from Table 2, contribution rate is decreasing with the endogenous variable yields increasing. At the same time, it increases with the increase in the growth rate of substitution. When given the rates of return respectively are 5% and 9%, while the tax rate is 10% in the payment phase, we assume that the employer and the employees pay the fees at the 50% proportion.

In the case of the tax rate on the enterprise annuity scheme is 10% in the collecting link and meets the target replacement rate of 20%. If the enterprise annuity plan implements a full tax exemption, the preferential tax rate should be between 10.71% and 13.67%. However, if partly giving preferential tax rate to meet the target replacement rate of 10%, the rate should be between 8.33% and 9.81%. When the enterprise annuity plan's target replacement rate is up to 30%, the scheduled interest rate will be 9% and the preferential tax rate will reach 15.89% under the condition of the tax rate on the enterprise annuity scheme of 10% in the collecting link.

4. ANALYSIS OF REGIONAL DIFFERENCES IN PREFERENTIAL TAX POLICY: CASE OF JIANGSU PROVINCE

4.1 Variance Analysis between Cities

Calculate as the household population; αPer capita consumption expenditure of urban residents include: health care, transportation and communications, entertainment, education and cultural services, housing and so on.

Source: Statistical Bureau of Jiangsu Province: Jiangsu Rural Statistical Yearbook 2009, China Statistics Publishing Company, 2009.

Due to the current economic and social development are unbalanced among the cities in Jiangsu Province, there are regional differences during the implementation of enterprise annuity system. From the classification between the

Table 4 and Table 5, we can see that the first category mainly is the South Jiangsu Province where the economic and social aspects are developed relatively faster and well, such as Suzhou and Wuxi. Because of the high degree of economic development of these cities and the high degree of efforts to protect the social security system, the enterprise annuity system is better than the northern and central regions of Jiangsu province. The second category α mainly is the central section area of Jiangsu Province, the economic and social development of these cities are relatively slower than South Jiangsu Province, and the establishment and development of the social security system is also relatively slow. So there is larger development space about the development of enterprise annuity. However, comparing with the North Jiangsu Province, its economic and social development are better than the third category β, therefore the development of enterprise annuity is less than the third category β of North Jiangsu Province.

4.2 The Correction Model

Based on the above analysis, we can adjust the tax incentives through the implementation of the difference between the empirical model. We performed a factor analysis of the three indicators: the average wage of workers (x_1), the per capital GDP (x_2), resident per capital consumption expenditure (x_3), getting to know the first principal component is:

$$X = 0.975x_1 + 0.932x_2 + 0.958x_3 \qquad (4)$$

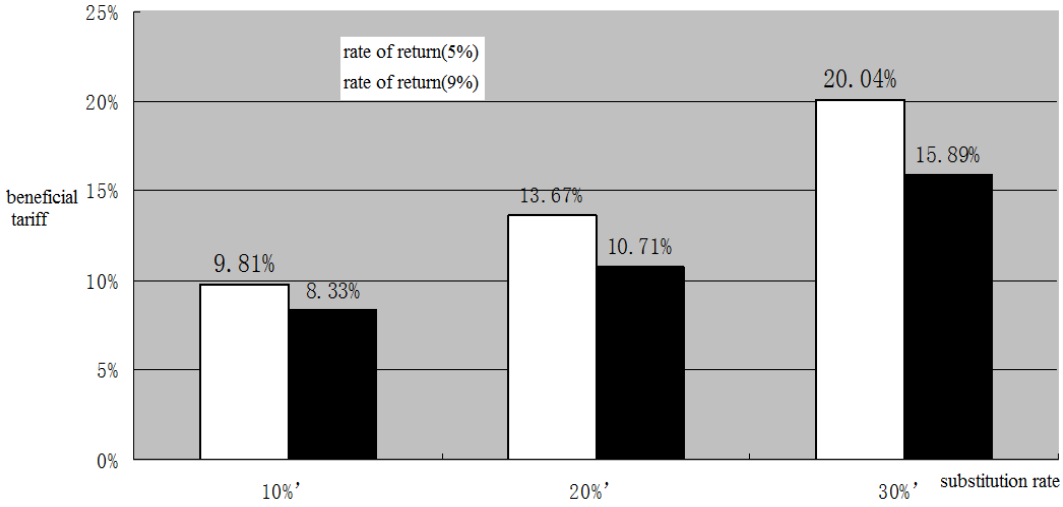

Fig. 1. Distribution graph about the preferential tax rate on the enterprise annuity under the different replacement rates and investment yields

The first principal component of variance contribution rate is 91.228%, then we put the first principal component as the new variables into the data from 13 cities, namely, the first category: $X_1 = \frac{1}{2}(X_{Suzhou} + X_{Wuxi})$ [3]; the second category: $X_2 = \frac{1}{8}(X_{Taizhou} + X_{Yangzhou}, \cdots, + X_{Xuzhou})$; the third category: $X_3 = \frac{1}{3}(X_{Zhenjiang} + X_{Changzhou} + X_{Nanjing})$; Calculating the value of the main component considering various cities (see Table 4).

[3] *Wherein,* X_{Suzhou} *is expressed as* $X_{Suzhou} = 0.975x_1 + 0.932x_2 + 0.958x_3$. x_1, x_2, x_3 *are respectively for the average wage of workers, the per capita GDP, resident per capita consumption expenditure in Su Zhou; The remaining indicators represent the same meaning.*

Since the difference between the cities around provinces, we must consider the adjustment coefficient γ which is used to adjust the differences. Referring to Chen Mingchao (2009)[4] [9], the measurement results are shown in Table 2, $\gamma_1 = 1.081$, $\gamma_2 = 0.778$, $\gamma_3 = 0.997$. Therefore, the result of $C/(1-N)$ can be re-expressed as:

$$C(\gamma_1 e_1 + \gamma_2 e_2 + \gamma_3 e_3) =$$

$$\frac{(\frac{1}{1+\beta})^{(x-a)}(1-{}_{x-a}Q_a)T(1+g)^{(x-a)}\{\sum_{j=0}^{\omega-x}[\frac{1}{1+\beta}(1+\delta)]^{j}(1-{}_{j}Q_x)\}}{\sum_{j=0}^{x-a-1}[\frac{1}{1+\beta}(1+g)]^{j}(1-{}_{j}Q_a)} \times (e_1+e_2+e_3)(1-N) \quad (5)$$

Wherein, γ_i represents the weighs of the ith city, e_i represents population of the ith city, then:

$$\frac{C}{1-N} = \frac{(\frac{1}{1+\beta})^{(x-a)}(1-{}_{x-a}Q_a)T(1+g)^{(x-a)}\{\sum_{j=0}^{\omega-x}[\frac{1}{1+\beta}(1+\delta)]^{j}(1-{}_{j}Q_x)\}}{\sum_{j=0}^{x-a-1}[\frac{1}{1+\beta}(1+g)]^{j}(1-{}_{j}Q_a)} \times \frac{e_1+e_2+e_3}{\gamma_1 e_1+\gamma_2 e_2+\gamma_3 e_3} \quad (6)$$

Table 3. Economic and people's lives data from Jiangsu Province in 2008 (Unit: RMB)

Region	The average wage of workers	per capita GDP	Residents per capita consumption expenditure
Nanjing	39876	60807	6655
Wuxi	38843	95460	5635
Xuzhou	26824	21267	4427
Changzhou	34834	61504	6793
Suzhou	36090	106863	6467
Nantong	30856	32815	4501
Lianyungang	26596	15458	4245
Huai'an	23993	17104	3700
Yancheng	22380	19775	3301
Yangzhou	27323	34238	4671
Zhenjiang	30958	52390	4609
Taizhou	25737	27840	3978
Suqian	19988	12289	2870

Table 4. Cluster analysis results about the economy and people's lives index around the city

Category	Around the city			
The first category	Suzhou Wuxi			
The second category	Taizhou Yangzhou Nantong Suqian Huai'an Lianyungang Yancheng Xuzhou			
The third category	Zhenjiang Changzhou Nanjing			
γ_i	1.081	0.788	0.997	—

[4] *Calculation of the adjustment coefficient:*

$$\gamma_i = 1 - \frac{\text{the mean of the i classification} - \text{overall mean}}{\text{overall mean}} * \frac{\text{Population from different cities of the i classification}}{\text{Total population}}$$

So, corresponding to the ith city, its contribution rate is $C_{1i} = C\gamma_i$, substituting into statistical data, we can get contribution rate of the three categories, Jiangsu Province, the specific measurement results are shown in Table 6.

When $N = 10\%$, on the condition of the inflation rate for $\pi = 4\%$, wage growth rate for $g = 6\%$, Scheduled investment yield respectively for 5%, 9% and substitution rate respectively for $T = 10\%$, $T = 20\%$, the proportion of the wage which may be deductible before the tax paid by these three kinds cities are as shown in Table 7.

Table 7 shows that, due to economic and social development and per capita consumption level are both higher in Suzhou and Wuxi of the first category. No matter what the perspective of the initial distribution or the perspective of the assignment, their situation are both better than other cities. From the payment link, they have had the relevant conditions to increase the contribution rate of enterprise annuity so that we suggest that this part of the city should be appropriate to increase the contribution rate efforts. Moreover, the data from Suzhou and Wuxi show the trend of aging is more clearly than other cities. Based on this situation, increase in the proportion of tax preference properly is feasible. For the cities in the category α, their economic and social development level are relatively low, and enterprise annuity system is also lagging behind the cities in the first category. However, the favorable condition for enterprise annuity is relatively minimal pressure. Therefore, in order to encourage the cities of enterprise annuity system quickly to build, giving more tax preference to the cities in the second category α to the government is quite necessary. The cities in the third category are in the middle level of the economic and social development, namely Zhenjiang and Nanjing belonging to the

Table 5. The cluster analysis icicle figure about the economy and people's live

Classification	The first category	The second category	The third category	Overall mean
Principal component values	49682.38	136609.25	94382.07	93557.9
Population (million)	411.89	1099.82	869.93	2381.64

Around the city	Number of clusters											
	1	2	3	4	5	6	7	8	9	10	11	12
Suzhou	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X								
Wuxi	X	X	X	X	X	X	X	X	X	X	X	X
	X											
Taizhou	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X					
Yangzhou	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	
Nantong	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X									
Suqian	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X						
Huai'an	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
Lianyungang	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X				
Yancheng	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X		
Xuzhou	X	X	X	X	X	X	X	X	X	X	X	X
	X	X										
Zhenjiang	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X							
Changzhou	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X			
Nanjing	X	X	X	X	X	X	X	X	X	X	X	X

Table 6. $C/_{1-N}$ Ratio table from the three types of cities

Around the city in province	The first category	The second category	The third category
$\frac{C}{1-N}$	0.2084	0.2473	0.1965

Table 7. Sensitivity analysis table about the enterprise annuity payroll tax deductibility among the classification cities

Meeting the conditions	$\beta = 5\%$，$T = 10\%$	$\beta = 9\%$，$T = 10\%$	$\beta = 5\%$，$T = 20\%$	$\beta = 9\%$，$T = 20\%$
equilibrium（C/2）	11.80%	8.24%	13.68%	10.63%
The first category	9.53%	8.09%	11.56%	10.65%
The second category	8.27%	6.91%	10.29%	8.96%
The third category	12.36%	7.75%	14.66%	11.08%

central section area of Jiangsu Province and Changzhou belonging to South Jiangsu Province, but the development of enterprise annuity system has great potential in those cities. Therefore, giving the higher tax preference to the cities can help to improve enterprise annuity system.

5. CONCLUSIONS AND RECOMMENDATIONS

After clustering analysis on the related data from the parts of the economy and people's lives in 13 cities, we adjust the model based on the cities' difference. The aim is to implement different tax preferential policies for the cities with the different economic and social development. Meanwhile, encouraging North and the central section area of Jiangsu Province whose the economic and social development is relatively lagging behind can establish and improve enterprise annuity system. According to the target substitution rate of enterprise annuity and financial capacity, the government must integrate the adequacy and incentive in order to measure out the appropriate limit of the tax preference. At the same time, in order to reflect fairness and encourage enterprise annuity system covering medium-sized and small enterprises as soon as possible, the limit of the tax preference should also have a certain amount of flexibility and the limit of the tax preference of medium-sized and small enterprises should be larger than large enterprises which have a certain scale and their enterprise annuity scheme is relatively perfect than the SMEs.

Because of the large differences on the situation of economic and social development between South and North and the central section area of Jiangsu Province, when formulating enterprise annuity on the preferential tax policy, the flexible mechanisms should be introduced so that the implementation of the plan becomes more maneuverability. The government can't compel the participants who are difficult to maintain basic living conditions to take part in enterprise annuity scheme and still cannot compel the medium-sized and small enterprises which are developing and surviving difficultly to set their contribution rate. Therefore, during the formulation and implementation process in the specific policy, the government must fully focus on two aspects, 1. Overall considering the financial affordability, from the perspective of economic growth, it needs to seek the best interests of economic entities equilibrium; 2. Learning experiences from developed countries and other Chinese provinces about enterprise annuity. When implementing enterprise annuity on the preferential tax policy, we must increase tax enforcement. Improving anti-tax evasion and evasion of the relevant provisions can ensure the health, rapid and sustainable development of enterprise annuity.

ACKNOWLEDGEMENTS

This work was supported by the National Natural Science Foundation of China (No.71601002), the major project of Humanities and Social Science of Ministry of Education of China (16JJD840008), and the Humanities and Social Science Foundation of Ministry of Education of China (16YJC630077).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Social Insurance Institute of the Ministry of Labor and Social Security. China's enterprises annuity of the fiscal taxation policy and operation. Beijing: China Labor & Social Security Publishing House. 2003;32-35.
2. Peng Xuemei. The study of the taxation policy about the enterprise annuity. Chengdu: Southwestern University of Finance and Economics Press. 2005;176.
3. Hwa EC, Zou HF. china: preferential tax policy. Cema Working Papers; 2012.
4. Gao Jianwei, Ding Kequan. The actuarial model and analysis about the pension standard from individual account of the social old-age insurance. South China Finance. 2005;3:52-55.
5. Pennacchi George G, Lewis Christopher M. The value of pension benefit guaranty corporation insurance. 1994;26:735-753.
6. Wang Hao. The study of the preferential tax policy which improving the development of the enterprise annuity. Fabric Market. 2007;9:64-66.
7. Yuan Zhigang. Endowment insurance economics. Shanghai: Shanghai People's Publishing House. 2005;191-194.
8. Xiaoyun Wang, Ruiyang Zhang, Lina Liu. A study on the effect and strategy of enterprise annuity preferential tax policy in China. International Journal of Business and Management. 2009;2(5).
9. Chen Mingchao, He Sihui, Qian Linyi. Modeling and analyzing preferential taxation policy in Chinese complementary pension. Statistics & Information Forum. 2009;11:66-71.
10. Li X. Research on the development strategies of enterprise annuity funds. Journal of Pingxinag College; 2013.
11. You GY, Zhang L, Zhao ZH. The actuarial analysis on the cost of preferential tax for the enterprise annuity from the micro perspective. Research on Economics & Management; 2011.
12. Hong J. Research on enterprise annuity fund in defined benefit and defined contribution payment models. Shanghai Management Science; 2012.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/19697