The Economic and Welfare Effects of Tax-deferred Employer Pensions in China

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Abstract

Based on the employer pension system and tax-deferred policy in China, this paper builds a general equilibrium model of overlapping generations to analyze how the changes of employee contribution and employer matching will affect the economic variables, such as the capital per worker, return rate to savings, wage, savings, consumption and total welfare, under three future tax assumptions, namely tax rate in retirement period is the same as, higher or lower than that in working period. The research results are as follows: the effects of the tax-deferred policy are up to the future tax trends to a large extent, we can hardly increase the retirement consumption and total welfare at the same time, the decrease of the welfare always follows the increase of the retirement consumption when the future tax rate falls, the employer matching affects economic variables way more than employee contribution does.

Keywords: Employer pensions Tax trend Economic effects OLG

1. Introduction

The aging problem is not unique to some individual country, it has become the global challenge we all have to face in the 21st century, the falling birth rate and longevity risk are making things worse in China. As the world's most populous country with nearly one-fifth of the world population, solving the problem of supporting the old properly, China will contribute a lot to tackling global aging.

There are three pillars in China's old-age security system. The first pillar is the social security system which is aimed to guarantee the minimum living standards of the elderly. The second pillar is the supplementary pension insurance set up by the employer, and it is to improve people's living standards after retirement, which is also the research subject in this paper. The third pillar, the individual savings, is totally up to personal situations. The social security system almost covers all Chinese citizens now, and after decades of development, it has been making its way to successfully playing its role. While the second pillar is a recent introduced program which calls for rapid growth to fulfill its mission to meet people's increasing consumption need after retirement. Therefore, the China's Ministry of Finance, Human Resource and Social Security Department and the State Administration of Taxation published: "The Notice about Some Issues Related to Individual Income Tax on Employer Pension and Occupational Pension"("The Notice" for short). Which states the details, such as employee contribution limit is 4% of one's average monthly pay for the previous year, about China's employer pension transferring from TEE to EET (T stands for taxed and E for exempted). And the EET has been officially put into practice since January 1, 2014.

The tax-favored Individual Retirement Accounts were first introduced in 1974 and the 401(k) plans in 1978 in the U.S., both of which were set up to encourage individuals without access to a pension or employees to save more in working period. In the meantime, the increasing national savings might have a good effect on domestic capital accumulation and productivity growth. Ever since the tax-favored plans came into operation, a lot of scholars have conducted a series of researches on them. The 401(k) plans surely did a great job and accumulated a large amount of money even though the scientific research results on the effects of the tax-favored plans differ from each other.

Whether the tax-deferred employer pensions will work as it did in the U.S. is still a question which need further investigation, since there are a lot of differences between China and America. The IRAs and 401(k) plans were to stimulate individual savings because of the declining personal savings rate in the U.S., while in China, the national savings rate is up to 50%, of which the government and corporate savings accounts for 30%. Besides, companies in China possess excess profits due to the imperfect competition market. Therefore, any tax-deferred policy on employer pensions should designed to raise employer matching.

A lot of literatures have focused on tax-deferred private pensions. Direr (2010) built a one working period and multiple retirement periods model, and concluded that it is possible to address the adverse selection problem by taxing annuities purchased by high incomes and subsidizing annuities purchased by low incomes. Amromin, Huang and Sialm (2007) showed, under some conditions, that there is a tax arbitrage between reducing mortgage prepayments and increaseing tax-deferred account contributions. But Rydqvist, Schwartz and Spizman (2014) thought that the tax benefit of income smoothing through the private retirement system, namely to contribute to a

private pension account when marginal tax rates are high and withdraw when marginal rates are low, is negligible.

Besides, quite a number of scholars have conducted research about the effects of tax-deferred accounts on savings. Poterb, Venti and Wise (1995) pointed out that they found little evidence that 401(k) contributions crowd out other forms of personal savings. Benjamin (2003) estimated that about one quarter of 401(k) balances represent current tax the government abandoned, one quarter represent new national savings, one quarter transfer from the DB or DC plan and one quarter come from other forms of family assets. Attanasio and DeLeire (2002), Gomes, Michaelides and Polkovnichenko (2009) all held that tax-deferred accounts can help to promote wealth accumulation, but have little effect on increasing net savings.

Apart from the literatures mentioned above, there are still many scholars studied the effect of employer matching, such as Engelhardt and Kumar (2007), Zhou (2009). Engelhardt and Kumar concluded that the worker participation will increase by 5% and the balance of the 401(k) account will increase $365 at the same time, if the employer matching increases 25 cents per dollar of employee contribution. Overall, the research shows that the 401(k) saving's elasticity of employer matching is quite low, which means that employer matching is really a poor instrument with which to increase saving for retirement. Zhou found that a typical employer matching program may increase contribution rates of low-income employees, and it increases the contribution rates and the participation rates of young employees at the same time, but it decreases contribution rates of old employees and high-income employees.

Most importantly, Creedy and Guest (2008) studied the macroeconomic effects of the changes of the taxation of private pensions in Australia, they analyzed how the unexpected changes of taxation of private pensions will affect consumption, savings, labor supply and social welfare under different pension tax mode, and they pointed out that the more the contribution, the greater the influence of tax delay on savings, labor supply and social welfare, though it may not change the form of the influence. Surely the tax-deferred policy and economic environments in Australia are totally different from that in China.

The history of employer pensions just started in 2005, most literatures on employer pensions in China have been focusing on the patterns of the employer pensions (Deng, 2004), the obstacle and countermeasures for the employer pensions to develop (Zhao, 2007). There are no literatures that quantitatively analyze the economic and welfare effects of the tax-deferred employer pensions. Therefore it is of both theoretical and practical importance for this paper to analyze the economic and welfare effects of the tax-deferred employer pensions in China according to the newly introduced tax policy.

In this context, this paper builds a general equilibrium model of overlapping generations to analyze how the increase of employee contribution, employer matching in working period will affect the social welfare and economic variables, such as capital per worker, interest rate, wage, savings and retirement consumptions, under three different marginal tax rates assumptions: 1) tax rate in retirement period is the same as that in working period, 2) tax rate in retirement period is higher than that in working period, 3) tax rate in retirement period is lower than that in working period. According to the last 30 years' data about tax rate in China, the tax rate changes a lot, and mostly goes up. The uncertainty of some policy may influence another policy's effectiveness, sometimes may be a total offset. So this paper made a quantitative analysis. The paper is organized as follows. Section 2 describes the model. Section 3 presents calibration of the model and

numerical results. Section 4 shows policy implications and conclusion.

2. The Model

The model in this paper is developed from Diamond (1965), and it is a general equilibrium model of two period overlapping generations with three sectors: households, firms and government, which are described in turn below. The social security was not taken into account for simplicity and transparency, surely such a practice is on one condition that leaving out social security will not affect the research results of this paper. The key assumption is that each person's life has two time periods: youth and old age, and it is assumed that only the young work; the old are retired. Here we use $N_{1,t}$ stands for the people who were born in period t, namely the young people in working period, $N_{2,t+1}$ stands for the retired people in period t+1, and n stands for the fixed population growth rate (we assume that the population growth rate is the same as the labor growth rate in this paper), then we have the following equation $N_{1,t} = (1+n) N_{1,t-1}$, and the total amount of people in t period is given by $N_t = N_{1,t} + N_{2,t} = N_{1,t} + N_{1,t-1} = \frac{2+n}{1+n} N_{1,t}$.

2.1. Households

The young people who were born in period t offer labor to get pay, and they get their disposable income after contributing to their tax-deferred employer pension accounts and paying individual income tax (which also means the labor income tax, since we only take labor income tax into account in working period in this paper, and it will be explained below). Part of the disposable income was deposited and the rest was consumed. In period t+1, the people who were born in period t retire and consume what they saved in working period and what they get from their employer pension accounts. Households derive utility from consuming goods and they choose consumptions in both working period and retirement period and savings to maximize their lifetime utility. The household's intertemporal problem is as follows:

$$\max \left\{ c_{1,t}, c_{2,t+1}, s_t \right\} U_t = \frac{c_{1,t}^{1-\sigma}}{1-\sigma} + \frac{1}{\beta} \frac{c_{2,t+1}^{1-\sigma}}{1-\sigma} \tag{1}$$

$$s.t. \quad c_{1,t} = \left[1 - a - \tau_{1,t} (1-a) \right] w_t - s_t \tag{2}$$

$$c_{2,t+1} = (1 + r_{t+1}) s_t + (1 - \tau_{2,t+1}) \bar{A}_{t+1} \tag{3}$$

$$\bar{A}_{t+1} = (1 + r_{t+1})(a + \eta) w_t \tag{4}$$

Where, $c_{1,t}$, is the consumption in working period, $c_{2,t+1}$ is the consumption in retirement period and U_t is the lifetime utility. The constant relative risk aversion coefficient $\sigma > 0$ and

$\sigma \neq 1$, $\frac{1}{\beta} \in (0,1)$ is the discount factor of the future utility. The following parameters and variables $a, \eta, \tau_{1.,t}, \tau_{2,t+1}, w_t, s_t, r_{t+1}$ represent respectively: the employee contribution rate, the employer matching rate, the individual income tax rate for young people in period t, the individual income tax rate for retired people in period t+1, the wage in period t, the savings in period t and the return rate to savings in period t+1. $\overline{A}_{t+1}$ is the total tax-deferred account balance. The first order condition of the household's intertemporal problem is:

$$c_{2,t+1} = \left(\frac{1+r_{t+1}}{\beta} \right)^{\frac{1}{\sigma}} c_{1,t} \tag{5}$$

Which means that consumption when young equals to consumption when old if the real return to savings is equal to the rate of time discount, that is to say if the incentive to save for the future is sufficient to offset the discounting of future utility.

2.2. Firms

The firms produce output of a single good according to a Cobb-Douglas production function. Output, Y, in period t, is given by $Y_t = AK_t^{\alpha} N_{1,t}^{1-\alpha}$. Where A is an exogenous technology parameter, K_t is the capital stock in period t, $N_{1,t}$ is the labor in period t, and $\alpha \in (0,1)$ is the share parameter of capital. Here is another expression of the production function $y_t = Ak_t^{\alpha}$. Where, k_t, is capital per labor, and y_t is output per labor. The employer matching is a certain percentage, $\eta \in (0,1)$, of the total wage. According to Euler's theorem in production, we have the following function $Y_t = AK_t^{\alpha} N_{1,t}^{1-\alpha} = r_t K_t + (1+\eta) w_t N_{1,t}$. The optimal stock is determined by the first-order condition that the cost of the capital, r, is equal to the marginal product of capital, and the price of labor, w, is equal to the marginal product of labor:

$$r_t = \alpha A k_t^{\alpha-1} \tag{6}$$

$$w_t = \frac{(1-\alpha) A k_t^{\alpha}}{1+\eta} \tag{7}$$

2.3. Government

The balanced budget condition for the government means that a reduction in taxation on employer pension must be accompanied by either reducing government spending, or raising the tax rate applying to other kind of income, in this paper, we assume that the reduction in taxation is

balanced by cutting government spending, and we only take labor income tax into account, as other kinds of income tax don't matter that much in our analysis. The government spending is denoted as, G , and T is the total government tax revenue.

$$T_t = (1-a)\tau_{1,t} w_t N_{1,t} + \bar{A}_t \tau_{2,t} N_{2,t} \tag{8}$$

2.4. The General Equilibrium solution

The capital stock in period t+1 is formed by the accumulation of the contribution and employer matching in the pension account and the individual savings in period t (see to appendix A).

$$s_t + (a+\eta) w_t = (1+n) k_{t+1} \tag{9}$$

Based on the initial capital stock (k_0) and the value of all parameters, the competitive equilibrium of this economic system is a sequence, $\{c_{1,t}, c_{2,t+1}, s_t, r_{t+1}, w_t, \bar{A}_{t+1}, k_{t+1}\}_{t=0}^{\infty}$, the value of which in every period all satisfy the equation from (1) to (9) above. Plunge equation (2) to (4) and equation (6), (7), (9) into equation (5), we can obtain the dynamic general equilibrium system described by the difference equation.

$$\begin{aligned} &\left(1+\alpha A k_{t+1}^{\alpha-1}\right)\left[(1+n)k_{t+1} - \frac{\tau_{2,t+1}(a+\eta)(1-\alpha)}{1+\eta} A k_t^{\alpha}\right] = \\ &\left(\frac{1+\alpha A k_{t+1}^{\alpha-1}}{\beta}\right)^{\frac{1}{\sigma}}\left[(1-\tau_{1,t}+a\tau_{1,t}+\eta)\frac{1-\alpha}{1+\eta} A k_t^{\alpha} - (1+n)k_{t+1}\right] \end{aligned} \tag{10}$$

Assume that there is only one steady state equilibrium solution for the dynamic general equilibrium system, and we can get the linear expression of equation (10) through the first order Taylor series expansion at steady state:

$$i(k_{t+1}-k) + j(k_t - k) = 0$$

Where

$$i = (1+n)\left(1+A\alpha^2 k^{\alpha-1}\right) + \frac{1+n}{\beta^{\frac{1}{\sigma}}}\left(1+\alpha A k^{\alpha-1}\right)^{\frac{1}{\sigma}} - \frac{(1+n)(1-\alpha)\alpha}{\sigma\beta^{\frac{1}{\sigma}}}\left(1+\alpha A k^{\alpha-1}\right)^{\frac{1-\sigma}{\sigma}} A k^{\alpha-1} +$$

$$\frac{(1-\tau_{1,t}+a\tau_{1,t}+\eta)(1-\alpha)^2\alpha}{\sigma(1+\eta)\beta^{\frac{1}{\sigma}}} A^2 k^{2(\alpha-1)}\left(1+\alpha A k^{\alpha-1}\right)^{\frac{1-\sigma}{\sigma}} + \frac{\tau_{2,t+1}(a+\eta)(1-\alpha)^2\alpha}{1+\eta} A^2 k^{2(\alpha-1)}$$

And

$$j = \frac{\alpha(\alpha-1)}{1+\eta}\left[\tau_{2,t+1}(a+\eta) + \frac{1-\tau_{1,t}+a\tau_{1,t}+\eta}{\beta^{\frac{1}{\sigma}}}\left(1+\alpha A k^{\alpha-1}\right)^{\frac{1-\sigma}{\sigma}}\right] A k^{\alpha-1}\left(1+\alpha A k^{\alpha-1}\right)$$

The steady-state condition for equation (10) is $0 < \frac{k_{t+1} - k}{k_t - k} = -\frac{j}{i} < 1$, namely $i + j < 0$.

We can derive from equation (10) that the capital per labor, $\bar{k}$, at steady state, satisfies the following equation:

$$\left(1+\alpha A\bar{k}^{\alpha-1}\right)^{\frac{\sigma-1}{\sigma}}\left[\left(1+n\right)-\frac{\tau_{2,t+1}\left(a+\eta\right)\left(1-\alpha\right)}{1+\eta}A\bar{k}^{\alpha-1}\right]= \left(\frac{1}{\beta}\right)^{\frac{1}{\sigma}}\left[\left(1-\tau_{1,t}+a\tau_{1,t}+\eta\right)\frac{1-\alpha}{1+\eta}A\bar{k}^{\alpha-1}-\left(1+n\right)\right] \tag{11}$$

The share parameter of capital in production function α , the constant relative risk aversion coefficient σ , the discount factor of the future utility β , the fixed population growth rate n , the employee contribution rate a , the employer matching rate η , the individual income tax rate in working period $\tau_{1,t}$, the individual income tax rate for retired people in period t+1 $\tau_{2,t+1}$. All of the factors above determine the capital per labor at steady state together. From equation (2), (3), (5), (6), and equation (7), we can derive the optimal solution for the economic variables at general equilibrium:

$$\bar{c}_1 = \left(1-\tau_{1,t}+a\tau_{1,t}+\eta\right)\frac{1-\alpha}{1+\eta}A\bar{k}^{\alpha}-\left(1+n\right)\bar{k} \tag{12}$$

$$\bar{c}_2 = \left(1+\alpha A\bar{k}^{\alpha-1}\right)\left[\left(1+n\right)\bar{k}-\frac{\tau_{2,t+1}\left(a+\eta\right)\left(1-\alpha\right)}{1+\eta}A\bar{k}^{\alpha}\right] \tag{13}$$

$$\bar{s} = \left(1+n\right)\bar{k}-\frac{\left(a+\eta\right)\left(1-\alpha\right)}{1+\eta}A\bar{k}^{\alpha} \tag{14}$$

$$\bar{r} = \alpha A\bar{k}^{\alpha-1} \tag{15}$$

$$\bar{w} = \frac{1-\alpha}{1+\eta}A\bar{k}^{\alpha} \tag{16}$$

$$\bar{U} = \frac{\bar{c}_1^{1-\sigma}}{1-\sigma}+\frac{1}{\beta}\frac{\bar{c}_2^{1-\sigma}}{1-\sigma} \tag{17}$$

3. Numerical Simulations

3.1. Calibration

The OLG model is calibrated to the Chinese economy with tax-deferred employer pension accounts. The constant relative risk aversion coefficient σ is set at 2.0 according to Blanchard, Fisher and Miyazato. Auerbach and Kotlikoff (1987) estimated that the one-year consumption patience was 0.98, which was adopted by Zaigui Yang (2008) too, we assume that the total working period is 28 years in this paper, so the discount factor of future utility is set at, $\frac{1}{\beta} = 0.98^{28} \approx 0.567976$. The population growth rate is estimated at, $n = \frac{71182}{24017} - 1 \approx 1.964$, in 1984-2012 according to the 2013 China Statistical Yearbook.

The total factor productivity, A, is set at 1.0. The share parameter of capital, α, is usually set at 0.30 in developed countries (Barro and Sala-I-Martin, 2004. Pecchenino and Polland, 2002). Since the price of labor in China is still lower compared to developed countries, the share parameter of capital is set at 0.35 in this paper.

According to "The Notice", the individual contribution (no more than 4% of one's average monthly pay for the previous year) is allowed to be deducted before paying individual income tax, so is the employer matching. Returns on the tax-deferred accounts are exempted from the individual income tax too, and the withdrawal will be taxed at ordinary income tax rate. "The Employer Pension Pilot Scheme" published in 2004 states that the employer matching for the whole year is no more than one-twelfth of the total payment for previous year, of which the sum of employee contribution and employer matching is no more than one-sixth. So we assume that the employer matching rate is 100% of contribution, which is to say that the employer matching is equal to employee contribution, $a = \eta = 3\%$.

With the rapid development of Chinese economy, the average wage in China now is more than thirty times higher than that of thirty years ago, and the seven-level progressive marginal individual income tax rate is in use after many alteration of tax regime have been made. We can't predict precisely where the economy in China will go, to what level the wages will increase and how the tax rate will change in the future thirty years. So based on the current wage level and tax rate, the labor income tax rate in working period $\tau_{1,t}$ is set at 10%, and the individual income tax rate in retirement period $\tau_{2,t+1}$ is set at 10%, 3% and 20% respectively.

3.2. Numerical Results

Here we give the specific simulation results of how the changes of employee contribution and employer matching will affect the economic variables, such as the capital per worker, interest rate, wage, savings, consumption and total welfare.

3.2.1. The change of employee contribution

The following three tables show how the economic variables will change with the increase of employee contribution, and E stands for the employee contribution rate elasticity of economic variable. The negative E value means that the economic variable decreases with the increase of the

employee contribution rate.

Table 1

The numerical results when tax rate is set at 10% in retirement period

a	k	r	w	c_1	c_2	s	U
2%	0.006836	8.942248	0.110219	0.082464	0.195957	0.014750	-15.025039
3%	0.006925	8.867377	0.110719	0.082777	0.195963	0.013881	-14.979085
4%	0.007013	8.794893	0.111210	0.083085	0.195964	0.013000	-14.934295
E	3.83%	-2.49%	1.34%	1.13%	0.01%	-18.91%	0.91%

Table 2

The numerical results when tax rate is set at 3% in retirement period

a	k	r	w	c_1	c_2	s	U
2%	0.006586	9.161444	0.108791	0.081874	0.196688	0.014080	-15.101624
3%	0.006625	9.126352	0.109016	0.082077	0.196845	0.013094	-15.069086
4%	0.006663	9.092487	0.109235	0.082277	0.196990	0.012101	-15.037296
E	1.74%	-1.13%	0.61%	0.74%	0.23%	-22.67%	0.64%

Table 3

The numerical results when tax rate is set at 20% in retirement period

a	k	r	w	c_1	c_2	s	U
2%	0.007193	8.651345	0.112199	0.083252	0.194919	0.015708	-14.925667
3%	0.007353	8.528740	0.113065	0.083698	0.194716	0.015007	-14.864625
4%	0.007512	8.410391	0.113919	0.084135	0.194513	0.014291	-14.805592
E	6.51%	-4.24%	2.28%	1.58%	-0.31%	-14.18%	1.21%

1). Capital stock and factor price

The capital per labor and wage will go up with the increase of employee contribution, while the return rate to savings decreases, whatever the tax rate in retirement period will be. The main reason for the return rate to savings going down is the accumulation of the capital stock. The wage is determined by both the capital per labor and employer matching rate, since the employer matching rate is set at a constant number, 3%, here, the rise of wage is almost completely due to the increase of capital stock.

Surely there are many differences among the three tables above about the change of capital stock and factor price when the tax rate in retirement period differs. The capital per labor, return rate to savings and wage are more elastic to employee contribution rate when tax rate in retirement period is higher than that in working period, take capital per labor for example, the contribution rate elasticity of capital per labor is 6.51% when tax rate goes up in retirement period, almost four times as big as that when tax rate decreases. There are several reasons to explain this, the main

reason is that the higher tax rate in retirement period adds up to the government tax revenue, which in turn increases the government savings and accelerates the accumulation of capital stock.

2). Savings

According to this paper, the employee contribution does crowd out personal savings. The three tables above show us that the crowd-out effect is the largest when tax rate in retirement period is set at 3%, and two reasons should be mentioned to account for this. On one hand, the substitute effect which comes from the rise of the return rate to savings promote the increase of savings, while on the other hand, the income effect which comes from the decrease of tax rate in retirement period should be responsible for the reduction of the savings. The total effect is the decreasing savings, since the income effect dominates the substitute effect.

3). Consumption and welfare

The disposable income in working period decreases because of the increase of employee contribution rate, but the young prefer cutting down savings to reducing consumption, so as to maintain or even increase their consumption level in working period. This is mostly because that the decreasing return rate to savings makes it much less attractive to save.

Generally speaking, the total welfare goes up with the increase of employee contribution rate. But the welfare is lower when tax rate in retirement period is 3% than that when tax rate in retirement period is set at 10%, the reason for this in as follows. The total welfare is co-determined by the consumption in working period and that in retirement period, consumption in working period is lower and consumption in retirement period is higher in table 2 compared to those in table 1, and the welfare gain from the increase of consumption in retirement period in less than the welfare loss from the reduction of consumption in working period.

The effect of the increase of employee contribution rate on consumption in retirement period changes with the future tax rate in retirement period. The retirement consumption increases with the rise of employee contribution rate when the tax rate stands still or goes down, namely when the tax rate in retirement period is set at 10% or 3%. On the contrary, the retirement consumption decreases with the rise of employee contribution when tax rate in retirement period goes up. In the meantime, employee contribution rate elasticity of retirement consumption in table 2 is 23 times as large as that in table 1. Among the three tables, the lower the tax rate in retirement period, the more the retirement consumption when the employee contribution rate is the same.

The tax-deferred accounts' effect on retirement consumption depends on where the future tax rate goes. The tax-deferred policy can't promote consumption in retirement period, if the inflation in the future, resulting from the government' easing monetary policy which is aimed at maintain high speed economic growth, confronts the retired with much higher marginal tax rate, or if the government finances its increasing future spending by raising government tax revenue, which in turn boosts the tax rate in retirement period. Contrarily, the retirement consumption will increase a lot if the future tax rate goes down.

3.2.2. The change of employer matching

Here in this part we assume that the employee contribution rate is constant, 3%, while the employer matching rate is respectively 100%, 200% and 300% of contribution. And E stands for the employer matching rate elasticity of economic variable. The negative E value means that the economic variable decreases with the increase of the employer matching rate.

Table 4

The numerical results when tax rate is set at 10% in retirement period

η	k	r	w	c_1	c_2	s	U
3%	0.006925	8.867377	0.110719	0.082777	0.195963	0.013881	-14.979085
6%	0.007168	8.670804	0.108892	0.083619	0.195974	0.011444	-14.857274
9%	0.007398	8.494616	0.107072	0.084397	0.195981	0.009077	-14.746938
E	6.60%	-4.29%	-3.35%	1.94%	0.01%	-41.85%	1.56%

Table 5

The numerical results when tax rate is set at 3% in retirement period

η	k	r	w	c_1	c_2	s	U
3%	0.006625	9.126352	0.109016	0.082077	0.196845	0.013094	-15.069086
6%	0.006730	9.033546	0.106516	0.082628	0.197247	0.010360	-14.981946
9%	0.006830	8.947353	0.104112	0.083148	0.197633	0.007748	-14.900584
E	3.05%	-1.98%	-4.60%	1.30%	0.40%	-51.30%	1.12%

Table 6

The numerical results when tax rate is set at 20% in retirement period

η	k	r	w	c_1	c_2	s	U
3%	0.007353	8.528740	0.113065	0.083698	0.194716	0.015007	-14.864625
6%	0.007791	8.213277	0.112118	0.084877	0.194162	0.013002	-14.707032
9%	0.008207	7.940539	0.111033	0.085932	0.193643	0.011000	-14.570274
E	10.98%	-7.14%	-1.81%	2.63%	-0.55%	-30.82%	2.00%

The three tables above vividly show that the wage decreases with the rise of employer matching rate, since the higher matching rate increase the corporate costs, which is quite the opposite of what happens to the employee contribution. Apart from what mentioned above, the employer matching has the same effect on economic variables as employee contribution did, only to a greater extent. Take capital per labor for example, when the tax rate in retirement period is set at 10%, 3% and 20% respectively, the capital per labor increases by 3.83%, 1.74%, 6.51%, respectively if employee contribution rate increases by 1%, and 6.60%, 3.05%, 10.98% when employer matching rate increases by 1%, which implies that it's more effective to increase employer matching when there is a positive effect to do so.

4. Conclusion and Policy Implications

To summarize the simulation results of how the changes of employee contribution and employer matching will affect economic variables, a number of results are as follows.

Firstly, the effects of the tax-deferred policy are up to the future tax trends to a large extent. A tax-deferred policy can't promote consumption in retirement period, if the inflation in the future, resulting from the government' easing monetary policy which is aimed at maintain high speed economic growth, confronts the retired with much higher marginal tax rate, or if the government finances its increasing future spending by raising government tax revenue, which in turn boosts the tax rate in retirement period. On the contrary, the retirement consumption will be stimulated largely by a tax-deferred policy if the tax rate in retirement period is much lower than that of working period. But the problem is that we can't predict the policy change in the future, besides, the optimal policy in the future which will be made according to the economic circumstance at that time is always not the best for today because of the "Time Inconsistency".

Secondly, we can hardly increase the retirement consumption and welfare at the same time, the decrease of the welfare always follows the increase of the retirement consumption when the future tax rate falls. The welfare is determined by consumption both in working period and retirement period. One unit of consumption in working period brings more welfare than that in retirement period because of "time preference" and time value of money. The difference of "time preference" implies the different proportion of retirement consumption in total welfare, the subjective "discount factor", determined by "time preference", is an important factor in deciding the total welfare, which also can partly explain the contradiction between increasing retirement consumption and raising welfare. Surely the imperfection of policy is objective which can hardly be avoided, and this calls for the decision maker to make a choice.

Thirdly, the employer matching affects economic variables way more than employee contribution does. The increase of employer matching is much more effective in raising consumption and welfare than the increase of employee contribution, which is because of the income increase resulting from employer matching increase. What's worth to be mentioned is that employer matching increase is superior to contribution increase in accumulating capital and cutting down return rate to savings too.

Some policy implications arise from the study of the simulation results. First, a tax deduction policy, namely EEE, is advisable in this paper, which means the contribution and employer matching is deducted from the taxable income, and this is exactly what's being adopted in Hungary. Employees are immune to tax change in the future with a tax-deducted account, which is to say that employee can get a definite benefit from a tax-deducted account whatever the future tax trend and tax policy will be, and this in turn makes employee much more inclined to contribute to the tax-deducted account. The employee's tax burden is still pretty high in China according to Annual Report 2012 by the Word Bank, and a tax-deducted account will contribute to lower the tax-burden. Second, to increase employer matching is preferable. On one hand, economic variables, such as savings and interest rate, are more sensitive to employer matching, and China is now going through the initial stage of interest rate liberalization, the lower interest rate, resulting from the increase of employer matching, will give more liquidity to monetary market. On the other hand, the increase of employer matching is able to increase consumptions in both periods and reduce savings at same time, which might be an advisable solution to the dilemma of high savings and inadequate consumption in China.

It's important to note that the results in this paper hold up subjecting to all the qualifications mentioned above, and some factors such as the difference among households, the utility of leisure, expectation and mortality will be taken into account in our future work.

Appendix A

The national income identity is given by: $Y_t = C_t + I_t + G_t$

Where $Y_t = r_t K_t + (1+\eta) w_t N_{1,t}$

$$C_t = c_{1,t} N_{1,t} + c_{2,t} N_{2,t}$$

$$I_t = \Delta K_{t+1} = K_{t+1} - K_t$$

$$G_t = T_t = (1-a)\tau_{1,t} w_t N_{1,t} + (a+\eta)(1+r_t)\tau_{2,t} w_{t-1} N_{2,t}$$

$$c_{1,t} = \left[1 - a - \tau_{1,t}(1-a)\right] w_t - s_t$$

$$c_{2,t} = (1+r_t) s_{t-1} + (a+\eta)(1+r_t)(1-\tau_{2,t}) w_t$$

Plunge the equation above to the national income identity gives:

$$\Delta K_{t+1} = (a+\eta) w_t N_{1,t} + r_t K_t + s_t N_{1,t} - (1+r_t) s_{t-1} N_{2,t} - (a+\eta)(1+r_t) w_{t-1} N_{2,t}$$

Divided by, $N_{1,t}$, we have the following equation:

$$(1+n) k_{t+1} - s_t - (a+\eta) w_t = \frac{1+r_t}{1+n}\left[(1+n) k_t - s_{t-1} - (a+\eta) w_{t-1}\right]$$

If we set, $z_t = (1+n) k_t - s_{t-1} - (a+\eta) w_{t-1}$, then:

$$z_{t+1} = \frac{1+r_t}{1+n} z_t$$

The equilibrium condition for steady solution is that, $z_{t+1} = 0$, which means:

$$s_t + (a+\eta) w_t = (1+n) k_{t+1}$$

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