Public pension, Altruism and Economic Growth in China

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Abstract: This paper employs an endogenous growth OLG model with altruistic motive to investigate the urban public pension system in China. We examine the effects of the individual contribution rate and firm contribution rate on the economic growth rate, saving rate, population growth rate, education expense rate for each child and bequest rate. According to the urban situation of China, we estimate the parameter values and simulate to get the direction and degree of exogenous variables influence the endogenous variables. Raising the firm contribution rate increases the population growth rte, education expense rate and bequest rate, and decreases the saving rate and economic growth rate; while raising the individual contribution rate decreases the saving rate, economic growth rate, education expense rate and bequest rate, while increases the population growth rate. From the absolute point of view, the impact of the individual contribution rate on the saving rate and education expense rate is about 6 times and 2 times of the impact of firm contribution rate, while the impact of the firm contribution rate on the population growth rate, bequest rate and economic growth rate is about 4 times, 8 times and 3.5 times of the impact of individual contribution rate. In order to boost economy, control population, decrease the individual saving rate, education expense and bequest for each child, we can get that a policy to decrease the firm contribution rate and increase the individual contribution rate is reasonable.

Keywords: Public Pension; Altruism; Economic Growth

1. Introduction

China reformed the urban public pension system in December 2005 and decide to put the individual contribution into her/his own individual pension account, this account will act as a fund; while put the firm contribution into a pension social pool and act as pay-as-you-go (PAYG) system.. The current firm contribution rate is 20%, while the individual rate is 8%. Whether are the contribution rates appropriate? As a developing country, China needs to maintain rapid economic growth. While in order to boost economy to recovery from financial crisis early, it is also necessary to reduce the level of individual savings to encourage consumption and increase business investment. If the firm contribution rate and the individual contribution rate increase or decrease, what will happen on the economic growth, saving rate and so on in China? These are what we concern.

This paper will also consider the following situations. Firstly, parents love their children, and have the intention to leave bequests for their children. But both the idea and practice of domestic and foreign inheritance tax and the fact that the social pension scheme is to provide pensions to support the basic living material to the retirees suggest that the reform of the public pension system should not increase individual intentional heritage. Secondly, parents wish their children to receive good education to improve their human capital, which makes parents feel good. Therefore parents are pleased to invest in the education for their children. However, the current ratio of family education expenses to family income is too high for most family in China. So the public want to decrease the education expenses for children.

A lot of papers employs overlapping generations (OLG) model to investigate the relationship of the economic growth, saving rate, population growth and public pension system. Junsen Zhang & Junxi Zhang (1995) use an endogenous growth model to compare the system without public pension, the fully fertility related public pension system, and the conventional public pension system and examine the effects of the different public pension systems on the rates of population growth and output growth. Junsen Zhang & Junxi Zhang (1998) analyze the effects of social security in a model with alternative motives of having children. They show that social security increases per capita income growth when the social security tax is not too high. Wigger (1999) employs a model in which parents derive utility from having children and expect support from children to study the interrelation between growth, fertility and PAYG-public pension size. It is shown that small sized public pensions stimulate per capita income growth, but further increases in public pensions reduce it. A rise in public pensions reduces fertility if they are either small or large, and stimulates fertility if they are medium sized. Within the framework of an OLG model with two-sided altruism and endogenous growth, Yang (2005) calculates the rates of fertility, output growth, child-rearing cost, saving, consumption, net intertemporal transfer, bequest and gift, and compares the equilibrium solutions under different public pension systems. One common feature of all these studies is to turn the capital per unit of effective labor into constant by using a special definition of productivity and turn production function into AK-type.

Jie Zhang (1995) uses an endogenous growth model to examine the effects of social security on the rates of per capita income growth and population growth. Instead of turning production function into AK-type, he introduces human capital, and makes it and the physical capital per unit of labor increase in the same growth rate. Assuming that consumption, the number of children and welfare of each child are sources of individual utility, he proves that in case of positive individual heritage, PAYG social security stimulates economic growth by reducing population growth rate and stimulating the ratio of human capital investment for each child to family income. Under the assumption of positive individual heritage, Jie Zhang (2001) uses the same method to compare the long-term effects of four forms of social security tax on the rates of economic growth and population growth. Within a framework of an OLG endogenous growth model, Yang (2007) examines the effects of China’s partially funded public pension on fertility, economic growth and family old-age security. Yew & Zhang (2009) use an OLG model with human capital externality, fertility rate and endogenous growth to examine the optimal size of PAYG social security.

This paper employs an endogenous growth OLG model to investigate the reformed urban public pension system in China. We examine the impact of the individual and firm contribution rate on the economic growth rate, saving rate, population growth rate, education expense rate for each child and bequest rate. We use the OLG model to investigate the direction and degree of exogenous variables influence the endogenous variables. According to the urban situations of China, we estimate the parameter values and simulate to examine the rationalities of the analysis results. This paper then makes some policy advices for the problems we concerned according to the analysis results and simulation results.

The rest of this paper is organized as follows: Section 2 presents the basic model. Section 3 analyzes the steady growth equilibrium system. Section 4 takes on the simulation process. The last section concludes the paper and makes some policy advices.

2. The model

This paper assumes a closed economy composed of numerous individuals, firms, and a government. Each individual lives for at most three periods divided into youth, working period, and retirement period. At the beginning of each period t, L_t identical agents of generation t enter the workforce. Each individual in generation t has n_t children, so $L_{t+1} = n_t L_t$.

2.1 Individual

In the youth period, each individual receives education to develop their human capital, and have no capacity to make economic decisions. In the working period, each individual has one unit of labor, they invest $\nu \in (0,1)$ units of labor to bring up their each child, therefore $(1-\nu n_t)$ units of labor to invest in the labor market to earn wage. They use the income to make pension contributions, save a part of income to support consumption in their retirement period, pay the education expenses for their children, and consume the rest. In the retirement period, they distribute their savings with accrued interest, individual account benefits and social pool benefits between their consumption and the bequests to their children. Obviously, individual has opportunity to get bequests from her/his parent, which can be used to support the consumption during the working period.

Each individual derives utility from their working-period consumption $c_{2,t}$, retirement-period consumption $c_{3,t+1}$, the human capital of their children and bequests to children. The utility is described by an additively separable logarithmic function. Thus, the utility maximization problem is:

$$\max_{\{s_t, n_t, e_t, B_{t+1}\}} U_t = \ln c_{2,t} + \beta \ln c_{3,t+1} + \gamma \ln\left(n_t h_{t+1}\right) + \alpha \ln(n_t B_{t+1}),$$

(1)

$$s.t. \qquad c_{2,t} = B_t + (1-\tau-s_t)(1-vn_t)\,w_t - n_t e_t,$$

(2)

$$c_{3,t+1} + n_t B_{t+1} = (1+r_{t+1})s_t(1-vn_t)\,w_t + I_{t+1} + P_{t+1}, \tag{3}$$

where $\beta \in (0,1)$ denotes the individual discount rate, $\gamma \in (0,1)$ the human capital discount rate, $\alpha \in (0,1)$ the altruism intensity, they reflect individual preference. The human capital of the generation t+1 is:

$$h_{t+1} = Ae_t^{\delta} h_t^{1-\delta}, \tag{4}$$

where $\delta \in (0,1)$ denotes the elasticity of human capital with respect to education expense, A>0 the productivity of human capital. w_t denotes the wage, τ the individual contribution rate, s_t the saving rate, e_t the education expense for each children, r_{t+1} the interest rate, I_{t+1} the individual account benefits, P_{t+1} the social pool benefits, B_{t+1} the bequests from their parents for each child in generation t+1.

Substituting equations (2)-(4) into equation (1), and differentiating with s_t, n_t, e_t and B_{t+1}, we can get the first-order conditions for the utility maximization problem are

$$\beta \frac{1+r_{t+1}}{c_{3,t+1}} = \frac{1}{c_{2,t}}, \tag{5}$$

$$\frac{e_t + (1-\tau-s_t)\,vw_t}{c_{2,t}} + \beta \frac{(1+r_{t+1})s_t vw_t + B_{t+1}}{c_{3,t+1}} = \frac{\gamma+\alpha}{n_t}, \tag{6}$$

$$\gamma \frac{\delta}{e_t} = \frac{n_t}{c_{2,t}}, \tag{7}$$

$$\beta \frac{n_t}{C_{3,t+1}} = \frac{\alpha}{B_{t+1}}.$$

(8)

2.2 Firm

Firms produce homogenous commodity in competitive markets. The production is described by Cobb-Douglas function $Y_t = DK_t^{\theta}(L_t l_t h_t)^{1-\theta}$, where Y_t is the output in period t, K_t the capital stock, l_t the labor hired from each individual of generation t, and D>0 the productivity of physical capital.

Firms make pension contributions at the rate of $\eta \in (0,1)$ on their payroll. According to the product distribution, one can get $DK_t^{\theta}(L_t l_t h_t)^{1-\theta} = (1+r_t)K_t + (1+\eta)w_t L_t l_t$. The first-order conditions for the profit maximization are

$$1 + r_t = \theta D\left(\frac{K_t}{L_t l_t h_t}\right)^{\theta-1}, \tag{9}$$

$$w_t = \frac{1-\theta}{1+\eta} D\left(\frac{K_t}{L_t l_t h_t}\right)^{\theta} h_t. \tag{10}$$

2.3 The government

The accumulation in the individual account is used to pay the individual when they retire in the next period as funded pension benefits:

$$I_{t+1} = (1 + r_{t+1})\tau(1 - \nu n_t)w_t, \tag{11}$$

The social pool fund is paid to the retirees in the current period as pay-as-you-go pension benefits: $L_t P_{t+1} = \eta L_{t+1} l_{t+1} w_{t+1}$, that is

$$P_{t+1} = \eta n_t l_{t+1} w_{t+1}. \tag{12}$$

2.4 The markets

The labor market clearing implies the demand is equal to the supply.

$$l_t = 1 - \nu n_t, \tag{13}$$

Similarly, in physical capital market, the capital demand is K_{t+1}, while the supply is the savings and pensions fund in individual accounts of generations t. The capital demand equals to the supply:

$$K_{t+1} = L_t(\tau + s_t)(1 - \nu n_t)w_t. \tag{14}$$

3. Balanced growth equilibrium

A balanced growth equilibrium is an equilibrium in which the intensive variables such as saving rate, population growth rate, and education expense rate $\gamma_e = \dfrac{e_t}{(1-\nu n)w_t}$ are all constant, while the extensive variables such as wage, human capital, labor-capital, and consumption are all increasing at a constant growth rate g. We will discuss the balanced growth equilibrium below.

3.1 The analytical solutions of variables

Arranging the equation (9) and equation (10) gives

$$\frac{w_{t+1}}{1+r_{t+1}}=\frac{1-\theta}{\theta(1+\eta)}\frac{(\tau+s)w_t}{n},\tag{15}$$

$$1+g=\frac{w_{t+1}}{w_t}=\frac{1-\theta}{\theta(1+\eta)}\frac{(\tau+s)(1+r_{t+1})}{n}.$$

(15')

Substituting equations (5) and (7) into equation (6) and arranging gives

$$e_t=\nu\delta\frac{1-\tau}{1-\delta}w_t.\tag{16}$$

Therefore the education expense rate

$$\gamma_e=\frac{\nu\delta}{1-\delta}\frac{1-\tau}{1-\nu n}.\tag{17}$$

From equations(5),(7) and(8) we can get

$$B_{t+1}=\frac{\alpha}{\gamma\delta}(1+r_{t+1})e_t.$$

(18)

Substituting equations (7), (16), (18) into equation (8) and (8) and arranging gives

$$(\alpha+\beta)\frac{(1-\tau)}{\gamma(1-\delta)}\frac{\nu n}{1-\nu n}=(1+\frac{\eta(1-\theta)}{\theta(1+\eta)})(\tau+s).$$

(19)

From equation (8) we have

$$B_t=\frac{\alpha}{\alpha+\beta}(\frac{\theta(1+\eta)}{1-\theta}+\eta)(1-\nu n)w_t.$$

(20)

From equation (7) we have

$$(1+\frac{1}{\gamma\delta})\frac{\delta(1-\tau)}{1-\delta}\frac{\nu n}{1-\nu n}=\frac{\alpha}{\alpha+\beta}\frac{\theta+\eta}{1-\theta}+1-(s+\tau).$$

(21)

Solving equations (19) and (21), gives

$$\tau+s=\frac{\frac{\alpha}{\alpha+\beta}\frac{\theta+\eta}{1-\theta}+1}{\frac{1+\gamma\delta}{\alpha+\beta}(1+\frac{\eta(1-\theta)}{\theta(1+\eta)})+1}.\tag{22}$$

Substituting equations (22) into equation (21), defining $\chi=\frac{\gamma\delta}{1+\gamma\delta}\frac{1-\delta}{\delta(1-\tau)}(1+\varphi)\frac{\psi}{1+\psi}$,

where $\varphi=\frac{\alpha}{\alpha+\beta}\frac{\theta+\eta}{1-\theta}$, $\psi=\frac{1+\gamma\delta}{\alpha+\beta}(1+\frac{\eta(1-\theta)}{\theta(1+\eta)})$, arranging gives $\nu n=\frac{x}{1+x}$, thus

$$n = \frac{1}{v}\frac{x}{1+x}, \quad (23)$$

$$s = \frac{\varphi + 1}{\psi + 1} - \tau .$$

(22')

Substituting equations (16) into equation (4) gives

$$\frac{h_{t+1}}{h_t} = A(v\delta \frac{1-\tau}{1-\delta}\frac{1-\theta}{1+\eta}\mathrm{D})^{\delta} (\frac{\mathrm{K}_t}{L_t l_t h_t})^{\delta\theta} .$$

(24)

From equations (10) and (14), we have

$$\frac{K_{t+1} / L_{t+1}}{K_t / L_t} = \frac{\tau + s}{n}\frac{1-\theta}{1+\eta} D(\frac{K_t}{L_t l_t h_t})^{\theta - 1} .$$

(25)

Since $1 + g = \frac{h_{t+1}}{h_t} = \frac{K_{t+1} / L_{t+1}}{K_t / L_t}$, from equations (24) and (25), we have

$$1 + g = [A^{1-\theta}(v\delta \frac{1-\tau}{1-\delta})^{\delta(1-\theta)} (\frac{1-\theta}{1+\eta} D)^{\delta} (\frac{\tau + s}{n})^{\delta\theta}]^{\frac{1}{1-\theta+\delta\theta}} . \quad (26)$$

Define the bequest rate γ_B as the rate between the bequest that the individual intend to leave to each child B_{t+1} and their wage income $(1 - vn)w_t$, thus

$$\gamma_B = \frac{\alpha}{\alpha + \beta}(\frac{\theta(1+\eta)}{1-\theta} + \eta)(1+g) . \quad (27)$$

3.2 The effect of firm contribution rate

Differentiating g, s, n, γ_e, and γ_B with respect to η yields

$$\frac{\partial s}{\partial \eta} = \frac{1}{A(\alpha + \beta)}\left[\frac{\alpha}{1-\theta} - \frac{(1+\gamma\delta)\frac{(1-\theta)}{\theta(1+\eta)}(1 + \frac{\alpha(\theta+\eta)}{(\alpha+\beta)(1-\theta)})}{A}\right],$$

where $A = 1 + \frac{(1+\gamma\delta)\ (1 + \frac{\eta(1-\theta)}{\theta(1+\eta)})}{\alpha + \beta}$,

$$\frac{\partial n}{\partial \eta} = \frac{\gamma\delta(1-\delta)}{v\delta(1+x)^2(1+\gamma\delta)(1-\tau)}\left[\frac{\alpha}{(\alpha+\beta)(1-\theta)}\frac{\psi}{1+\psi} + \frac{(1+\varphi)}{(1+\psi)^2}\frac{1-\theta}{\theta(1+\eta)^2}\right] > 0,$$

$$\frac{\partial \gamma_e}{\partial \eta} = \frac{\gamma\delta}{\alpha+\beta}(1+\frac{1-\theta}{\theta}\frac{\eta}{1+\eta})\left\{\frac{\tau+s}{n}+\frac{\frac{\partial s}{\partial \eta}n-\frac{\partial n}{\partial \eta}(\tau+s)}{n^2}\right\},$$

$$\frac{\partial \gamma_B}{\partial \eta} = \frac{\alpha\nu}{1+\lambda_1}\left\{\begin{array}{l}\frac{1-\tau}{\gamma(1-\delta)(1+\varphi)}\left[\frac{1-\theta}{\theta}\frac{1}{(1+\eta)^2}(1-\frac{1+\psi}{1+\lambda_1})-\frac{1+\psi}{1+\varphi}\frac{\alpha}{(\alpha+\beta)(1-\theta)}\right] \\ +\frac{1-\theta}{\theta(1+\gamma\delta)(1+\eta)^2}(1-\frac{\psi}{1+\lambda_1})\end{array}\right\},$$

$$\frac{\partial g}{\partial \eta} = \left[A(\nu\delta\frac{1-\tau}{1-\delta})^{\delta}\right]^{\frac{1-\theta}{1-\theta+\delta\theta}}\left[(1-\theta)D\right]^{\frac{\delta}{1-\theta+\delta\theta}}\frac{\delta}{1-\theta+\delta\theta}\left[\begin{array}{l}(\frac{1}{1+\eta})^{\frac{\delta}{1-\theta+\delta\theta}}\theta\frac{\frac{\partial s}{\partial \eta}n-\frac{\partial n}{\partial \eta}(\tau+s)}{n^2}- \\ (\frac{1}{1+\eta})^{\frac{\delta}{1-\theta+\delta\theta}+1}(\frac{\tau+s}{n})^{\frac{\delta\theta}{1-\theta+\delta\theta}}\end{array}\right].$$

Obviously, raising the firm contribution rate induces the increases in the population growth rate, and the effect to the economic growth rate, saving rate, education expense rate and bequest rate depend on the relative parameter values.

3.3 The effect of individual contribution rate

Differentiating g, s, n, γ_e, and γ_B with respect to τ yields

$$\frac{\partial s}{\partial \tau} = -1 < 0;$$

since $\frac{\partial(\frac{\tau+s}{n})}{\partial \tau} = -\frac{1+\gamma\delta}{\gamma\psi}\frac{1}{1-\delta} < 0$, obviously

$$\frac{\partial n}{\partial \tau} > 0;$$

from equations (17) and (19) we have, $sign(\frac{\partial \gamma_e}{\partial \tau}) = sign(\frac{\partial(\frac{\tau+s}{n})}{\partial \tau})$, thus

$$\frac{\partial \gamma_e}{\partial \tau} < 0;$$

$$\frac{\partial g}{\partial \tau} = -(1+g)\frac{1-\theta}{1-\theta+\delta\theta}\frac{1-\delta}{\nu(1-\tau)}+(1+g)\frac{\delta\theta}{1-\theta+\delta\theta}\frac{n}{\tau+s}\frac{\partial(\frac{\tau+s}{n})}{\partial \tau} < 0;$$

from equation (27) we have, $sign(\frac{\partial \gamma_B}{\partial \tau}) = sign(\frac{\partial g}{\partial \tau})$, thus

$$\frac{\partial \gamma_B}{\partial \tau} < 0.$$

Raising the individual contribution rate induces the increase in the population growth rate, while decrease in saving rate, economic growth rate, education expense rate, and bequest rate. We will estimate the parameter values and then examine the effects as follows.

4. Simulations

4.1 Estimation of parameter values

Because a period length is usually in the interval of 25-30 years in the literature on OLG model and the standard retirement age in China is 60, this model sets a period length of 30 years. Analogous to Pecchenino and Pollard (2002), we assume that the individual discount rate per year is 0.985, hence the individual discount rate per period is $\beta = 0.98^{30}$. Assuming the human capital discount rate is 0.975, hence the human capital discount rate per period is $\gamma = 0.975^{30}$. Similarly, assuming the altruism intensity per year 0.965, hence the altruism intensity per period is $a = 0.965^{30}$.

The capital share of income, θ, is usually to be estimated as 0.3 in developed countries (e.g. Barro and Sala-i-Martin, 1995; Zhang, 2001; Pecchenino and Pollard, 2002; etc). The labor in China is comparatively cheaper, thus the labor share of income is lower, while the capital share of income is higher than that in developed countries. Hence, we assume that θ in China could be 0.35.

Assuming that the elasticity of human capital to the education expense δ=0.3, and bringing up a child need labor v=0.17. Analogous to Jie Zhang (1995), we assume that A=8, D=7 to ensure g>0.

According to the Chinese State Council Document 26 of 1997 and the Chinese State Council Document 38 of 2005, we can estimate that the individual contribution rate τ=8%, and the firm contribution rate η=20%.

4.2 Effect of exogenous variables

Hold other parameters constant, let the firm contribution rate be 20% and 22%, run the simulation process and get the result as in Table 1. Obviously, raising the firm contribution rate induces the increases in the population growth rate, education expense rate and bequest rate, and decrease in the saving rate and economic growth rate. The g and n in the table is the value for a period (30 years), not for one year; s, γ_e, and γ_B are ratio, hence value for each year equals to value each period.

Table 1 Effect of firm contribution rate

h	20%	22%	Percentage increased
s	41.51%	41.36%	-0.38%
n	54.47%	56.26%	3.29%
g_e	7.39%	7.41%	0.34%
g_B	163.30%	167.30%	2.45%
g	399.55%	393.83%	-1.43%

Similarly, hold other parameters constant, let the individual contribution rate be 8% and 10%, run the simulation process and get the result as in Table 2: raising the individual contribution rate induces the decrease in the saving rate, economic growth rate, education expense rate and bequest rate, while increase in the population growth rate.

Table 2 Effect of individual contribution rate

τ	8 %	10 %	Percentage increased
s	41.51%	39.51%	-4.82%
n	54.47%	55.57%	2.01%
g_e	7.39%	7.24%	-1.97%
g_B	163.30%	161.93%	-0.84%
g	399.55%	395.34%	-1.05%

According to Table 1 and Table 2, we can calculate the elasticity of the endogenous variables with respect to η and τ, as shown in Table 3. They reflect the extent to which the two exogenous variables influence the five endogenous variables. Comparing the absolute flexibility of endogenous variables on exogenous variables gives the impact of the individual contribution rate on the saving rate and education expense rate is about 6 times and 2 times of the impact of firm contribution rate, while the impact of the firm contribution rate on the population growth rate, bequest rate and economic growth rate is about 4 times, 8 times and 3.5 times of the impact of individual contribution rate.

Table 3 the elasticity of the endogenous variables on η and τ

	Elasticity on η	Elasticity on τ
s	-3.75%	-19.27%
n	32.89%	8.05%
g_e	3.4%	-7.89%
g_B	24.50%	-3.36%
g	-14.30%	-4.21%

5 Conclusions

This paper employs an endogenous growth OLG model with altruistic motive to investigate the urban public pension system in China. We examine the effects of the individual contribution rate and firm contribution rate on the economic growth rate, saving rate, population growth rate, education expense rate for each child, and the bequest rate. According to the urban situation of China, we estimate the parameter values and simulate to get the direction and degree of exogenous variables influence the endogenous variables.

The theoretical analysis results are shown as follows: raising the firm contribution rate induces the increases in the population growth rate, and the effect to the economic growth rate, saving rate, education expense rate and bequest rate depends on the relative parameter values; while raising the individual contribution rate induces the increase in the population growth rate, while decrease in the saving rate, economic growth rate, education expense rate and bequest rate.

The simulation results are shown as follows: raising the firm contribution rate induces the increases in the population growth rte, education expense rate and bequest rate, and decrease in the saving rate and economic growth rate; while raising the individual contribution rate induces the decrease in the saving rate, economic growth rate, education expense rate and bequest rate, while increase in the population growth rate. From the absolute point of view, the impact of the individual contribution rate on the saving rate and education expense rate is about 6 times and 2 times of the impact of firm contribution rate, while the impact of the firm contribution rate on the population growth rate, bequest rate and economic growth rate is about 4 times, 8 times and 3.5 times of the impact of individual contribution rate.

The above results have straightforward policy implication. According to the fact of China, the current economic targets are as follows: to keep a high economic growth rate, control the population size, decrease the individual saving rate and education expense for each child. Meanwhile, on the one hand, the idea and practice of both domestic and foreign inheritance tax suggest that governments do not encourage people to leave too many bequests to their children; on the other hand, providing basic living material to retirees, the social pension scheme should not be a source of intentional heritage. Therefore, the bequest rate should not be increased with the pension contribution rate.

In order to boost economy and control population, it is necessary to decrease the firm and individual contribution rates. In order to decrease the individual saving rate, it is necessary to increase the firm and individual contribution rates. In order to decrease the education expense and bequest rate for each child, it is necessary to decrease the firm contribution rate, and increase individual contribution rate. Balancing between the economic targets above and taking the extent to which the exogenous variables influence the endogenous variables into account, we can get that a policy to decrease the firm contribution rate and increase the individual contribution rate is reasonable.

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