Postponing Retirement and Its Influence on Growth in a Dynastic Model with Differences in Vocation

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Abstract. Considering the different occupations and different groups of people willing to delay retirement, this article designed to delay the retirement age of differences in vocational. Model analysis show that: First, it will increase the total consumption; the second is when the growth rate of per capita assets is greater than the rate of decrease wages will increase the total social assets; third the per capita capital stock will be reduced k; four are indirect due to increased labor supply, it leads to a decline in real wages income levels. Recommendations respect the wishes of the workers, using more flexible policy by Occupation delay retirement, can increase the proportion of high-level human capital, better for promote economic development.

1. Introduction

In the face of social security expenditure financial pressures, many scholars put forward the reform of the social security system, Echevarria (2004) also pointed out that the developed countries in the face of an aging population and the case of increasing life expectancy, the only solution is to delay retirement path. There are several reasons why pension system might not to be sustainable, demographic change and fertility rates are falling, the disappearance of demographic dividend is a challenge faced by the pension system; The pressure of social security payments from the increased scope and scale of social security, and also form The pressure of the fiscal revenues. While the moderate reform is to mainly adjust the calculation formula of social security, delay retirement is also belonging to a kind of such reforms.

Another one of the more radical reform, is privatized of social security funds. The aim of this paper to assessment different occupations affected by delay retirement policy, Different professions to the requirement of physical condition is different, whether for retirement decision will also be different, and this policy is obviously influent of economics performance, such as growth, labor supply, and the consumption etc.

This study will be divided into two part, one is occupational delay retirement policy program, the performance of the first high-income groups to delay retirement, the last of the heavy manual workers delay acclaimed. Secondly, in neoclassical economic growth model, staging impact on labor supply, consumption, property and future residents of utility and other factors, and to determine changes in consumption growth and capital stock. Combined with some individual characteristics of survey data

to calculate the retirement wishes of some professional groups of points. Finally, appropriate policy recommendations based on research findings.

2. Method

The model assumes a closed economy, the household sector, the delay is mainly reflected in the increase of the pension is reduced leisure and income, family members have assumed infinite life, and everyone will experience a delay retirement.

2.1 Labor and capital. In the framework of this model, according to Weil (1989) and Blanchard (1985) model, made some extensions and modifications in the production function, choice of the more commonly used C-D function, which can be expressed as:

$$Y_t = AK_t^a \tilde{L}_t^{1-a} \cdot \left(\frac{R}{L_t}\right)^{\mu} \quad (1)$$

In this model, A represent technical level, K represents capital element, a is the efficient use of capital or labor, $\tilde{L} = L_t e^{xt}$ as effective labor input, both delayed retirement t when labor input elements occur change, x is the impact of this change. Delay retirement is a way to assume a new element into the production function, this element is represented by R, and$(R/L_t)^{\mu}$ represents the increment due to the factors of labor into new elements brought about by increase, μ represents the rate of increase of such elements. In addition, the sub-delay occupational retirement policy would increase the supply of labor force, $m(t)$means that due to delay retirement for labor supply rate. Due to the time t of the total population of labor supply:

$$L(t) = L(0) \cdot e^{nt} \cdot exp \int_0^t m(v)dv \quad (2)$$

Where n is the natural growth rate of labor, exp $\int_0^t m(v)dv$ represents 0 to t delay of occupational retirement points lead to the number of labor growth. $L(0)$is the amount of labor supplied without delay before retirement. It is supplied in the labor market increases, but in the case of a balanced labor supply is $L(0)$.

According to the production function to optimize first-order conditions, factor price equal to its marginal product, which can be determined wage rates under its optimal conditions:

$$\omega = (1-a) \cdot A\hat{k}^a \cdot \left[\left(\frac{R}{L_t}\right)^{\mu}\right] e^{xt} \quad (3)$$

$\hat{k}$ represents the ratio of capital and labor, both due this proportion will change after the delay retirement, it can be said that changes in capital stock per capita occurred. You can also obtain new capital density:

$$\hat{k} = \left[\frac{aA \cdot (R/L_t)^{\mu}}{r+\delta}\right]^{1/(1-a)} \quad (4)$$

Where, $r + \delta$for the cost of capital, namely the rental price of capital. If R delay retirement policy was introduced as a real event occurs, it is assumed that the cost of capital remains unchanged under the circumstances, can lead to a new wage rate, but will also affect capital intensity$\hat{k}$ changes.

2.2 Household's utility function. For delayed retirement residents, delay retirement, the resulting wage work in terms of the amount of general pension than larger, due to the increase of their income, or increase revenue in increased consumption, it will bring positive the utility, which is part of the consumer and income arising from increased effectiveness can be expressed as:

$$U(d,t) = \int_0^{\infty} \{\ln[c(d,v)] \cdot e^{-(\rho-n)\cdot(v-t)} dv\} \quad (5)$$

Wherein, $c(d,v)$ to delay retirement population per capita consumption at the point in time when the $(v-t)$ said that due to the changes in utility consumption delay brought about, and for people who delay retirement, retirement will be delayed such that due to the reduced leisure time, and for damage to health, with $\tau(h,t)$ is represented, it will lead to less effective.

$$U(h,t)=\int_0^{\infty}\ln[\tau(h,t)]\,e^{-(\rho-n)\cdot(v-t)}dvdt \qquad (6)$$

The delay retirement equal to total utility increases, increase the effectiveness of reducing consumption brought increased leisure spending minus income:

$$U_{add}=\int_0^{\infty}\left\{\langle\ln[c(d,v)]-\ln[\tau(h,t)]\rangle\cdot e^{-(\rho-n)\cdot(v-t)}dv\right\} \qquad (7)$$

$U_{add}>0$this is mainly developed in revenue brought about by the effects of its big sacrifice for the health and recreation utility consumption, people are more willing to delay retirement, such people are not necessarily high-income groups.

$U_{add}\leq 0$ When equal to 0, whether people choose to delay retirement has no effect, and when less than 0, then the people will resist to delay retirement.

2.3 The affected of resident's property. Delay retirement policy implementation, not only will make the labor supply and household utility function changes will make the residents of the property changes, due to the delay retirement to each resident brought the budget constraint change can be expressed as:

$$\dot{a}(t)=w(0)+\tilde{w}(t)+(r(t)-n)a(t)-c(0)-\tilde{c}(t)-p(t) \qquad (8)$$

Wherein the amount of $\tilde{c}(t)$ is increased consumption, the operator of the time t, $\tilde{w}(t)$ due to the wage increase, wage increases, but also takes into account the overall level of wages due to the increase in the quantity of labor supply It brought the overall problem of declining wages, discounted to present value at time t:

$$\tilde{w}(t)=\int_0^{t}w(v)\cdot e^{\check{r}(v-t)}\,dt \qquad (9)$$

Which is the average interest rate$\check{r}$ time 0 to t between points, and can also cover the problem of declining wages, with

$$\check{r}=\left[1/(v-t)\cdot\int_t^{v}r(v)dv\right] \qquad (10)$$

p (t) is the number of delayed retirement old-age pension, which is calculated as:

$$P(t)=\int_0^{t}p(v)\cdot e^{\check{r}(v-t)}\,dt \qquad (11)$$

Using the relationship P (t) and w (t) can be determined between the pension replacement rate, the replacement rate is represented by φ, we can draw the following formula:

$$\varphi=\frac{P(t)}{\tilde{w}(t)}=\int_0^{t}p(v)/w(v)\cdot e^{\check{r}(v-t)}\,dt \qquad (12)$$

We can see that the replacement rate is a major factor for the resident's incremental property changes. Incremental property residents also suffer due to increased revenue, increased consumption caused by the impact.

3. Solving

Implementation delay retirement policy, since such work longer hours, will make the residents' income in its life cycle created by the increase in income is bound to make its total consumption changes, and will make changes in their wages. According to (1), (2) and (7), you can find the total consumption at the time point t:

$$C(t) = \int_0^t \{\langle \ln[c(d,v)] - \ln[\tau(h,t)] \rangle \cdot m(j) \cdot \hat{L} \cdot e^{n(t-j)}\} dj + e^{nt}.c(0,t) \quad (13)$$

Wherein, $m(j)$the rate of change for retirement, and it may bring changes in the number of labor L, and$e^{nt}.c(0,t)$ indicates the initial consumption in the absence of these changes is the removal of the population natural growth factors and other aspects, j represents 0 to t within the time rate of change, j time. It can be seen that increasing consumption of total consumption and income of residents brought about to give up leisure consumption disutility related, and changes in total consumption, and $m(j)$ the rate of a great relationship, but also with changes related to $\hat{L}$. As can be seen from the growth in consumption depends $\ln[c(d,v)]$ and $\ln[\tau(h,t)]$ proportion, if $\ln[c(d,v)] > \ln[\tau(h,t)]$is the total consumption increases, if $\ln[c(d,v)] < \ln[\tau(h,t)]$reduction in the total consumption, while the population growth rate for these factors change have a greater impact.

In addition to changes in the total consumption, may be obtained in direct contrast to the increase of the total number of assets and changes in the amount of the original:

$$A(t) = e^{nt} \int_0^t \left\{[a(j,t) - \tilde{w}(t)] \times m(j) \cdot e^{\int_0^j m(v)dv}\right\} dj + e^{nt} a(0,t) \quad (14)$$

Total assets equal to its initial assets $e^{nt}.a(0,t)$, plus the time range from 0 to t, an increase due to the delay caused by the retirement policy of total assets. Can be seen, as long as the duration of labor input, total assets are not added, depending on the $[a(j,t) - \tilde{w}(t)]$ ratio, assets increased wages brought the direct proportion with lower wages, the difference can truly reflect the increase in the total number of assets.

For solving the neoclassical growth model, usually constructed Hamiltonian function, build a set of constraints for optimal Solution. According to the formula (8) of the Residents budget constraints, policy variables into the impact of delayed retirement brings, will become the consumer budget constraint change rate of its total assets:

$$\dot{A}(t) = \kappa(t) \cdot m(t) \cdot L(t) + r(t)A(t) - C(t) + [a(j,t) - \tilde{w}(t)]e^{nt}$$

$$\cdot \left\{1 + \int_0^t m(j) \cdot e^{\int_0^j m(v)dv}\right\} \quad (15)$$

Where, $\kappa(t) < 0$ indicates that the amount of increase in per capita assets, which due to the increase in the labor force, increasing per capita assets are often negative, $\kappa(t) \cdot m(t) \cdot L(t)$ is due to the delay reduce the amount of retirement brought per capita assets. And $C(t) = c(0) + \tilde{c}(t)$, is represented by the total consumption function is determined by income does not change when the change plus $\tilde{c}(t)$. The$[a(j,t) - \tilde{w}(t)]e^{nt} \cdot \left\{1 + \int_0^t m(j) \cdot e^{\int_0^j m(v)dv}\right\}$ is due to the increase in the labor force, increase the number of revenue brought here to subtract a wage level for reducing the negative effects brought about, then get the amount of increase in total assets.

Thus, the Hamiltonian can be constructed:

$$H = \langle \ln[c(d,v)] - \ln[\tau(h,t)] \rangle \cdot e^{-(\rho-n)\cdot(v-t)} dv + \lambda(\kappa(t) \cdot m(t) \cdot L(t) + r(t)A(t) - C(t) + [a(j,t) - \tilde{w}(t)]e^{nt} \cdot \left\{1 + \int_0^t m(j) \cdot e^{\int_0^j m(v)dv}\right\} \quad (16)$$

Can be optimized first-order conditions can be obtained equilibrium solution, you can get on consumption increment expression:

$$\dot{c}/_c = r(t) - \rho - m(j) \cdot e^{\int_0^j m(v)dv} \cdot (\rho - n) \cdot [k(t) - \kappa(t)]/c(t) \quad (17)$$

Here, only the value of consumer willingness ρ is not constant, because each unit of its perception of the consumer will be different. If $m(t) = m(j) \cdot e^{\int_0^j m(v)dv}$ is 0, it means no delay retirement, its solution and the solution of the optimal consumption undoubtedly under ideal condition is$r(t) - \rho$, where the impact of delayed retirement for the consumer, no doubt, and the role ρ, like delay retirement will reduce the consumption of per capita consumption. In addition, per capita consumption to reduce capital $k(t) - \kappa(t)$ is also represented by the negative effect of reducing per capita consumption of capital will make a corresponding reduction.

Thus the growth rate of per capita capital can be obtained:

$$\dot{\hat{k}}/_{\hat{k}} = f(\hat{k})/_{\hat{k}} - \hat{c}/_{\hat{k}} - (x + n + \delta) - m \cdot [1 - \kappa/_{\hat{k}}] (18)$$

The formula is in equilibrium, an increase in per capita capital accumulation, calculated by the model results show that the production function $f(\hat{k})$ correlated with per capita consumption and capital stock $\hat{c} / \hat{k}$ negatively correlated with natural labor force incremental n, and the ratio of the incremental delay retirement workforce brought x reflected, which is equal to the increase in population $\int_0^t m(j) \cdot e^{\int_0^j m(v)dv}$ the original population of the ratio of the rate of depreciation, and capital δ, a negative correlation, and delay retirement brought about by population growth m, per capita capital stock and the construction of $[1 - \kappa/_{\hat{k}}]$, are showing negative correlation.

Changes in consumption growth mainly depends on $m(t) = m(j) \cdot e^{\int_0^j m(v)dv}$, is to delay retirement rate, this rate does not reflect the different occupations for the type of impact of increased consumption, there is no doubt that high-income groups to increase the rate of delayed retirement from the mass of workers will increase this rate, thereby increasing the total consumption is obtained. For the total assets, the most critical is $[a(j,t) - \tilde{w}(t)]e^{nt} \cdot \left\{1 + \int_0^t m(j) \cdot e^{\int_0^j m(v)dv}\right\}$, the $a(j,t)$ and $\tilde{w}(t)$ absolutely, delay retirement policy for high-income people to delay retirement assets per capita will make $a(j,t)$ the growth rate is greater than the effect of policies since the labor supply brought about by lower wages $\tilde{w}(t)$ growth rate, so the increase in the total assets may be positive.

4. The estimated effect of policy implementation

4.1 Impact on wages. Binding model parameters derived from the results, assuming that the increase in the population are able to full employment, into the actual data to estimate their effect on the average wage:

$$\omega = (1-a)\cdot A\hat{k}^{a}\cdot\left[\left(\frac{R}{L_t}\right)^{\mu}\right]e^{xt} \qquad (19)$$

First, the affected wage labor input factors in the proportion of total input (1-a), technological progress A， $\hat{k}^{a}$ and capital per capita will be reduced, while also making the $\left[\left(\frac{R}{L_t}\right)^{\mu}\right]e^{xt}$ change. $\hat{k}$ representing the delay before retirement did not implement the reduction of 3.66% is $\hat{k} =$ （1 − 3.66%）k, assuming that the previous capital per worker is 1 and a is assumed to be 0.5, the delay retirement, real wages would make the time t levels decreased 1.83%, delay retirement will make people whole lower wages.

4.2 Impact on Consumption levels. Its effect on consumption, the formula can be expressed as:

$$\dot{c}/_{c} = r(t) - \rho - m(t)\cdot(\rho - n)\cdot\frac{[k(t)-\kappa(t)]}{c(t)} \qquad (20)$$

Here only the estimated time t consumption growth rate, calculated by the above formula shows that $m(t) = 3.78\%$, $[k(t)-\kappa(t)]$ is negative 3.66%, with all other factors remain unchanged, Since$m(t)\cdot(\rho-n)\cdot[k(t)-\kappa(t)]/c(t)$is negative, so that per capita consumption will grow, but because per capita consumption relative to $c(t)$ and $r(t)-\rho$ consumption will vary, it is estimated that two data more difficult, so the assumption that $r(t)-\rho$constant delay retirement will make the consumption $\dot{c}/_{c}$ growth.

4.3 Impact on Physical capital. Impact on capital, the formula is as follows:

$$\dot{\hat{k}}/_{\hat{k}} = f(\hat{k})/_{\hat{k}} - \hat{c}/_{\hat{k}} - (x+n+\delta) - m\cdot\left[1-\kappa/_{\hat{k}}\right] \qquad (21)$$

Similarly, on the assumption that other factors constant, $m\cdot[1-\kappa/_{\hat{k}}]$ is positive and growth capital $\dot{\hat{k}}/_{\hat{k}}$ presentation reverse change, the growth of capital per capita is also negative, indicating that as the delay retirement policy, the per capita capital will decline. Other scholars Jie Zhang (2003) also made a similar point of view, it is believed to reduce the accumulation of physical capital due to an increase in life expectancy caused.

5. Conclusion

Overall, the different occupations, people whether "deferred retirement" brought about by the utility is not the same for the high-income occupations, their willingness to delay retirement due to the decline in revenue faster, so it was not strong, and for low-income families, it "deferred retirement" makes it a significant increase in negative effects. So the state can change the mandatory retirement policy applied to take full account of people's retirement will, and adopt a more flexible division occupational delay retirement policy, not only to enhance the overall effectiveness of people, such as executives also makes some classes, teachers in universities for knowledge accumulation demanding

career, to better play its ability to increase our human capital accumulation, in order to better promote economic development.

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