Segmented labour market and private pension decisions

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Abstract

This paper analyses the effects of social security in a two period OLG model when there is a segmented labor market with different unemployment risks for each segment. Considering two categories of agents, namely public sector and private sector employees, the model deals with the welfare implications of the private pension decisions for both labour segments. The effects of the privatisation of pension scheme seems obvious and are praised for a long time whereas it seems that the private pension option has not been that much attractive. We expect that part of this is due to the segmentation of the labour market.

1 INTRODUCTION

Many countries in Latin America, Central and Eastern Europe adopted mandatory private pension schemes and many other choosed to introduced private pension on a voluntary basis along side the public pay-as-you-go (PAYG) scheme. There is not to much discussion about what system is better performing in terms of welfare. The current question is rather which system (PAYG or funding) or which administrative channel (public or private) can be more efficient, as well as welfare enchancing. Should private schemes be mandatory or not given the fact that Latin American and UK experiences proved high administrative costs and many inefficiencies?

Altough the theoretical discussions are in favor of private pension scheme an there is a strong lobbying for the privatisation it reveals that the private pension scheme does not motivate individuals to participate. Multitude of choices, information asymmetries, income risks render the defined contribution private schemes much more complicated and indviduals can choose not to participate at all when voluntary. This model accounts for a pure exchange economy. Time horizon is limited to two periods for an easy interpretation. We consider two segments of labour market according to the variability of their wages. We include government and pension system and suppose that any deficit option overcome the financial burden.

2 THE MODEL

This model accounts for a closed economy inspired from Diamond (1965). Time horizon is limited to two periods for an easy interpretation. We consider tow segments of labour market according to the variability of their wages. We include the government and the pension system and suppose that any deficit option overcome the financial burden. We suppose that there are two types of labour in the economy: private and public sector workers. We would like to analyse the impact of different pension scheme on the welfare of these segments.

2.1 Households

There are two sectors in the economy public and private sector. These sectors differ in the determination of the wage rate. Public sector offers a secure environment protected with solid contracts and a low variability wage. Private sector on the other hand is characterised with a higher unemployment risk during economic recessions but offers also a higher wage rate during economic expansions. We propose the following configuration to describe this situation.

The superscript k denotes the agent type and we set $k = 1$ for private sector workers and $k = 2$ for public sector workers. We note respectively by N_t^1 and N_t^2 the population working for private and public sector. The total population is N_t. We suppose that these labour populations have the same growth patterns. We denote by n the population growth rate. We can simply write the next period population as a function of the current period

population by the following way: $N_{t+1} = (1+n)N_t$. For the generation t, μ[1] is the share of private sector workers and $(1-\mu)$ the share of public sector workers.

Both types of agents live two periods. The first period is the working period and the second period is the retirement period. Each agent is endowed with one unit of labor that they inelastically supply in the labor market. Without loss of generality we suppose that since public sector is a relatively more stable environment, the wage rate in this segment is $w_t^1 = w_t$ But on the other hand private sector workers face the risk of unemployment during recessions and a relatively higher wage during booms. During recessions a fraction $1-\varepsilon$ of total labor supply in private sector is employed. This means that there is an unemployment probability which is uniformly distributed within this labor category as in Jensen et al. (1996). The wage rate is w and there is an unemployment benefit χw_t. The income of a private sector worker during recession becomes $w_t^r = (1-\varepsilon)w_t + \varepsilon\chi w_t$. During booms private sector workers benefit from a relatively higher wage rate $w_t^b = \nu w_t$ with $\nu > 1$[2]. There are two states of nature: the economy may be in a boom with a probability p and in a recession with a probability $1-p$. The income of an agent working for private sector becomes then

$$w_t^2 = \begin{cases} w_t^b & \text{with } P(s=r) \\ w_t^r & \text{with } P(s=b) \end{cases}.$$

Remark 1 *Notice that the unemployment seems like a recession phenomena. We only would like to consider the unemployment created during recessions to differentiate between these two states.*

The agent derives utility from his consumption of private and public goods. We distinguish between the working period consumption c_t^k and the retirement period consumption d_{t+1}^k which will determine the first and second period utilities respectively. If we denote the time preferences by ρ, the lifetime utility of agents born at time t is a discounted sum of the first and the second period utilities[3]:

$$\bar{U}(c_t^k, g_t, d_{t+1}^k, g_{t+1}) = U(c_t^k, g_t) + \frac{1}{1+\rho}U(d_{t+1}^k, g_{t+1}) \tag{1}$$

[1] $\mu_t = \frac{N_t^1}{N_t}$

[2] Notice that $w^r < w$ and $w^b > w$.

[3] The utility function is supposed to have the following properties: $U' \geq 0$ and $U'' < 0$. Note that $\rho \geq 0$ and $\frac{1}{1+\rho}$ is the subjective discount factor.

The instantaneous utility is supposed to take the following form: $U(c_t^k, g_t) = \ln c_t^k + \chi \ln g_t$. The parameter χ measures the impact of public services on the instantaneous utility of consumer where publicly-provided services affect the household's utility directly. However, we suppose that private consumption and public services are additively separable[4]. We suppose that both private consumption and public consumption generate a positive marginal utility, so that $\chi > 0$ in line with the theoretical studies by Barro (1981) and Agenor (2007) we take a positive value for χ and suppose that publicly provided goods and services are substitutes for private goods and services.

The first period income is allocated between consumption, pension contributions and tax payments. After the payment of pension contribution and wage income tax, at rates θ^k and τ^k, young agents consume c_t^k. In the second period, both type of agents are retired. Their incomes are the pension benefits $b_{t+1}^{k,m}$ where m indicates the prevailing pension scheme. We consider two pension scheme: an unfunded scheme (u) and a private scheme (f). We suppose that households do not pay any taxes on their pension benefits. At the retirement period, they consume their total incomes. The bugdet constraints for both periods and the resulting intertemporal budget constraint are given by the following equations:

$$\begin{aligned} c_t^k &= (1-\tau)(1-\theta^m)w_t^k \\ d_{t+1}^k &= b_{t+1}^{k,m} \end{aligned} \tag{2}$$

2.2 Government

We suppose that the government imposes a tax on wage income after contributions. The total tax revenue finance government expenditures on public services and in recession times unemployment benefits and transfers:

$$g_t = \begin{cases} ((1-\mu) + \mu(1-\varepsilon+\varepsilon\chi))\tau(1-\theta^m)w_t - \mu\varepsilon\chi w_t - tr_t & \text{with } P(s=r) \\ ((1-\mu) + \mu\nu)\tau(1-\theta^m)w_t & \text{with } P(s=b) \end{cases}$$

Remark 2 *Notice that unemployment benefits $\mu\varepsilon\chi w_t$ as well as tranfers tr_t appear in public budget only in recessions. This is due to the fact that we*

[4]We follow the theoretical formulation in Agenor (2007) which is in line with the empirical evidence provided by Karras (1994), McGrattan et al. (1997), Chiu (2001) and Okubo (2003). For this type of formulation the reader can also check Turnovsky (1996, 2000, 2004), Chang (1999), and Baier and Glomm (2001) as reference.

introduce unemployment as the additional unemployment due to recession of the economy and as private sector employees will undercontribute due to the decrease of their wage their welfare will be diminished when they are retired. Government intervenes in labour market during recessions to correct these welfare effects by unemployment benefits to private sector workers and transfers to private sector retireees.

2.3 Pension system

We consider two different pension schemes as we want to compare their welfare implications when the economy is moving from booms to recessions or the economic environment involves risk for some agents. These welfare implications may reflect the low willingness to participate to private scheme when they are not compulsory.

2.3.1 Fully unfunded pension - Public Pension Institution

We suppose that the public system is a defined benefit PAYG. The principle of PAYG is to finance the pension benefits of retirees by the contributions of current workers. We suppose that the same constribution rate applies to all workers. The budget constraint of PAYG scheme is then as follows:

$$\frac{(1-\mu)b_t^1 + \mu b_t^2}{1+n} = \begin{cases} ((1-\mu)+\mu(1-\varepsilon+\varepsilon\chi))\theta^u w_t & \text{with } P(s=r) \\ ((1-\mu)+\mu\nu)\theta^u w_t & \text{with } P(s=b) \end{cases}$$

The pension benefit of an agent k is a function of his average wage and the accrual rate ϕ. This implies following benefit rules for the agents:

$$\begin{aligned} b_t^1 &= \phi w_t \\ b_t^2 &= \begin{cases} \phi(1-\varepsilon+\varepsilon\chi)w_t & \text{with } P(s=r) \\ \phi\nu w_t & \text{with } P(s=b) \end{cases} \end{aligned}$$

For a balanced PAYG scheme budget $\phi = \theta^u(1+n)$. The accrual rate is as a function of cotisation rate and population growth rate.

2.3.2 Fully funded pension - Private Pension Institution

We suppose that private and public schemes do not coexist to make an analysis of welfare differences accompanied with each system. The retirement period is financed by benefits received from private scheme denoted by $b_t^{k,f}$. The

contribution rate is θ^k for an agent of type k in public and private sector. We suppose that the public sector wage provides just a subsistence consumption in each period of life. Thus when a public sector employee is deciding for his contribution rate to funded scheme, he will certainly choose a contribution rate which is not greater than PAYG contribution rate $\theta^{1,f} \leq \theta^u$ since this PAYG level provides with subsistence consumption at the working period. So the contribution rate of public sector employees is determined as a solution of optimal allocation of consumption between working and retirement periods subject to the subsistence level constraint.

Remark 3 *We suppose that government choose PAYG contribution rate that maximise the intertemporal utility public sector employee which will coincide with the private scheme contribution rate* $\theta^{1,f} = \theta^u$.

Here this will require a comparison of PAYG returns coming from population growth and accrual rate and funded scheme returns provided with interest earnings. For a private sector employee the decision becomes even more complicated by the additional risk parameter of private sector environment. In either status, the pension benefit of the individuals equals the real return of total contributions:

$$b_{t+1}^{k,F} = (1 + r_{t+1})(1 - c)\theta^{k,f} w_t^k$$

where the operational cost c incurs to workers. For private sector $\theta^{2,f}$ is the contribution rate. We have two different states for private sector employee.

For recession period private sector employee definitely earns less than public sector employee but as public sector employee lives at subsistence level private sector employee is also constrained by this level in his choice of contribution. He could only contribute wage after consumption so this contribution rate is calculated as follows:

$$\begin{aligned} (1-\tau)\theta^{2,f} w_t^r &= (1-\tau)w_t^r - c_t^1 \\ \theta^{2,f}(1-\varepsilon+\varepsilon\chi)w_t &= (1-\varepsilon+\varepsilon\chi)w_t - (1-\theta^u)w_t \\ \theta^{2,f} &= \frac{\theta^u - \varepsilon(1-\chi)}{1-\varepsilon(1-\chi)} \end{aligned} \tag{3}$$

For recession period private sector employee determines the contribution by maximising the intertemporal utility and thus the contribution rate is $\theta^{2,f} = \theta^u$.

3 Welfare implications

Here we inquire the decision of a private sector employee among pension schemes. This is done through simple welfare comparisons. Notice that public sector employee do not differentiate between this two schemes but private sector employee may be better off if he is in one scheme rather than the other.