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Labor demand for senior employees in the context of early retirement

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Abstract

With respect to the labor market participation of the elderly in welfare states, the economic literature focuses on the incentives to the worker in the light of generous early retirement opportunities. The sociological literature on the other hand addresses the problem of low productivity of elderly in the context of occupational disability and workplace design. The economic link between supply and demand is hardly taken into account. This paper focuses on the labor demand for elderly in the context of necessary specific investment. According to this paper, due to better perspectives on the labor market following a decrease of the incentives to retire early, e.g. by a raise in the average effective retirement age, need not necessarily harm the elderly people. The paper thus helps to close the gap in the evaluation of pension reforms.

JEL classification: D33, J26, J32
Keywords: Retirement, labor demand, incentives

1 Introduction

This paper examines the interplay among labor market participation of senior employees and firm incentives in terms of an investment, e.g. in workplace design for aged. It is well established, that elderly people face a substantial handicap applying for a job, but also staying employed. The risky investments on the side of the employer and the attractive opportunities in early retirement for the employee go hand in hand in order to reduce labor market participation of elderly. Pension reforms (Fisher and Keuschnigg (2010)) attempted to reduce the incentives for the employees but have been criticized to bear a pure pension cut in face of missing job opportunities. Early retirement was introduced as a response to the general problem of unemployment. Taking labor demand as fixed or rigid, the reduction in labor supply would reduce the unemployment rate, so the naive hope of the politicians. In contrast to this intention those countries with high early retirement rates showed the biggest rise in unemployment (Duval (2004)). Generous early retirement benefits carry large and long-term costs, increase the necessary funding of social security contributions, decrease labor demand and are thus not well suited to reduce unemployment.

Most of the economic literature however concentrates on the incentives to employee and its consequences on labor supply, see e.g. Börsch-Supan et al. (2007), Gruber and Wise (1998). The aspect of the incentives to the firm and its consequences on labor demand is hardly taken into account.

Hutchens, R. (1999) discusses the opportunity for the firm to make use of early retirement programmes to react to demand shocks by encouraging employees to retire early. This works like an extra unemployment insurance and an easy instrument to undercut dismissal protection. Dorn and Sousa-Poza (2010) empirically test this hypothesis relying on international data and find substantial differences between countries. Khaskhoussi et al. (2009) discuss the interaction of human capital formation and early retirement decisions in a general equilibrium model. They show that reveals that an actuarially unfair pay-as-you-go retirement system negatively affects both human capital investment and retirement decisions.

Our approach is new in the context of involuntary unemployment of elderly. We analyze the interaction between the incentives to the firm to invest in human capital or workplace design and the early retirement benefits offered. We are going to address the question how the early retirement benefits influence the incentives to invest, thereby

affecting the unemployment rate of elder worker, and evaluate the consequences on the social security system and aggregate retirement benefits spent in equilibrium.

2 The model

The model is kept as simple as possible. We assume that the labor market for elderly is not cleared or that opportunities of workplace design in order to alleviate the risk of disability are not exhausted. In both cases firms have to invest, either to train the worker or to improve workplace design, both with uncertain yields. The wage in the first period is assumed to be fixed $w = w^0$. If the worker is not employed, the worker is assumed to be unemployed until retirement. If the workplace is not improved, either the worker's probability to become disabled is increased, the workers disutility of labor is increased or he is not employed at all and therefore stays unemployed.

In the sequel for the employed worker there is an exogenous move of nature (chance move), determining the health status of the worker. She can be healthy (h) or disabled (d). Disabled worker get disability benefits B_d. Healthy worker decide upon working until the regular retirement age (s) or retiring early, which gives them an early retirement pension B_e. B_e can also be negative, we will however assume that B_e is some percentage of the regular pension payment B, $B_e = \alpha B$. The decision of the worker depends on $w - f \geq B_e$, the wage w and disutility of labor f, the latter is assumed to be unobservable to the firm and uniformly distributed in $f \in [f_a, f_b]$.

In order to keep the worker in the job, the firm can individually raise wages w. Firms profits $\Pi = p \cdot (s - w)$ depend on the wage, the productivity s, which is assumed to be well known, and the probability p the worker stays in good health p_h and in the job p_s ($p = p_h \cdot p_s$). Figure 1 displays the structure of the extensive form game. The first period e.g. reflects ages between 50 and 60, the second period between 60 and 65, the statutory retirement age. We are not yet raising the question of postponing retirement nor the specific individual retirement decision within this period. Figure 1 depicts the extensive form with the decisions of the firm F, Nature (chance move) N and the employee E.

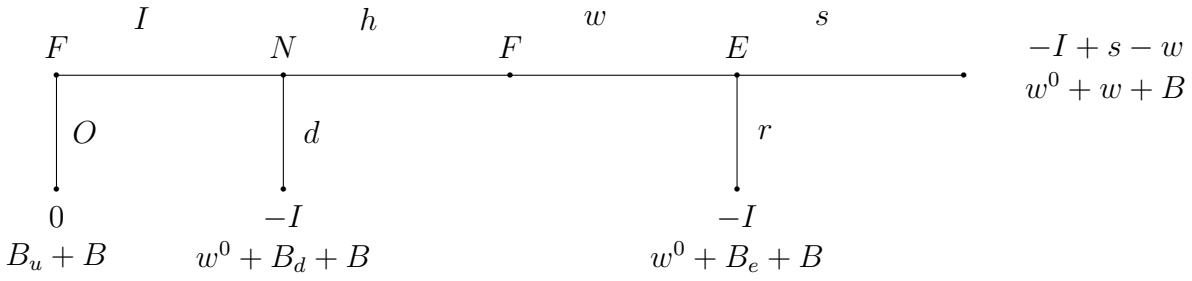

Figure 1: Extensive form

2.1 Equilibrium

We look for a subgame perfect equilibrium. So we start with the decision of the worker, whether to retire early r or stay in the job s. She will stay if $w - f \geq B_e$ or equivalently $f \leq w - B_e$. The probability keeping the worker until statutory retirement is then $p_s = p_s(w, B_e) = \frac{w - B_e - f_a}{f_b - f_a}$.

Expected firm's profit in the second stage then result in

$$\Pi_2(w) = p_s(w) \cdot (s - w) = \frac{w - B_e - f_a}{f_b - f_a} \cdot (s - w),$$

ignoring sunk cost. The first order condition is $s + B_e + f_a - 2w = 0$, which leads to the profit maximizing

$$w^* = \frac{1}{2}(s + B_e + f_a) = \frac{1}{2}(s + \underline{w}),$$

where $\underline{w}$ is the lower bound for w and $p_s^* = \frac{1}{2} \cdot \frac{s - \underline{w}}{f_b - f_a}$.

The investment decision then depends on investment cost I, which reflects the difference of revenues and cost in the first stage, and the probability the worker will stay until the statutory retirement age $p = p_h \cdot p_s^*$

$$\Pi = p^* \cdot (s - w^*) - I = p_h \cdot \frac{1}{2} \cdot \frac{s - \underline{w}}{f_b - f_a} \cdot (s - \frac{1}{2}(s + \underline{w})) - I = \frac{p_h \cdot (s - \underline{w})^2}{4 \cdot (f_b - f_a)} - I > 0.$$

The firm will invest if $s > \underline{w} + 2\sqrt{\frac{(f_b - f_a) \cdot I}{p_h}} = B_e + f_a + 2\sqrt{\frac{(f_b - f_a) \cdot I}{p_h}} = \underline{s}$. The investment will me more likely and unemployment of elderly p_u less frequent if B_e decreases. If productivity s is uniformly distributed $s \in [s_a, s_b]$, unemployment rate $p_u = \frac{\underline{s} - s_a}{s_b - s_a} \cdot p_h$ decreases with B_e. This is due to both, the fact that equilibrium wage w^* will decrease as well as the increase of the probability to stay in the job.

Corollary 1 *Decreasing the incentives to retire early B_e will decrease equilibrium wages w^* increase probability staying in the job p and increase investment. There is less involuntary unemployment for elderly and higher employment.*

2.2 Social security benefits

The previous subsection just follows the standard neoclassical labor market approach. Decreasing incentives decreases labor cost and increases employment. In order to investigate the consequences with respect to the social security system the model is going to be adapted accordingly to calculate the aggregate retirement benefits. Increasing employment will increase the contributions to the social security system. Decreasing wages in contrast may reduce the contributions. Decreasing early retirement finally will shift retirement benefits towards regular retirement benefits.

The following approach takes aggregate contributions apart from contributions of elder worker to be fixed and not affected from changes of retirement incentives. Aggregate contributions $\bar{B}$ are then spent to all retiree. It is assumed that early retirement benefits are proportional to regular retirement benefits $B_e = \alpha B$. The influence of changing α is going to be analyzed here.

Theorem 2 *Reducing the incentives of elder people to retire early ($\alpha' < \alpha$) increases aggregate pension contributions ($\bar{B}' > \bar{B}$).*

Proof Let $\alpha' < \alpha$, w', p', p'_s, p'_u the corresponding equilibrium outcomes according to the changed incentives.

All other things equal we assume that all changing contributions as well as savings due to lower unemployment pay entirely incurs the retirement pension system. It is assumed that contributions to the social security system are fully payed by workers as a fixed portion τ of their wages. In order to simplify analysis let $B_d = \beta B$ a fixed and unchanged portion of regular retirement benefits, increasing proportionally with increasing retirement benefits. Then aggregate social security spending is

$$\bar{S} = p_u B_u + p_d B_d + (1 - p^* - p_u - p_d) B_e + B = p_u B_u + (p_d \beta * (1 - p^* - p_u - p_d)\alpha + 1) B.$$

Aggregate pension contributions change according to

$$\bar{B}' - \bar{B} = (p_u - p'_u) \cdot (B_u + w^0) + \tau \int_{\underline{s}'}^{s_b} p' \cdot w' - \tau \int_{\underline{s}}^{s_b} p^* \cdot w^*. \tag{1}$$

In order to calculate the contributions to the social security system $\tau \cdot w$ we have to include the changing incentives to work. This will change the above equilibrium conditions.

$$u(w, f) = (1 - \tau) \cdot w - f, \quad p(w, B_e) = \frac{(1 - \tau)w - B_e - f_a}{f_b - f_a}, \quad \underline{w} = \frac{B_e + f_a}{1 - \tau}.$$

Equilibrium wages then change to

$$w^* = \frac{1}{2}(s + \underline{w}) \quad \text{and} \quad p^* = \frac{1}{2} \cdot \frac{(s - \underline{w}) \cdot (1 - \tau)}{f_b - f_a}.$$

Critical productivity becomes $\underline{s} = \underline{w} + \sqrt{\frac{(f_b - f_a) \cdot I}{p_h \cdot (1 - \tau)}}$. Decreasing the incentives α will have consequences also with respect to B, which can increase or decrease, and thereby changes $B_e = \alpha \cdot B$ in two ways. We will show that decreasing α, $\alpha' < \alpha$ will also decrease B_e, $B'_e < B_e$ and thus unemployment will decrease $p'_u < p_u$ and employment will increase $\underline{s}' < \underline{s}$.

For all employee employed in both states $s \geq \max\{\underline{s}, \underline{s}'\}$ aggregate wages add up to

$$p^* \cdot w = \frac{1}{4} \cdot \frac{1 - \tau}{f_b - f_a} \cdot (s + \underline{w}) \cdot (s - \underline{w}) = \frac{1}{4} \cdot \frac{1 - \tau}{f_b - f_a} \cdot (s^2 - \underline{w}^2).$$

The change in the wage sum for those employed in both states gives

$$p' \cdot w' - p^* \cdot w^* = \frac{1}{4} \cdot \frac{1 - \tau}{f_b - f_a} \cdot (\underline{w}^2 - \underline{w'}^2),$$

which is strictly positive if $\underline{w} > \underline{w'}$ equivalent to $B_e = \alpha B > \alpha' B' = B'_e$.

If we assume that $\alpha > \alpha'$, then $\underline{w} > \underline{w}'$, $p_u > p'_u$, $\underline{s} > \underline{s}'$ and according to Equation 1 $\bar{B}' - \bar{B} > 0$ which proves the assumption that $\bar{B}' > \bar{B}$.

Aggregate change in pension contributions is then strictly positive. Despite the fact that early retirement benefits as well as equilibrium wages shrink this leads to an increase in aggregate retirement payments. This increase is in favor of the opportunities of elder people to come in employment but also the assets for disability pensions. ∎

2.3 Wage Rigidity

Up to now wages have been treated perfectly flexible, chosen by the firm to maximize expected profits. Incentives to prolong work leads then to higher investment but also to increased employment due to decreasing wages. In the sequel wages are assumed to be fixed (bounded from below) by some minimum wage or collective contract w_{min}.

Let us assume that this restriction becomes binding: $\frac{1}{2}(s + \frac{B_e + f_a}{1-\tau}) < w_{min}$.

$$p^*(s - w_{min}) - I = p_h \cdot \left(\frac{(1-\tau)w_{min} - B_e - f_a}{f_b - f_a} \right) \cdot (s - w_{min}) - I > 0$$

Investment pays if

$$s > w_{min} + \frac{I \cdot (f_b - f_a)}{(1-\tau)w_{min} - B_e - f_a} = \underline{s}$$

The consequence of an increase in the incentives still exists but is less accentuated.

$$p^* \cdot w_{min} = p_h \cdot \left(\frac{(1-\tau)w_{min} - \alpha B - f_a}{f_b - f_a} \right)$$

$$p' \cdot w_{min} = p_h \cdot \left(\frac{(1-\tau)w_{min} - \alpha' B' - f_a}{f_b - f_a} \right)$$

$$\bar{B}' - \bar{B} = \frac{\alpha B - \alpha' B'}{s_b - s_a} \frac{I \cdot (f_b - f_a) \cdot (B_u + w^0)}{((1-\tau)w_{min} - \alpha B - f_a) \cdot ((1-\tau)w_{min} - \alpha' B' - f_a)} +$$

$$+\tau \int_{\underline{s}}^{s_b} p_h \frac{\alpha B - \alpha' B'}{f_b - f_a} w_{min} + \tau \int_{\underline{s}'}^{\underline{s}} p_h \cdot \left(\frac{(1-\tau)w_{min} - \alpha' B' - f_a}{f_b - f_a} \right) w_{min}.$$

Again there is a positive effect on aggregate social benefits.

3 Conclusion

In case of involuntary unemployment of elder worker, one relevant issue is the incentive to the firm to invest in human capital of elderly or the workplace design. This issue is analyzed in a sequential game. In the light of early retirement opportunities the firm faces the risk not to cover the investment cost if the probability of illness and early retirement become too important. Reducing the early retirement benefits decreases the probability of early retirement as well as equilibrium wages for elder employees. Thereby the chance to cover the investment increases, which makes it more likely that elderly worker stay or become employed. Decreasing wages and increasing employment affect the social security contributions in the opposite direction. We show that decreasing early retirement benefits unambiguously lead to higher aggregate contributions to

the social security system and therefore higher expected retirement benefits, which is in contrast to the commonly accepted opinion. The analysis suggests that it is the higher incentives to the worker that makes employment opportunities for elderly more likely. If unemployment and poverty for elderly worker is essential we should thus not wait for the jobs for elderly worker to come before incentives are implemented.

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