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PARTIAL RETIREMENT AND THE EARNINGS TEST

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This paper studies the effects of the earnings test on retirement behavior. The earnings tests of most social security systems tax post-retirement earnings at a relatively high level and do not lead to actuarially fair increases in future benefits. This results in discouragement of partial retirement. The paper shows that a reduction in the earnings test's tax rate is likely to increase part-time work; and that in special cases the increase in work effort may even lead to a reduction in the net transfer from social security to the individual.
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1. Introduction

The present paper discusses the incentives for partial retirement. Retirement represents a major change in an individual's life cycle, and many elderly people experience retirement as a 'shock'. This observation highlights the desirability of a gradual transition from full time work to complete withdrawal from the labour force. Why is in many countries partial retirement a negligible episode in the work experience of the elderly?[1] In this paper, I will argue that the design of the social security programmes - via the retirement test - might contribute to an answer to this question.[2]

The paper is organized as follows. The next section outlines the theoretical model, and compares its results under actuarially fair social security systems with the more realistic case of actuarial unfairness. Section 3 studies the effects of changing the implicit tax rate of the earnings test and addresses some financial aspects of old age insurance programmes related to the test. A final section mentions the limitations of the present analysis and discusses possible extensions of the model.

2. A Model of Partial Retirement

Suppose that workers plan consumption and labour supply over the life cycle to maximize life time utility. Assume further that the allocation of labour supply is determined by the duration of three major phases: full-time work, in the interval $[0,R_1)$, part-time work (i.e. partial retirement) during $[R_1,R_2)$, and retirement during $[R_2,T]$. Life expectancy, T, is assumed to be known with certainty.

The representative individual has an instantaneous utility function, which is additively separable in consumption, c, and

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1 For West Germany, Börsch-Suppan (1992) reports part-time rates for elderly males as low as 1.6 % in the age group 60-64, and 7.5 % for 65-69. In Zabalza et al (1980) the corresponding figures for the U.K. are 3 and 16 %. Burtless and Moffit (1984) found for the U.S. that only 18 % of retired men held part-time jobs within two years after retirement.

2 Most models of retirement (e.g. Sheshinski, 1978, Burbidge and Robb, 1980, Crawford and Lilien, 1980, or Diamond and Hausman, 1984) behaviour do not allow for partial retirement. Notable exceptions are Gordon and Blinder (1980), Gustman and Steinmeier (1986), and Burtless and Moffitt (1985, 1986). For a discussion on the U.S. retirement test see Honig and Reimers (1989) and Gustman and Steinmeiner (1990).

leisure, l, given by $u(c_t)+v(l_t,t)$. Utility of consumption, u, is twice differentiable with $u'>0$ and $u''<0$. Utility of leisure, v, depends on the amount of leisure itself and on the individual's age, t. The latter assumption implies the worker's valuation of leisure increases with his age, reflecting that working gets more fatiguing in advanced ages, so that leisure gains importance in the instantaneous utility function. Within each period, leisure can take only one of three possible values: l_1, l_2 and l_T during full-time work, partial and full retirement, respectively. This is because hours of work are institutionally set. In addition, I assume that age enters the utility function in a 'leisure augmenting' way, so that $v(l_i,t)=f(t)v(l_i)$ with $f'>0$ and $f''\geq 0$, $(i=1,2,T)$, where $v(l_1)$, $v(l_2)$ and $v(l_T)$ are standardized to 0, α and 1 respectively, with $0<\alpha<1$.

With the rate of time preference and the rate of interest equal to zero and the assumption of additive separability of the utility function, the worker will choose a constant level of consumption per period over the whole lifetime, so that $c_t=c$. Then, lifetime utility, V, can be written as

$$(1)\ V = T\,u(c) + \alpha \int_{R1}^{R2} f(t)\,dt + \int_{R2}^{T} f(t)\,dt.$$

During periods of full-time work, net earnings are given by $y_1(1-p_1)$, where y_1 denotes constant labour income and p_1 is the social security contribution rate. When the individual stops working full time, he becomes eligible for social security benefits, d_1. If he decides not to withdraw completely from the labour force, he will earn in addition $y_2(1-p_2)$, where y_2 is labour income and p_2 is the benefit reduction rate imposed by the retirement test. (The choice of notation makes the analogy between p_1 and p_2 evident: p_2 can be viewed as the 'contribution rate' during partial retirement.) In periods of full retirement, income is given by $d_1 + d_2$, where d_2 reflects the benefit adjustments in future periods arising from reductions in benefits during part-time work. Thus, the lifetime budget constraint is given by[3]

$$(2)\ Tc \leq R_1 y_1(1-p_1) + (R_2-R_1)y_2(1-p_2) + (T-R_1)d_1 + (T-R_2)d_2.$$

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3 Since the duration partial retirement period is a non-negative number, a complete statement of the model would require the additional constraint $R_1 \leq R_2$. Note also, that the model is dynamically consistent. Individuals have the opportunity to revise their plans over time, but this would be suboptimal, since their expectations are always realized.

Most national social insurance systems are far from being actuarially fair. Computation of benefits are based on complicated formulas, which take into account the standard of living, family circumstances and the like. Actuarial unfairness can take the form of unfairness on the average, which simply means that the amount of benefits received during $[R_1,T]$ does not equal the amount of contribution payments during $[0,R_1)$ plus benefit reductions during $[R_1,R_2)$. Unfairness at the margin, on the other hand, implies that the payment of additional social security contributions does not give rise to an equivalent increase in future benefits.

Following Crawford and Lilien (1981, p.515) I will assume that the benefit formula is given by:

$$(3a)\ d_1\ (T-R_1) \equiv D_1 = A_1 + (1-B_1)\ R_1\ p_1\ y_1,$$

$$(3b)\ d_2\ (T-R_2) \equiv D_2 = A_2 + (1-B_2)\ (R_2-R_1)\ p_2\ y_2.$$

This is of course a simplification, but it captures the two notions of marginal and average fairness of the public pension scheme. The crucial parameters characterizing the system are the A_i's and B_i's. If $A_i=B_i=0$, $(i=1,2)$, the insurance scheme is fair both on the average and at the margin. In this case benefits received over $[R_1,T]$, D_1+D_2, are equal to contributions paid over $[0,R_1)$ plus the benefit reductions due to the retirement test. With $A_i>0$ and $B_i=0$, the system is more than fair on the average, but it is fair at the margin. With $B_i>0$ and $A_i=0$, it is less than fair both on average and at the margin. Note that $(1-B_i)$ measures the 'degree of marginal fairness'. It indicates the increase in benefit receipts from an additional unit of contribution payments. In accordance with many real world social security programmes I will assume that: (i) $0 \le B_i \le 1$; this reflects too low annual increments (decrements) for later (earlier) retirement, and (ii) $A_2=0$; choosing a positive duration of partial retirement does not per se imply the eligibility to a transfer.

It is worth noting, that the formulas (3a) and (3b) ignore some characteristics of many real world social security systems, most importantly the exemption of income below a certain level from the test. This causes the test's tax rate to vary with the level of earnings. One could argue that an earnings disregard may alter the impact of the test on labor force participation and part time work. For the analysis below, however, this causes no real problems. Since I analyze the decision making of an individual with given earnings, the benefit reduction rate is a constant, too.

Now consider the optimal values of c, R_1 and R_2, which are obtained by maximizing (1) subject to (2) using (3a) and (3b):

$$(4a)\quad c = \frac{R_1}{T} w_1 + \frac{R_2 - R_1}{T} w_2 + \frac{A}{T}, \quad \text{with } w_i = y_i\,(1-B_i p_i),\ (i=1,2), \text{ and } A = A_1,$$

$$(4b)\quad f(R_1) = u'(c)\,\frac{w_1 - w_2}{\alpha},$$

$$(4c)\quad f(R_2) = u'(c)\,\frac{w_2}{1-\alpha}.$$

Since f(t) is monotonically increasing in t, a necessary and sufficient condition for the duration of partial retirement, (R_2 - R_1), to be positive is $f(R_1)/f(R_2) < 1$. It follows from (4b) and (4c) that in this case w_2/w_1 must exceed $(1-\alpha)$. Individuals with low $(1-\alpha)$ have ceteris paribus (c.p.) high preferences for partial retirement. The point in time, when they leave the labour force will be rather late. However, R_1, the date of switching from full to part time work, will c.p. be relatively early.

It should be clear, that under an actuarial fair social security system (i.e. $A_i = B_i = 0$) neither the amount of benefits nor the level of social security contributions influence the optimal choice of c, R_1 and R_2. The reason is obvious: if social security contributions are too high, so that net income per period falls short of the desired level of consumption, the individual can respond by freely borrowing on perfect capital markets: by assumption, decisions are not subject to any liquidity constraint.

Under actuarial unfairness the parameters of the social security system become important, because they influence directly the relative prices of full- and part-time leisure. Rewriting (4b) and (4c) gives

$$(5)\quad \frac{f(R_1)}{f(R_2)} = \frac{1-\alpha}{\alpha}\left[\frac{y_1(1-p_1B_1)}{y_2(1-p_2B_2)} - 1\right].$$

Recall that the l.h.s. of (5) must be lower than 1 for a positive duration of partial retirement. It follows that, an individual who would choose partial retirement in the absence of compulsory old age insurance, might fail to do so under an actuarially unfair retirement scheme, if the reduction in pension benefits imposed by the test are actuarially at least as unfairly adjusted as the basic scheme (i.e. $B_1 \leq B_2$) and if the retirement test tax rate is considerably higher than the contribution rate of the basic scheme ($p2 > p1$). This two conditions characterize the systems of many countries. The design of the earnings test might be one reason why the gradual withdrawal from the labor force is a rather uncommon phenomenon.

3. Relaxing the Earnings Test

In what follows I consider the impact of varying the social security parameter p_2[4], i.e. I look at the effect of lowering the benefit reduction rate on the optimal choice of R_1 and R_2. I will then concentrate on the impact of reducing p_2 on the relation of contribution payments and benefit receipts over the life cycle of a given individual.

Using equations (4a) - (4c) we can do the comparative statics excercise. After some calculations, one gets:

$$(6a)\quad \frac{dR_1}{dp_2} = \frac{y_2B_2}{\theta}(1-\alpha)\{u'f'(R_2) - \frac{u''}{T}[(R_2-R_1)f'(R_2)(w_1-w_2) + f(R_2)w_1]\} > 0,$$

$$(6b)\quad \frac{dR_2}{dp_2} = \frac{-y_2B_2}{\theta}\alpha\{u'f'(R_1) + \frac{u''}{T}[(R_2-R_1)f'(R_1)w_2 - f(R_1)w_1]\},$$

where θ is the determinant of the Jacobian given by

$$(7)\quad \theta = \alpha f'(R_1)(1-\alpha)f'(R_2) - (u''/T)[(1-\alpha)f'(R_2)(w_1-w_2)^2 + \alpha f'(R_1)w_2^2] > 0.$$

Note that (6a) is unambiguously positive for $R_2 \geq R_1$, which is the relevant case. A decrease of p_2 reduces the marginal value of full time work, $(w_1 - w_2)$, whereas it raises income from part-time work, w_2. Thus a substitution effect works in favour of advancing

4 Note that the effects of a change in B_2 yield similar results, because B_2 and p_2 enter (5a) - (5c) multiplicatively.

the application for benefits, R_1. Provided leisure is a normal good, which is assured by the assumptions above, also a wealth effect leads to a decrease in R_1.

In contrast, the sign of (6b) cannot be determined a priori. Income and substitution effect work in the opposite direction. A reduction in p_2 increases potential life cycle income: this has a tendency to advance the full retirement age. It also makes partial retirement more expensive in terms of foregone income and therefore tends to delay the switch from partial to full retirement. A sufficient condition for an increase in R_2 as result of a reduction in p_2 is $f(R_1)w_1 > (R_2-R_1)f'(R_1)w_2$.[5]

It may be interesting to study the effect of relaxing the earnings test on the lifetime relation between contribution payments and benefit receipts from the point of view of a single individual. Denote by Ω the difference between contributions paid and benefits received by the individual over his whole life cycle. Using (3a) and (3b) Ω is given by

$$(8)\quad \Omega = -A + R_1 y_1 B_1 p_1 + (R_2-R_1) y_2 B_2 p_2.$$

Differentiating (8) with respect to p_2 yields

$$(9)\quad \frac{d\Omega}{dp_2} = y_2 B_2 (R_2-R_1) + b_1 \frac{dR_1}{dp_2} + b_2 \left[\frac{dR_2}{dp_2} - \frac{dR_1}{dp_2}\right],$$

with $b_i = y_i B_i p_i$, $(i=1,2)$.

As long as $R_2>R_1$, the sign of the r.h.s of equation (9) is likely to be positive. To see this, note that the ambiguity comes from the last term in brackets, which is negative under weak assumptions (see e.g. footnote 5). But this term is of higher order than the (unambiguously positive) first term on the r.h.s. of (9). As a result, equation (9) will be positive as long as R_2-R_1 is large enough.

However, consider the interesting case, when initially there is no incentive to choose partial retirement, so that $R_1 = R_2$. Equation (9) then reduces to

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5 Consider the case when $f(t) = t$. A sufficient condition for a negative sign of (9b) then is that $R_1 w_1 \geq (R_2-R_1)w_2$, i.e. net labour income during the (full time) working life exceeds net labour earnings during partial retirement.

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$$(10)\quad \left.\frac{d\Omega}{dp_2}\right|_{R_1=R_2} = \frac{y_2 B_2}{\theta}\,[(1-\alpha)b_1 - b_2]\,[u'f'(R_2) - u''f(R_2)w_1/T].$$

If initially partial retirement will not be chosen due to too low effective labour income during part time work, w_2, the result of decreasing p_2 on the contribution/benefit relation will depend on the first term in brackets of r.h.s. of equation (10). From (4b) and (4c) it follows that $w_2/w_1 \leq (1-\alpha)$ if $R_2=R_1$. It is straightforward to show that lowering the implicit earnings tax will reduce the life time transfer of the social security institution to the individual, if

$$(11)\quad \frac{p_2}{p_1} > \frac{B_1}{B_2}.$$

It has to be mentioned, that one cannot conclude that this effect will hold in general, or even that the outcome of a reduction in the earnings tax will facilitate the financing of social insurance on the aggregate. However, to the extent that the low part-time rates of elderly people are a result of the disincentives of the earnings test, this effect may concern a non-negligible part of older workers.

4. Conclusions

The analysis above concentrated on the incentive effects of the earnings test on partial retirement. The earnings tests of a number of social security systems have the common features that they tax post retirement earnings a relatively high level, and does not give appropriate increases in future benefits. It has been shown that the incentive for partial retirement under such systems is per se rather low. In certain special cases it may even be the case, that the net transfer from social security to the individual will decrease as a result of relaxing the test.

It has to be mentioned that the above results rely on simplifying assumptions. Most importantly, the model disregards uncertainty in individual decision making. This may a serious shortcoming as far as life expectancy and future income is concerned. In order to evaluate the distortionary effects of the retirement test as a whole, the analysis has to go not only beyond these assumptions, but also to remove the partial equilibrium character of the model. On the aggregate, the social security system faces the constraint of financial stability, so that neither contribution rates nor benefit rules can be treated as exogenous. This is beyond the scope of this paper but certainly the most fruitful way to extend the model presented above.

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