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SOCIAL SECURITY AND RETIREMENT IN THE NETHERLANDS

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ABSTRACT

Compared to other industrialized countries, the labor force participation of the elderly in the Netherlands is very low. Moreover, it has fallen very fast over recent years. We discuss the incentives for employees to retire, arising from public schemes such as social security and disability insurance, and from private arrangements, such as early retirement and occupational pensions. In general, the generous replacement rates offered by these schemes act as powerful stimuli for retirement. Although Dutch research into the retirement effects of the earnings replacing schemes for the elderly was limited until the early nineties, there is now a fast growing literature on this. This literature confirms the findings in the current paper.

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Introduction

The programs providing income to the elderly in the Netherlands may be characterized by a limited number of salient features. First, there is a distinct cut-off at age 65. Broadly speaking, all persons aged 65 or over are entitled to the same General Old-age Pension (AOW, we will refer to this as "social security"). Most other benefits (e.g., disability, unemployment, welfare) expire when someone turns 65. Secondly, both above and below 65, next to the entitlement programs guaranteed by law, relatively many people who stop working are entitled to other benefits, e.g. occupational pensions supplementing social security for persons over 65 and early retirement pensions for persons below 65. Strictly speaking, the latter type of benefits are not part of the social security system. However, these benefits provide powerful incentives to retire next to the benefits provided by social security.

Until recently, studies about the incentives of social security for retirement behavior in the Netherlands were scarce[1]. In fact, most people no longer work when they reach the age of 65. Partly this may be ascribed to pressure by employers to take early retirement and partly it is due to various other earnings replacement schemes for people below 65.

Like most other developed countries, the Netherlands is faced with an increasing share of elderly persons in the total population. The share of the population over 65 has grown from 8% in 1950 to 13% in 1995 and is expected to rise to 21% by the year 2050. If nothing else changes, this will cause a considerable increase in the social security expenditures. However, the fact that the occupational pensions for persons over 65 are fully funded presents a relative advantage over many other countries. A more immediate concern is the low participation rate for persons below 65, and the costs of the programs providing income to these persons, both public programs, such as disability insurance, and occupational early retirement schemes. In

recent years, government has considerably limited the access to disability insurance (DI) and the attractiveness of DI, in order to limit the costs of the program. Moreover, many firms have started to negotiate reforms in the early retirement programs, because the financial burden of these programs is threatening profits.

The set-up of this paper is as follows. In part I, we present statistics about the labor market behavior of older people in the Netherlands, both cross sectionally and over time. In part II, we describe the structure of the entitlement schemes for the elderly in the Netherlands, and give a brief description of recent research in the Netherlands on the retirement incentives inherent in the system. Finally, in part III, we present results of simulating the retirement incentives inherent in the social security system, calculating the implicit tax on continued work for older people at different retirement ages.

Part I: The Labor Market Behavior of Older Persons in the Netherlands.

The data used to obtain the figures presented in this section are drawn from a number of different sources. These are summarized in Appendix I.

Historical Trends

Figures 1 and 2 graph the labor force participation rates of older men and women in different age groups since 1960. For older men, there is a decline in the labor force participation in all age groups. The decline is particularly dramatic for 60-64 year old. In 1960, about 80% of this age group was in the labor force, as opposed to only 20% in 1994. For men aged 65 or over labor force participation declined from about 20% in 1960 to about

3% in 1985. After that year, *Statistics Netherlands* stopped recording the labor force participation in this age group.

For women, there is a notable increase in the labor force participation in the age group 45-54 (from less than 20% in 1960 to more than 40% in 1994). There is also a slight increase in the participation rate in the age group 55-59. The participation rates in the oldest age groups remained low.

It is clear that the changes in the social security system in the period concerned are not the main explanatory factor for the declining labor force participation rates, since social security only provides an income to persons of 65 or older, while the largest decline in labor force participation took place among persons younger than 65. Yet, the proliferation of occupational pensions in addition to the basic pension provided by social security made it less and less likely that persons would continue to work after age 65.

In the younger age groups, the relatively generous disability insurance scheme (introduced in 1967) offered an attractive way to retire before the age of 65. In particular in the 70s and 80s, when the Netherlands faced periods with rapidly increasing unemployment, the disability route to retirement for older employees became a very popular alternative to general lay-offs. In 1968, 12 % of the males between 55 and 64 years of age received a disability insurance benefit. From 1975 to 1985, this percentage increased from 21% to 37%. In 1995, about one third of the males between 55 and 64 received a disability benefit.

In addition, in the face of continued pressure to decrease labor costs, many firms started to offer even more generous early retirement programs. In 1981, about 2% of the males between 55 and 64 received an early retirement (VUT) benefit, in 1987, this percentage had increased to about 10% and in 1995 to about 17%[2].

Labor Market Behavior in 1994

For a more detailed picture of the labor force participation in recent years, we use the 1993/1994 Housing Needs Survey (Woningbehoeftenonderzoek, WBO). The WBO is a large nationally representative survey (55,000 households) which, among others, records labor force attachment and income.

The age-pattern of labor force participation for men and women in 1994 is depicted in figure 3. At age 45 almost 95% of men and about 55% of women participate in the labor force, i.e. either they classify their main activity as paid work or call themselves unemployed. Among men, participation drops gradually to about 85% for 54-year olds, and then starts dropping sharply to about 55% for 59-year olds. Between age 59 and 60 there is a drop of another 20% to a level of 35%, and up to age 62 participation drops further to about 20%. At age 65 there is a further drop to about 10%, and above 65, only about 5% of the male population is in the labor force.

For women, participation gradually declines from 55% at age 45 to about 22% at age 59. From age 59 to age 60 participation halves to about 11%. Above age 65 hardly any woman considers herself to be part of the labor force.

Figures 4 and 5 further subdivide males and females into socio-economic groups. Figure 4 shows that non-working males mainly consist of disabled up to age 55. After age 55, the percentage of disabled still rises to about 25% between age 60 and 65[3], but the percentage of retirees rises from almost zero at age 54 to almost 50% beyond age 60. Beyond age 65, a large majority of men consider themselves as retired. Figure 5 shows that most non-participating women younger than 65 are classified as "other". This largely pertains to housewives. The percentage of disabled rises slightly from age 45 to age 64 but remains clearly lower than the corresponding percentage for men. The same holds for the percentage of retirees up to age 64.

After age 65, almost all women call themselves retired.

Figures 6 and 7 examine the incidence of public assistance and private retirement income for older persons. Figure 6 graphs the percentage of men receiving SS, DI and any other kind of public assistance (excluding child benefits): the most important kinds of benefits are disability benefits, unemployment benefits, social assistance (welfare benefits), and social security. In principle social security is paid to persons over 65, and the other benefits mainly (in the case of disability insurance and unemployment benefits exclusively) to younger persons.

At age 45 about 12% of men receive some form of benefit. This percentage rises gradually to about 23% at age 54, and then shows a steep rise to about 35% at age 55. Between age 55 and 64 the percentage of men receiving public assistance shows a small increase to about 40%, and then it explodes to about 95% at age 65 and above.

Figure 7 reports the percentages of men and women at each age who are receiving private pension income[4]. For men, this percentage increases from about 5% at age 55 to about 23% at age 59. Between ages 59 and 60 there is a fairly sharp increase of almost 20% to 42%. The percentage of males receiving private pensions increases further to about 50% at age 62. Between ages 64 and 65 there is again a sharp increase to almost 75%. Above age 65, between 75% and 80% of men report that they receive private pensions.

For women, the percentages receiving private pensions after age 55 are considerably lower than for men. The increase to about 30% at age 74 is fairly smooth. The increase of about 10% between age 74 and 75 is rather remarkable. It should be noted that many private pension funds in the Netherlands have an arrangement for widows pensions. Therefore the pensions received by women are not all due to their own labor market history.

Figure 8 shows the distribution of family income by source for couples, plotted against the

age of the family head. Four sources of income are considered: earnings, capital income, private pensions and public sector income (mainly social security for persons aged 65 or over, disability insurance and other public benefits for younger persons). Below age 53, more than 80% of income consists of earnings. Between age 58 and 65, earnings decline from 60% to about 5% of income. Capital income is not a large component in any of the age groups. Private pensions (including early retirement) start to make up a significant part of total income at about age 56, and rise to more than 50% at some ages between 60 and 65, which illustrates the importance of this component for the decision to retire before the age of 65. After age 65, private pensions make up about 35 to 40% of total income. The share of public benefits increases from about 5% for the age groups below 50 to about 25% for the age groups between 60 and 65. Above age 65, public benefits consist mainly of social security and make up about 50% of total income on average.

Part II: Key features of the Social Security System

History of the SS System in the Netherlands

The General Old Age Pension Law (Algemene ouderdomswet, AOW, i.e. social security) was introduced in 1957. Its purpose was to guarantee a sufficient income to virtually all persons of 65 or over. The AOW was preceded by several earlier schemes such as the so-called Drees Emergency Law[5] (Noodwet Drees, 1949) which had a less broad coverage. Since 1980 the level of social security benefits has been linked to the statutory minimum wage. Couples with a head over 65 were entitled to a social security benefit equal to the after tax minimum wage, and single persons over 65 were entitled to a social security benefit equal to

70% of the (after tax) minimum wage.

Current features of the SS System

In 1994, the system was changed in such a way that each individual of 65 or over is now entitled to 50% of the minimum wage, with a supplement of 20% for single persons, of 40% for single parents with a dependent child aged below 18, and of up to 50% for persons with a partner aged below 65 (the percentage depends on the income of the partner).

Social security is financed purely as pay-as-you-go by a payroll tax on taxable income of persons aged below 65. The associated tax rate is currently (1996) 15.4% levied on taxable income up to a maximum (of Dfl. 45325 per annum). Social security basically provides equal coverage of all persons over 65. An exception is formed by persons who spent part of their working life (age 15-64) abroad. In that case social security benefits are reduced by 2% for every year spent abroad. In 1994 social security benefits amounted to about Dfl 32 billion, or 5% of GDP. Currently, about one in every five households in the Netherlands receives social security.

The entitlement to social security does not require retirement from the labor force.

Other public programs

A number of arrangements exist which enable persons to stop working before turning 65. The main ones are: disability insurance, unemployment benefits, and various early retirement schemes. Together, these schemes induced the number of persons working in the age bracket 60-65 to drop dramatically over the last 35 years (cf. Figure 1).

One important benefit program is the Disability Insurance Act (Wet op de Arbeids-ongeschiktheidsverzekering, WAO) introduced in 1967. Disability insurance covers all

employees (except civil servants who have their own, very similar, arrangements) against loss of earnings due to long-term sickness and disability. Until 1992, disability insurance guaranteed employees who lost more than 80% of their earnings capacity a benefit of 70% (80% before 1985) of their daily wage (up to a maximum) up to age 65. Currently, disability benefits start at 70% of previous earnings (up to a maximum), but falls to a lower level after a certain period (both the length of this period and the percentage depend on age). However, most employees have taken out an additional insurance to cover the risk of disability insurance benefit falling below 70% of their previous earnings.[6]

In the 1980s, the disability insurance has become a very popular arrangement, which employers could use to elegantly get rid of elderly, less productive, employees. Severe legal obstacles existed (and still exist) to lay off employees while disability benefits were more generous than unemployment benefits (disability benefits would last until one reaches the age of 65, while unemployment benefits would typically last for only two and a half years - though longer for older workers; furthermore while on disability, pension rights often kept accumulating as if one were still employed -this would vary by pension fund-, whereas an unemployed person would accumulate very few pension rights if any). As a result of this, both employers and employees had a preference for the disability route to unemployment. The ensuing rise in costs of disability insurance has induced the government to limit eligibility for disability insurance by tightening entry conditions and reducing benefit levels. Moreover, persons receiving disability benefits are now subject to a more rigorous screening of their loss of earnings capacity.

As mentioned above, unemployment benefits (Werkloosheidswet, WW) are less generous than disability benefits, mainly because they are only paid for a limited period (dependent on the number of years worked before unemployment). However, most people aged 60 or above

who become unemployed can expect to receive unemployment benefits equal to 70% of their previous earnings up to age 65[7]. Another relevant feature is that above age 57.5 unemployed no longer have to register with an employment agency and thus *de facto* can retire from the labor market.

Households with a head younger than 65 without other sources of income (and limited household wealth) are entitled to social assistance (ABW/RWW). The level of the benefits is approximately equal to the level of social security for persons over 65. Since social security is linked to the minimum wage, this implies that for employees earning low wages the replacement rate is about 100%. Hence, in particular for those with low wages who are over 57.5 years of age, and hence have no obligation to look for a job in order to qualify for benefits, early retirement does not involve a loss of income.

All public benefits for persons younger than 65 are only paid to the extent that a person is not employed[8].

Private transfers

Next to social security, a majority of the population over 65 is entitled to a supplementary occupational pension. Meuwissen (1993) estimates that about 80% of households with a head aged 65 or over received some form of additional pension in 1989. It can safely be assumed that this percentage has only increased since then. Of those households not receiving a pension, more than half draw additional income from other sources, like capital income. Typically, occupational pensions supplement social security to 70% of final pay for persons who have worked for 40 years. After tax, the replacement rate is usually substantially higher.

In general, if an employer offers a pension scheme, then participation in such a scheme is compulsory. More than 99% of the pension schemes are of the defined benefit type[9], whereas

the remainder (0.6%) is of the defined contribution type. More than 72% of the pension benefits are defined on the basis of final pay, the remainder being a mixed bag of various combinations of final pay, fixed amounts, and average pay. Combining the effects of social security and private pension schemes leads to the following before tax replacement rates for those individuals who have contributed for a sufficient number of years: 34% receives less than 60% of the final pay, 27% receives between 60 and 69%, 20% receives between 70 and 79%, 19% receives at least 80% of final pay. One should keep in mind that after tax replacement rates may be substantially higher.

Most large firms have their own pension fund, smaller firms usually participate in sector-wide pension funds. In the latter case, the contribution rates do not differ between firms depending on the composition of the labour force.

Private pension arrangements usually require that people leave the job in which they accumulate pension rights at age 65 at the latest. There is no earnings test, however, and people may consider looking for secondary jobs once they retire.

Early retirement has become increasingly common during the 1980s, and was viewed as a means of reducing unemployment. In recent years, costs of early retirement have increased considerably, and many firms are currently trying to reduce these costs, by reducing the entitlements or increasing the minimum age at which employees are eligible for early retirement. Typically, the early retirement schemes guarantee an employee a benefit equal to 70 or 80% of previous earnings up to the age of 65. In after tax terms, replacement rates are even higher. Furthermore, while being in early retirement, one often keeps accumulating pension rights though possibly at a lower rate than when one would be working.

Early retirement may be organized via the pension funds which also provide the occupational pensions, or via the employer himself. Moreover, in contrast to these pensions,

early retirement is usually financed as pay-as-you-go. Early retirement usually requires ten years of employment with the same employer before the early retirement date, whereas old age pension rights remain valid if the worker changes jobs. The payment of early retirement pensions usually requires a complete withdrawal from the labor market.

Figures 9 and 10 give the hazard rates of labor force exit for men and women, defined as the number of persons who leave the labor force at the specified age, relative to the size of the labor force a year earlier. These figures are based on 1992-1993 Socio-Economic Panel data. Because of the size of the panel and the low participation rates above age 60 or so, the figures should only be considered as illustrative. Nevertheless, for men, the figures suggest that the hazard rates of leaving the labor force surpass the 20% rate around age 57, and peak at age 60, which is consistent with the proliferation of early retirement programs. For women, the figures are based on even smaller numbers of observations. Here, we find that leaving the labor force occurs more frequently at earlier ages, but also peaks around age 60.

It can be concluded that in the Netherlands there exists an elaborate system of income replacing transfers which can be expected to act as incentives to leave the labor force on one's 65th birthday at the latest. Moreover, it should be noted that whereas rather strict laws are in force which prevent employers to lay off younger employees, reaching the age of 65 is a legal reason for discharge, and social insurances protecting against loss of earnings as a result of sickness, disability or unemployment only cover employees younger than 65.

The Retirement Effects of SS - Empirical Evidence

Until recently, the literature on the retirement effects of social security, disability, or unemployment programs in the Netherlands was quite thin. Papers on this issue were usually descriptive and qualitative in nature. This situation has changed in the nineties, due to an

initiative of the so-called NESTOR program[10]. Under this program, a substantial grant was given to a group of researchers at the University of Leiden (who subsequently called themselves CERRA, Centre for Economic Research on Retirement and Aging) to set up a panel of elderly households (at the time of the first wave (1993), the head of the household had to be between 43 and 63 years old) and to set up a research program using these data. A fair amount of research of CERRA[11] has been on retirement.

An overview of the empirical literature in the Netherlands on retirement is given in Appendix II. The literature brings out a number of salient, though perhaps not surprising, facts: There exist powerful incentives to retire early and people usually retire as soon as they are eligible. Both unemployment and disability acts as an alternative for early retirement. The choice between the three exit routes (unemployment, disability, early retirement) is partly driven by the financial attractiveness of the routes. The dramatic fall in labor force participation among the elderly in the Netherlands can probably be explained largely by the introduction of additional incentives to retire over the last three decades.

Part III: Retirement Incentives

In this section, we estimate Social Security wealth and pension wealth for a number of stylized cases to assess the incentives of Social Security and private pensions through accrual rate effects. For simplicity of terminology, we will use the term social security wealth to also include pension wealth, unless explicitly stated otherwise.

Simulation

In the Netherlands, roughly after age 60, the levels of unemployment benefits, disability benefits (both until the age of 65), and social security (after 65) do not depend on the age of retirement. After becoming unemployed or disabled, the worker can expect to keep the same level of benefits up to age 65. After age 65, social security is independent of work history. Hence, if we would limit ourselves to these three benefit types, the implicit subsidy on retiring (the change in the worker's future benefits, relative to what he would earn in the coming year) would be equal to the replacement rate (the level of benefits in the coming year relative to his earnings in the coming year) plus the rates of contribution to the programs. The only way in which an employee's future income (after the coming year) may be affected by retiring one year earlier is via his or her private pension. Retiring before the age of 65 may affect the level of private pension to be received after age 65 by reducing the number of years counting towards pension benefits.

In this section we will compute social security and pension wealth, accrual rates and implicit tax/subsidy rates for persons aged 55 in January 1985, dependent on when they stop working (between 1985 and 2000, i.e. between their 55th and 70th birthday). As in Diamond and Gruber (1997), accrual rates are defined as the change in the worker's social security and pension wealth relative to the social security and pension wealth if he would retire one year earlier, and tax/subsidy rates are defined as the change in the social security and pension wealth relative to what he or she would earn over the coming year. Social security and pension wealth (the sum of which will be denoted by SSW) is calculated as the actuarially discounted sum of future benefits minus the discounted sum of future contributions to the programs involved when still at work. In our computations we distinguish four baseline cases:

a. Persons who receive an early retirement pension when they stop working at age

60[12] or later and who will receive a private pension in addition to social security once they turn 65.

b. Persons who receive a disability benefit when they stop working before age 65 and who will receive a private pension in addition to social security once they turn 65.

c. Persons who will only receive social security when they turn 65.

d. Persons who receive a disability benefit when they stop working before age 65 and who will only receive social security when they turn 65.

As can be inferred from the data given in section I, cases a and b are the most common ones. A large majority of employees is entitled to private pensions in addition to social security when they turn 65. Moreover, most firms have early retirement programs, and all employees have disability insurance. Early retirement usually requires 10 years of continuous service with the same employer, which would qualify most elderly employees. Access to the disability route is supposed to be limited to persons disabled for work, which has been relatively easy to prove until fairly recently. Cases c. and d. are only valid for the (very small) groups of employees who, upon retirement, are entitled to public benefits only.

For all entitlements we assume zero growth in real terms after 1995.[13] For survival probabilities we use sex/age specific survival tables of Statistics Netherlands (1992). We assume independence between the mortality rates of the worker and his spouse. We use a real discount rate of 3%. To compute net benefit and pension levels we subtract payroll and income taxes. For the years after 1995 we use the tax schedule for 1995, keeping tax rates and brackets fixed in real terms.

To produce our base line numbers, we consider a typical male individual who was born in January 1930, and thus turned 55 in January 1985. We assume that his annual before tax

earnings in 1985 equal Dfl. 48,152 which is equal to the median earnings for males working more than 32 hours per week in the age group 50-59, as based on the Socio-Economic Panel (SEP) of 1985. We assume that the worker's wife is three years younger than he is, and that she has no earnings herself.

We assume that between 1985 and 1995 the wage has moved with the index for the statutory minimum wage.

Base case results

We consider a worker who may or may not be working another year, between his 55th and 70th birthday. The results are shown in table 1, and the resulting tax/subsidy rates are graphed in figure 11. In general, working another year can affect SSW in different ways:

1. The worker younger than 65 who chooses to work another year must pay payroll taxes towards social security, unemployment insurance, disability insurance and, possibly, private pensions. This lowers net SSW.

2. The worker younger than 65 may forego a year of benefits (disability insurance, early retirement if aged above 60), which lowers net SSW.

3. At age 59, the worker would only be entitled to early retirement if he worked another year. This would considerably increase net SSW.

4. Working another year (up to age 65) would imply accumulating another year of occupational pension rights, which increases net SSW.

5. Working another year after age 65 could imply foregoing a year of occupational pensions, and receiving a lower amount of net social security benefits than without earnings. This would decrease net SSW.

The four baseline cases can be summarized as follows.

a. Persons who are entitled to an early retirement pension at age 60 would typically loose the right to an early retirement pension and stop accumulating pension rights when they would stop working before that age. In the calculations we assume that they go on accumulating pension rights until their 65th birthday if they take early retirement. Because, typically, entry in an occupational pension scheme is impossible before the age of 25, we assume that individuals have started accumulating pension rights at age 25.

As early retirement is assumed to be only possible as of age 60, no replacement rate is reported in the table until the age at the last year of work is 59. Typically, early retirement pensions pay 80% of previous earnings; the after tax replacement rate is about 90%. After age 65, the occupational pensions supplement social security to 70% of final pay, which likewise results in an after tax replacement rate of about 90%, as a result of the fact that persons aged 65 or over no longer pay contributions to social security or other payroll taxes.

From 55 to 58, every additional year of work results in a decrease in SSW by about 7%. By working an additional year, the person accumulates an additional year of pension rights, which increases his pension to be received after age 65. However, the net present value of this is much lower than the contributions paid by him and his employer for social security, pensions, disability insurance and unemployment insurance. In fact, there is an implicit tax of around 60% of net earnings upon working an additional year[14].

When the person works until his 60th birthday, he is assumed to be entitled to early retirement. As a result of this, his SSW increases by more than 50%, and there is an implicit subsidy on his net earnings of more than 375% if on his 59th birthday he decides to work another year.

From age 60 onward, by working another year, the workers not only pay another year of

contributions toward social security, pensions, etc., but also forego a year of early retirement benefits. Their pension rights (as of age 65) are not affected. As a result, working another year is implicitly taxed at a rate of around 130% of net earnings.

The calculations for the cases in which the persons retire on their 66th birthday or later are tentative, at most, because retirement at age 65 is virtually automatic, if the persons have not retired earlier. In the calculations we assume that a person who works after age 65 is paid the same net earnings as before his 65th birthday, and in addition, receives social security. Moreover, it is assumed that he stops accumulating pension rights, and is not entitled to (occupational) pensions as long as he keeps working.

Foregoing the occupational pension for a year results in a decrease of SSW by about 6.5% per year. This amounts to an implicit tax rate of about 33% on net earnings.

All in all, the figures suggest that there is a huge incentive to stop working at the early retirement age, especially if one looks at the social security and pension wealth, the accrual rate and the implicit tax rate. For most couples in the Netherlands, the replacement rate would be the most obvious decisive factor. The replacement rates of more than 90% make it likely that only very few persons would decide to work an extra year, for instance if they derive high non-monetary rewards from their work[15].

b. For persons who receive a disability benefit when they stop working before age 65 and an occupational pension in addition to social security after age 65, we assume that they would stop accumulating pension rights once they receive disability benefits.

If these persons would receive disability benefits, they receive 70% of their previous earnings, or almost 80% after tax. By working an additional year, the worker would forego a year of DI-benefits, and pay an additional year of contributions. On the plus side, he would accumulate additional pension rights. The net result is a decrease in SSW. This decrease in

SSW drops from about Dfl 42000 in 1986 to Dfl 24000 in 1994, which amounts to an accrual rate increasing from -9% to -16%, or an implicit tax rate on net earnings decreasing from almost 150% in 1985 to 101% in 1994.

The results for retiring between one's 66th and 70th birthday are equal to the results of base case a.

In this case the figures suggest an incentive to retire into disability as soon as possible. The accrual rates and tax rates could even be higher if one keeps acccumulating pension rights during disability (free of charge), as is the case in some pension schemes.

Again it should be mentioned that probably the most important incentive to retire is the replacement rate. Although the replacement rate in terms of gross earnings was reduced from 80% to 70% by January 1985, this does not appear to have affected the attractiveness of the scheme very much. The introduction of sharper criteria for disability in recent years appears to have been somewhat more successful in reducing the inflow.

c. For persons who only receive social security after age 65, we assume that they would not receive any benefit until reaching age 65 if they would retire voluntarily before that age.

Because they would not receive any benefit, the replacement rate is, in fact, zero. If they continue working, the payment of contributions for social security, disability insurance and unemployment insurance causes SSW to decrease by 7 to 10% per year from 1985 to 1994, which implies an implicit tax rate of more than 47% of net earnings in 1985, a percentage which gradually decreases to 38% in 1994. In view of the replacement rate in this case, these numbers are probably not very relevant in practice.

If they would retire after age 65, we assume they would receive the same net earnings as before age 66, and, in addition, receive social security. The replacement rate of social security only is about 61%. In this case, if they continue to work, they pay a higher income tax rate on

their social security benefit than without earnings, which reduces SSW by about 3% per year (an implicit tax on earnings of about 11%).

Again, looking at SSW only, the incentive would seem to be to retire as soon as possible. However, without any earnings replacing benefits, the option of retiring would not be feasible for most persons.

d. For persons who receive a disability benefit when they stop working before age 65 and receive social security after age 65, there are two main differences with case b above. First, when working, they would not pay pension contributions towards the occupational pension scheme. Second, they would not receive an occupational pension after age 65.

If these persons were to retire between their 66th and 70th birthday, the results would be equal to base case c.

Because these persons do not pay pension contributions, both the replacement rates and the implicit tax rates are slightly lower than in case b above. However, solely from the viewpoint of accrual rates and implicit tax rates, there is still a distinct incentive to retire as soon as possible.

Other cases

Table 2 gives the analogous results for a single worker. The main differences with table 1 are the considerably lower amounts of SSW accumulated by a single worker. In most cases the implicit tax rates are much the same as for a couple, while the accrual rates are higher because the denominator (SSW) is lower.

Similar to the case for couples, the single worker who could take early retirement would find it attractive to take it at the earliest possible age, if he could afford an income loss of about 10%. The disability benefit option also appears to be very attractive.

The next two tables (3 and 4) concern workers who are at the 90th and 10th percentile of the earnings distribution, respectively (see also figures 12A-D). As is the case for the median, we take the 90th and 10th percentile of the 1985 income distribution of full-time male workers between 50 and 59, and assume that the time pattern of wages follows that of the statutory minimum wage.

The replacement rates, accrual rates and tax/subsidy rates for workers at the 90th percentile (table 3) who are entitled to early retirement are much the same as those for workers with a median wage. The main difference concerns the unlikely case of retiring after age 65. Since for high income workers, occupational pensions make up a larger share of total income after age 65, they would forego a larger amount by continuing to work after age 65. It should be remembered that the basic social security benefit is paid independent of whether the worker has retired or not, whilst occupational pensions are paid conditional upon the worker having left his job.

When 90th percentile workers receive disability insurance benefits, their replacement rate is considerably lower than for the median worker, as a result of the ceiling in the public disability insurance system. The rates of accrual and the implicit tax rates are also lower than for the median worker. However, only the lower replacement rate suggests that for these workers retiring via the disability route is less attractive than for workers with lower wages[16].

90th percentile workers who are not entitled to occupational pensions after their 65th birthday nor to any benefit before age 65 have a lower SSW than median workers if they retire after age 55, as a result of the higher contributions to social security, disability insurance and unemployment insurance made during the years they are still working. The accrual rates - the decrease in SSW as a result of working an additional year - are also higher than for median workers, in particular when they choose to continue working beyond age 60. In that case the

amounts of payroll taxes paid toward social security, unemployment insurance and disability insurance reduce SSW - the denominator in the accrual rate calculations - to such an extent that the accrual rates increase considerably although the absolute amounts of the decrease remain limited. On the other hand, the implicit tax rates on net earnings are somewhat lower than for median workers, because the contributions to social security, disability and unemployment insurance are subject to a ceiling. After age 65, the replacement rate of social security only is about 36.5% for workers at the 90th percentile.

90th percentile workers who are entitled to disability insurance before age 65 and to social security only after age 65 also face lower replacement rates than median workers. Similar to the previous case, their accrual rates increase considerably when they continue to work, whilst the tax-rates are somewhat lower than for median workers.

Workers who are at the 10th percentile of the earnings distribution face slightly lower replacement rates than median workers, if they are entitled to early retirement. This is because the increase in net income as a result of the fact that pension contributions and payroll taxes no longer have to be paid, is lower at this level of income. The rates of accrual and the implicit tax rates are slightly lower than at the median.

In the case where these workers with low wages would receive disability insurance, their benefits would be equal to the social minimum. As a result of this the replacement rates for persons retiring before age 65 are higher than for the median worker. The accrual rates and the implicit tax rates are much the same as those for median workers.

For low wage workers who, upon reaching the age of 65, are only entitled to social security, SSW is higher than for workers at the median. This is a result of the lower contributions to social security (and disability and unemployment insurance) made before retiring, which are not followed by lower benefits after age 65.

The replacement rate for SS only is only marginally lower than for the worker who is also entitled to private pensions after age 65 (.851 as compared to .871), which shows that private pensions only make up a very small part of total income after retirement for low wage workers.

Table 5 presents the results for persons with an incomplete earnings history. Social security benefits and disability benefits are not affected by the earnings history. With respect to occupational pensions, we assume that the persons have accumulated only 30 years of pension rights when working until the age of 65 instead of the maximum of 40. Apart from a reduction in SSW, this hardly appears to affect the results. In fact, in monetary terms, the accruals are exactly the same in most cases, because the amounts paid for contributions are the same and the amounts foregone in pension receipts are also the same because the increase in before tax pensions as a result of accumulating one more pension year leads to a constant increase in net pensions at the relevant range of pensions. The amounts of accrual only differ sometimes if the threshold for the statutory health insurance for the elderly is crossed.

As a result of having accumulated pension rights during 30 instead of 40 years, the replacement rate of the pensions received after age 65 is reduced by about 7%, from .91 to .84. It should be noted that in this case the decrease for single workers would be higher (from .92 to .79), mainly because the occupational pension makes up a larger share of the income for a single retiree than for a couple.

Since by working after age 65, individuals forego a lower amount of occupational pension, the amounts of accrual after age 65 are lower than in table 1, as are the implicit tax rates.

Summarizing the results of these calculations, it can be seen that the Dutch system of social security, disability insurance, early retirement and occupational pensions results in high incentives to retire as soon as possible, except in the case where the worker would be entitled

to early retirement, in which case it would be attractive to wait until the early retirement age. These findings are fairly robust to changes in assumptions about earnings. Further calculations show that the results are also unaffected by changes in assumptions about discount rates, mortality, and wife's age. The fact that very few persons in the Netherlands work until their 65th birthday can be seen to be entirely consistent with these findings.

Nevertheless, some remarks are in order. First, it should be mentioned that the implicit tax rates take into account contributions to social security, disability insurance, unemployment insurance and occupational pensions which a worker in the Netherlands would hardly be able to estimate. In particular, pension and social insurance contributions made by the employer are often not mentioned on wage slips. Furthermore, payroll taxes are collected jointly with income taxes and only a very well informed worker would be able to identify them separately. In the end, what really seems to matter for the individual considering retirement is the replacement rate.

Second, the options open to workers are dependent on individual circumstances. Early retirement is currently a fairly general provision in most firms, but retirement via the disability route has been made more difficult in recent years.

Concluding remarks

In the Netherlands, the system of provisions for elderly people who (have to) stop working can be characterized by two main dimensions. First, there is a division by age, between people of 65 and older and people aged below 65. Second, both public and private schemes are important. For people aged below 65, publicly provided disability and unemployment benefits exist next to early retirement schemes provided by the employer. For most people above 65,

private pensions supplement social security.

The labor force participation of the elderly, especially of males, has dropped considerably over the last 35 years. Between 60 and 65 only about 20% of males are in the labor force, and above 65, participation is considered to be too low to be of interest.

Combining public and private schemes, employees who stop working can mostly expect high replacement rates. The effect on future benefits of retiring now instead of working one more year is rather low. The resulting implicit tax rates of working one more year are very high. This in itself may provide a strong incentive to retire early. Yet, without further research it would be hard to say which part of the drop in participation among older workers is due to those incentives and which part is involuntary, i.e. due to real disability and involuntary unemployment. Empirical research available to-day suggests that the incentives described here provide the main explanation for the sharp drop in labor force participation among the elderly part of the labor force.

Appendix I: Data Sources

All data used come from Statistics Netherlands.

Historical data

Data are from Census (1960, 1971), Labor Force Surveys (1975, 1979, 1985, 1990, 1994). Figures are not adjusted for changes in definitions. Figures for labour force participation of persons aged 65 or above are unavailable after 1985.

Contemporaneous data

For the detailed figures on the labor force participation, we use the 1993/1994 Housing Needs Survey (Woningbehoeftenonderzoek, WBO). The WBO is a large nationally representative survey (55,000 households) which, among others, records labor force attachment and income.

The figures on hazard rates (figures 9 and 10) are based on the 1992 and 1993 waves of the Socio-Economic Panel. The income composition figures (figure 8) are based on the latest available Socio-Economic Panel data (1993), and pertain to the year 1992. The SEP is a nationally representative household panel consisting of about 5,000 households. The figures pertain to before tax incomes. It should be noted that the subdivision into age groups causes the numbers of observations on which the figures are based to be rather small.

Appendix II: The effect of SS on Retirement - Recent Evidence

As noted by Woittiez, Lindeboom, Theeuwes (1994), until recently there was "a paucity of empirical research"[17] in the Netherlands on factors determining retirement. Contributions they mention are Delsen (1987), who gives an overview of early retirement schemes in Europe, Bolhuis, Ottens, Steenbeek-Vervoort (1987), who discuss the problem of financial sustainability of early retirement schemes introduced in the early eighties, and Henkens and Siegers (1990), who provide one of the first quantitative analyses of retirement decisions of males in the Netherlands. The most prominent study in this "earlier literature" is undoubtedly Aarts and de Jong (1992). This monograph reports on a project covering more than a decade of research into the determinants of disability. Next to obvious health factors, financial considerations are found to play an important role. Indeed this study was the first to document

by means of quantitative analysis the fact that the disability scheme was both a financially attractive route into early retirement for the employee and a convenient way to lay off elderly employees.

In view of the tightening of eligibility rules for disability and the reduction of disability benefit levels, and the simultaneous introduction of various generous early retirement schemes, one would expect a substitution of channels into retirement as a result of this. Woittiez, Lindeboom, Theeuwes (1994) study precisely this point. By means of both multinomial logit and conditional logit models they model the probability of finding elderly individuals (defined as being between 48 and 62 years old) in one of four states: working, disabled, unemployed, or early retired. They find a significant role for financial incentives, i.e. a state becomes more likely if the associated income level is higher. Simulations with their models show for instance that a reduction of benefits in the non-working states by 10 % raises the percentage of individuals found working by a few percentage points. The authors also find evidence for stigma effects (cf. Moffit (1983)) in their conditional logit model, indicating that the state of unemployment is valued below the state of disability, and both below early retirement. This finding is partly supported by Woittiez and Theeuwes (1997), who use self reported measures of life satisfaction as well as several measures of mental and somatic health, to find that, other things being equal, people who work are generally better off than non-working people, but with early retirees being a close second. The disabled are least satisfied with their life, whereas the unemployed are above the disabled and below the early retired. The key difference between the unemployed and the early retired lies in the involuntary nature of the former state. Indeed the authors find that it is precisely this involuntary nature that explains most of the dissatisfaction of the unemployed.

In principle, also early retirement can have a non-voluntary nature, as an employer may put

pressure on an employee who is eligible for early retirement to leave the firm. Thio (1995) lumps together all exit routes considered so far (disability, early retirement, unemployment) for a sample of household heads aged between 53 and 63. Everyone not working in his sample has indicated whether the separation from the last job was involuntary (dismissal, forced by the firm, afraid to get laid off) or voluntary (had "worked long enough", etc.). He then uses a competing risks model to explain these different routes into retirement. He does find some evidence for involuntary early retirement, although this is not significant. Nevertheless, early retirement remains the favorite exit route out of employment. In Kerkhofs, Theeuwes and Woittiez (1996) transitions out of a job are analysed by means of a duration model. They also establish a substitution pattern in the choice of exit routes. When the early retirement route is available, it dominates the other exit routes.

As both eligibility rules and replacement rates for early retirement differ across firms (or sectors), one may suspect that employees and employers match to their mutal benefit. Workers with a preference for early retirement may match with firms that offer relatively low wages and the possibility to retire early. Firms (or sectors) that need healthy young workers, may decide to offer generous early retirement schemes. Thio and Woittiez (1996) investigate this issue by estimating a hedonic price relation in which the wage offered to an individual employee is related to characteristics determining worker productivity and early retirement benefits. The early retirement benefits are constructed on the basis of a wage growth equation and specific information on the early retirement rules for the firm. These are converted into a ratio of the expected present value of early retirement to the expected present value of wages. It is found that there is a trade off between wages and early retirement benefits, but not one for one, i.e. the better early retirement benefits are not fully reflected in lower wages. This finding seems to be consistent with the behavior of employers in the Netherlands, who are

increasingly anxious to change the early retirement rules as these turn out to be much more expensive than originally anticipated.

Clearly for this type of study the availability of data for both employees and employers is essential. Another study taking advantage of this is Theeuwes and Lindeboom (1995). They match firm and employee data to analyse the effect of exit routes on the number of elderly employees leaving the firm. They provide evidence that there is some but not full substitution between channels into retirement. This gives room for policy measures to reduce retirement. Based on employee data only they find that eligibility requirements rather than the benefit heights determine the moment of retirement. Heyma and Thio (1994) take up the issue of explaining differences in labor force participation among elderly workers between the U.S. and the Netherlands, exploiting the HRS and the CERRA samples. They first estimate standard probit participation equations, as well as non-parametric variants. Next they consider simple transition models. Qualitatively, the models are not very different across the two countries; parameter estimates generally have the same sign, with one major exception: (imputed) log-wage has a positive effect on the probability of participation in the Netherlands and a negative effect in the U.S. It is a bit hard to interpret this difference as no replacement ratios are being given. The interesting part of their analysis is where they use the U.S. estimates to predict participation in the Netherlands and *vice versa*. This shows that if the Dutch would have the American coefficients, labor force participation would even be higher than in the U.S., whereas if the Americans would have the Dutch coefficients labor force participation in the U.S. would have been even lower than in the Netherlands. This suggests that the explanation for the observed differences between the U.S. and the Netherlands is not a matter of different characteristics of individuals, but rather a matter of a different institutional environment. The two main features of this institutional environment are financial incentives

and eligibility rules, both of which are not, or not fully, taken into account in the comparison of Heyma and Thio (1994)[18].

Heyma (1996) addresses both these elements in a dynamic programming model of retirement decisions. He takes into account the three exit routes mentioned earlier and allows for the possibility of lay-offs. Except for working, all states (disability, unemployment, retired) are assumed to be absorbing states. He builds financial incentives and eligibility rules into his model. Having estimated the model, he simulates various policy changes, like later eligibility for early retirement, raising the mandatory retirement age by two years, and lower early retirement benefits. The effects found are substantial. For example, if the early retirement benefits are set equal to disability benefits, labor force participation of 62-year olds easily doubles. Heyma, Lindeboom and Kerkhofs (1997) extend this model by using data on individual behavior, survival rates, private pensions and firm data. The effects are similar to the ones found in Heyma (1996). Putting emphasis on the institutional characteristics they are able to explain quite a lot of the dynamics in retirement behavior.

The research reviewed here provides ample evidence for the dominant role of financial incentives and eligibility rules in the explanation of the low labor force participation rate among the elderly in the Netherlands. However, no study has yet fully quantified the part of the decrease in labor force participation among the elderly that can be ascribed to the changes in incentives and eligibility rules over the last three decades.

Footnotes

1. See the end of part II and Appendix II

2. These figures only include early retirement (VUT) benefits, but do not take account of persons who received a regular old age pension before the age of 65. In a limited number of occupations, the official pension age is lower than 65. Moreover, some pension funds used to offer retirement after 40 years of work, if this number was reached before age 65.

3. These numbers are lower than the numbers quoted above, where it is stated that about one third of the males between 55 and 64 receive disability benefits. The numbers above stem from registers. Apparently the WBO underrepresents DI-recipients.

4. This includes early retirement benefits.

5. Drees was the Minister of Social Affairs at the time.

6. It should be noted that for single earners who lost more than 80% of their earnings capacity, disability benefits are always at least as high as the relevant social assistance (welfare) level (ABW/RWW), which, for a couple, is approximately equal to the after tax minimum wage. In contrast to the entitlement to social assistance, household wealth is not taken into account.

7. Similar to the case for disability benefits, if necessary the unemployment benefit is supplemented by welfare benefits to reach the social assistance level, without taking household wealth into account. Hence, for single earners with low wages, the replacement rate can be almost 100%.

8. For persons in part-time employment, benefits may supplement their earnings.

9. The information in this paragraph stems from PN (1987)

10. NESTOR is an acronym (in Dutch) for Netherlands Program for Research on Ageing. It is probably best compared with the National Institute of Aging in the U.S., be it that NESTOR only had a temporary nature.

11. A description of the research program is to be found in CERRA(1996).

12. It should be noted that the early retirement age varies by employer or sector. In the calculations we assume that early retirement is possible as of age 60.

13. For disability, social security, and unemployment benefits, this is more or less in line with current government policy. Some private pension funds guarantee pensions to grow with the increase in real wages, however.

14. It should be noted that one of the factors determining the accrual rates and the implicit tax rates is the contribution to be made to the occupational pension fund. These contributions vary considerably across pension funds. In the calculations we have used the contributions valid for one of the largest private pension funds in the Netherlands (PGGM), operating mainly in the health sector.

15. It should also be noted that the loss of fringe benefits such as a company car might be taken into account in the decision whether or not to retire early.

16. It should be noted that in a number of pension arrangements, the disability benefit for workers with wages above the public insurance ceiling is supplemented to 70% of previous earnings by the pension fund. For these workers, the replacement rate would be fairly close to that of the median worker.

17. Page 5.

18. The inclusion of log-wages captures some financial incentive aspect, but since no repacement ratios are used, it is not very clear what to make of it.

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Table 1: Incentive Calculations for Base Case

a. SS + ER + PP

Age at Last Year of Work	Replac. Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		266958			
55		247365	-19593	-0.073	0.687
56		229033	-18332	-0.074	0.650
57		212121	-16912	-0.074	0.612
58		196668	-15453	-0.073	0.578
59	0.910	296367	99699	0.507	-3.777
60	**0.906**	**258463**	**-37903**	**-0.128**	**1.410**
61	0.900	222715	-35748	-0.138	1.384
62	0.902	188559	-34157	-0.153	1.339
63	0.892	157316	-31242	-0.166	1.280
64	0.909	128554	-28762	-0.183	1.222
65	0.909	120371	-8183	-0.064	0.357
66	0.909	112631	-7740	-0.064	0.347
67	0.909	105331	-7300	-0.065	0.337
68	0.909	98468	-6863	-0.065	0.327
69	0.909	92038	-6430	-0.065	0.315

b. SS + DI + PP

54	0.791	459325			
55	0.789	417164	-42161	-0.092	1.478
56	0.787	376878	-40285	-0.097	1.428
57	0.788	338751	-38128	-0.101	1.379
58	0.782	303010	-35741	-0.106	1.338
59	0.761	269520	-33490	-0.111	1.269
60	0.761	237690	-31830	-0.118	1.184
61	0.759	207718	-29972	-0.126	1.160
62	0.762	179121	-28598	-0.138	1.121
63	0.758	152290	-26831	-0.150	1.099
64	0.909	128554	-23735	-0.156	1.009

c. SS only

54		197610			
55		183590	-14019	-0.071	0.475
56		170062	-13528	-0.074	0.464
57		157316	-12746	-0.075	0.447
58		145269	-12047	-0.077	0.436
59		134189	-11080	-0.076	0.407
60		122498	-11691	-0.087	0.421
61		111459	-11039	-0.090	0.415
62		100220	-11240	-0.101	0.431
63		89981	-10239	-0.102	0.410
64	0.610	80823	-9158	-0.102	0.380
65	**0.610**	**78045**	**-2778**	**-0.034**	**0.118**
66	0.610	75414	-2632	-0.034	0.115
67	0.610	72927	-2487	-0.033	0.112
68	0.610	70584	-2343	-0.032	0.109
69	0.610	68383	-2200	-0.031	0.105

d. SS + DI

54	0.764	389976			
55	0.763	353389	-36587	-0.094	1.239
56	0.763	317908	-35481	-0.100	1.217
57	0.763	283946	-33962	-0.107	1.191
58	0.759	251611	-32334	-0.114	1.171
59	0.761	220903	-30708	-0.122	1.129
60	0.739	190069	-30834	-0.140	1.111
61	0.743	160918	-29150	-0.153	1.096
62	0.744	132173	-28745	-0.179	1.103
63	0.740	105447	-26726	-0.202	1.069
64	0.610	80823	-24624	-0.234	1.022

Table 2: Incentive Calculations for Single Worker

a. SS + ER + PP

Age at Last Year of Work	Replac. Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		159640			
55		140245	-19395	-0.121	0.709
56		122103	-18141	-0.129	0.670
57		105379	-16724	-0.137	0.631
58		90114	-15265	-0.145	0.595
59	0.905	186501	96387	1.070	-3.780
60	**0.918**	**149038**	**-37463**	**-0.201**	**1.457**
61	0.909	113675	-35363	-0.237	1.455
62	0.908	79981	-33694	-0.296	1.418
63	0.898	49195	-30786	-0.385	1.357
64	0.920	20866	-28329	-0.576	1.295
65	0.920	9409	-11457	-0.549	0.535
66	0.920	-1424	-10833	-1.151	0.521
67	0.920	-11640	-10216	**	0.506
68	0.920	-21241	-9602	**	0.490
69	0.920	-30235	-8993	**	0.472

b. SS + DI + PP

54	0.790	342352			
55	0.788	301321	-41032	-0.120	1.499
56	0.787	262126	-39195	-0.130	1.447
57	0.789	225044	-37081	-0.141	1.398
58	0.784	190286	-34759	-0.154	1.355
59	0.750	157612	-32673	-0.172	1.281
60	0.763	126428	-31184	-0.198	1.213
61	0.758	97060	-29368	-0.232	1.208
62	0.758	69134	-27926	-0.288	1.175
63	0.754	43911	-25223	-0.365	1.112
64	0.920	20866	-23045	-0.525	1.053

c. SS only

54		94825			
55		80806	-14019	-0.148	0.494
56		67278	-13528	-0.167	0.483
57		54532	-12746	-0.189	0.465
58		42485	-12047	-0.221	0.454
59		31405	-11080	-0.261	0.421
60		19080	-12324	-0.392	0.464
61		7430	-11650	-0.611	0.466
62		-4538	-11969	-1.611	0.493
63		-15514	-10976	**	0.474
64	0.462	-25358	-9844	**	0.441
65	**0.462**	**-28807**	**-3449**	**	**0.158**
66	0.462	-32068	-3261	**	0.154
67	0.462	-35143	-3075	**	0.149
68	0.462	-38033	-2890	**	0.144
69	0.462	-40740	-2707	**	0.139

d. SS + DI

54	0.762	277538			
55	0.762	241882	-35656	-0.128	1.256
56	0.762	207301	-34581	-0.143	1.234
57	0.762	174197	-33103	-0.160	1.209
58	0.759	142656	-31541	-0.181	1.189
59	0.725	112570	-30086	-0.211	1.144
60	0.742	82177	-30394	-0.270	1.143
61	0.742	53412	-28765	-0.350	1.151
62	0.742	25103	-28309	-0.530	1.166
63	0.738	-1168	-26270	-1.047	1.134
64	0.462	-25358	-24191	**	1.083

Table 3: Incentive Calculations for 90th percentile

a. SS + ER + PP

Age at Last Year of Work	Replac. Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		448203			
55		414605	-33599	-0.075	0.678
56		383316	-31288	-0.075	0.637
57		354915	-28401	-0.074	0.586
58		329104	-25811	-0.073	0.531
59	0.924	512294	183189	0.557	-4.031
60	**0.925**	**448763**	**-63530**	**-0.124**	**1.394**
61	0.917	389145	-59618	-0.133	1.366
62	0.916	333770	-55375	-0.142	1.305
63	0.907	282947	-50824	-0.152	1.249
64	0.921	236198	-46748	-0.165	1.196
65	0.921	213761	-22438	-0.095	0.586
66	0.921	192537	-21223	-0.099	0.571
67	0.921	172517	-20020	-0.104	0.555
68	0.921	153694	-18823	-0.109	0.537
69	0.921	136056	-17637	-0.115	0.519

b. SS + DI + PP

54	0.566	697921			
55	0.566	636243	-61678	-0.088	1.244
56	0.582	577533	-58710	-0.092	1.195
57	0.563	521598	-55935	-0.097	1.154
58	0.594	469394	-52204	-0.100	1.073
59	0.595	421043	-48351	-0.103	1.064
60	0.596	378667	-42376	-0.101	0.930
61	0.598	338622	-40044	-0.106	0.917
62	0.605	301317	-37305	-0.110	0.879
63	0.605	267455	-33863	-0.112	0.832
64	0.921	236198	-31256	-0.117	0.800

c. SS only

54		197610			
55		174209	-23401	-0.118	0.446
56		151300	-22909	-0.132	0.442
57		129860	-21439	-0.142	0.420
58		109485	-20375	-0.157	0.399
59		90816	-18670	-0.171	0.393
60		74362	-16454	-0.181	0.349
61		59183	-15179	-0.204	0.336
62		44271	-14912	-0.252	0.342
63		30191	-14079	-0.318	0.336
64	0.365	17632	-12560	-0.416	0.313
65	**0.365**	**12684**	**-4948**	**-0.281**	**0.126**
66	0.365	8008	-4676	-0.369	0.122
67	0.365	3601	-4406	-0.550	0.119
68	0.365	-537	-4139	-1.149	0.115
69	0.365	-4410	-3873	**	0.111

d. SS + DI

54	0.535	447327			
55	0.536	395847	-51480	-0.115	0.980
56	0.553	345516	-50331	-0.127	0.971
57	0.537	296543	-48973	-0.142	0.960
58	0.567	249775	-46768	-0.158	0.917
59	0.595	205460	-44315	-0.177	0.932
60	0.575	163616	-41844	-0.204	0.887
61	0.581	124488	-39128	-0.239	0.865
62	0.589	86614	-37874	-0.304	0.868
63	0.589	50693	-35921	-0.415	0.858
64	0.365	17632	-33061	-0.652	0.823

Table 4: Incentive Calculations for 10th percentile

a. SS + ER + PP

Age at Last Year of Work	Replac. Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		199961			
55		186692	-13269	-0.066	0.617
56		174143	-12549	-0.067	0.591
57		162460	-11683	-0.067	0.562
58		151665	-10795	-0.066	0.540
59	0.878	213951	62286	0.411	-3.157
60	**0.876**	**189332**	**-24619**	**-0.115**	**1.284**
61	0.871	166123	-23209	-0.123	1.261
62	0.872	143921	-22202	-0.134	1.209
63	0.864	123585	-20335	-0.141	1.151
64	0.871	104841	-18744	-0.152	1.100
65	0.871	104023	-819	-0.008	0.049
66	0.871	103249	-774	-0.007	0.048
67	0.871	102520	-729	-0.007	0.046
68	0.871	101836	-684	-0.007	0.045
69	0.871	101196	-640	-0.006	0.043

b. SS + DI + PP

54	0.871	357535			
55	0.869	325515	-32020	-0.090	1.488
56	0.866	294784	-30731	-0.094	1.447
57	0.867	265573	-29210	-0.099	1.406
58	0.854	238085	-27488	-0.104	1.374
59	0.866	212255	-25830	-0.108	1.309
60	0.867	188023	-24232	-0.114	1.264
61	0.861	165145	-22878	-0.122	1.243
62	0.863	143282	-21863	-0.132	1.191
63	0.856	123282	-20000	-0.140	1.132
64	0.871	104841	-18441	-0.150	1.083

c. SS only

54		197610			
55		189610	-8000	-0.040	0.366
56		181812	-7798	-0.041	0.362
57		174439	-7373	-0.041	0.350
58		167410	-7030	-0.040	0.345
59		160898	-6512	-0.039	0.325
60		154346	-6552	-0.041	0.336
61		148153	-6193	-0.040	0.330
62		141899	-6254	-0.042	0.336
63		136276	-5624	-0.040	0.314
64	0.851	131268	-5008	-0.037	0.290
65	**0.851**	**130598**	**-670**	**-0.005**	**0.040**
66	0.851	129966	-632	-0.005	0.039
67	0.851	129373	-594	-0.005	0.037
68	0.851	128817	-556	-0.004	0.036
69	0.851	128298	-519	-0.004	0.035

d. SS + DI

54	0.858	355184			
55	0.856	328432	-26752	-0.075	1.224
56	0.854	302453	-25980	-0.079	1.206
57	0.852	277553	-24900	-0.082	1.183
58	0.839	253830	-23723	-0.085	1.166
59	0.866	231335	-22495	-0.089	1.121
60	0.851	209265	-22070	-0.095	1.132
61	0.850	188413	-20852	-0.100	1.112
62	0.852	167919	-20494	-0.109	1.102
63	0.846	148850	-19069	-0.114	1.066
64	0.851	131268	-17582	-0.118	1.020

Table 5: Incentive Calculations for Incomplete Earnings History

a. SS + ER + PP

Age at Last Year of Work	Replac. Rate	SSW	Accrual	Accrual Rate	Tax/ Subsidy
54		243842			
55		224249	-19593	-0.080	0.687
56		205917	-18332	-0.082	0.650
57		189005	-16912	-0.082	0.612
58		173551	-15453	-0.082	0.578
59	0.910	274123	100572	0.579	-3.810
60	**0.906**	**236220**	**-37903**	**-0.138**	**1.410**
61	0.900	200472	-35748	-0.151	1.384
62	0.902	166315	-34157	-0.170	1.339
63	0.892	135073	-31242	-0.188	1.280
64	0.838	106311	-28762	-0.213	1.222
65	0.838	99460	-6851	-0.064	0.298
66	0.838	92976	-6484	-0.065	0.291
67	0.838	86856	-6120	-0.066	0.283
68	0.838	81099	-5757	-0.066	0.274
69	0.838	75701	-5398	-0.067	0.265

b. SS + DI + PP

54	0.791	436209			
55	0.789	394047	-42161	-0.097	1.478
56	0.787	353762	-40285	-0.102	1.428
57	0.788	315634	-38128	-0.108	1.379
58	0.782	279894	-35741	-0.113	1.338
59	0.761	246404	-33490	-0.120	1.269
60	0.761	214574	-31830	-0.129	1.184
61	0.759	184602	-29972	-0.140	1.160
62	0.762	156005	-28598	-0.155	1.121
63	0.758	130069	-25936	-0.166	1.062
64	0.838	106311	-23758	-0.183	1.010

c. SS only (not affected)

54		197610			
55		183590	-14019	-0.071	0.475
56		170062	-13528	-0.074	0.464
57		157316	-12746	-0.075	0.447
58		145269	-12047	-0.077	0.436
59		134189	-11080	-0.076	0.407
60		122498	-11691	-0.087	0.421
61		111459	-11039	-0.090	0.415
62		100220	-11240	-0.101	0.431
63		89981	-10239	-0.102	0.410
64	0.610	80823	-9158	-0.102	0.380
65	**0.610**	**78045**	**-2778**	**-0.034**	**0.118**
66	0.610	75414	-2632	-0.034	0.115
67	0.610	72927	-2487	-0.033	0.112
68	0.610	70584	-2343	-0.032	0.109
69	0.610	68383	-2200	-0.031	0.105

d. SS + DI (not affected)

54	0.764	389976			
55	0.763	353389	-36587	-0.094	1.239
56	0.763	317908	-35481	-0.100	1.217
57	0.763	283946	-33962	-0.107	1.191
58	0.759	251611	-32334	-0.114	1.171
59	0.761	220903	-30708	-0.122	1.129
60	0.739	190069	-30834	-0.140	1.111
61	0.743	160918	-29150	-0.153	1.096
62	0.744	132173	-28745	-0.179	1.103
63	0.740	105447	-26726	-0.202	1.069
64	0.610	80823	-24624	-0.234	1.022

List of Figure Legends.

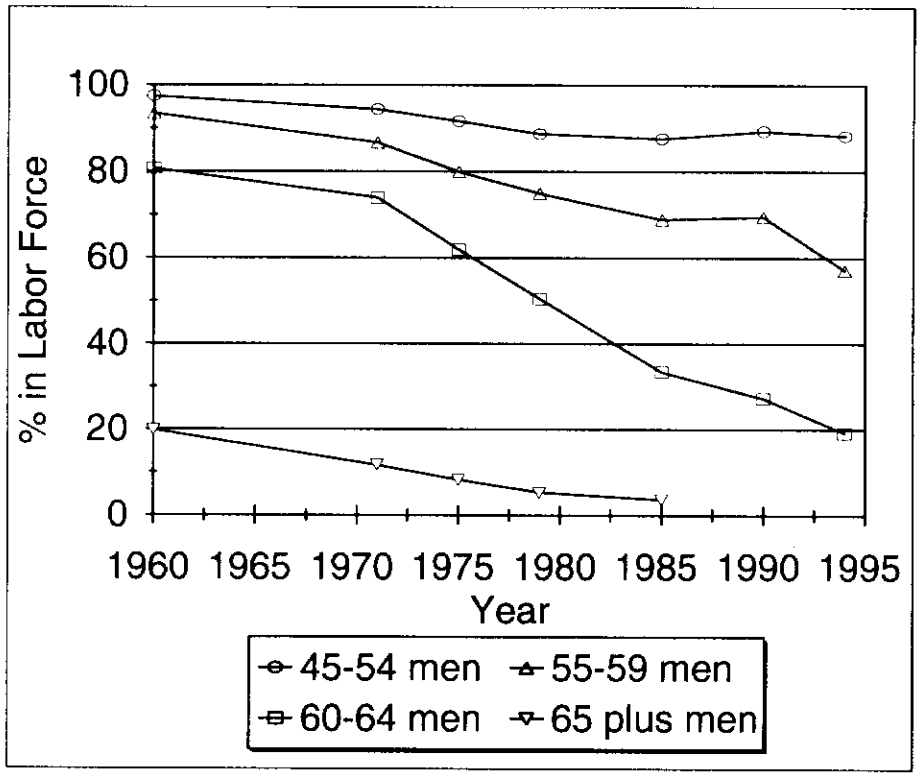

100
80
60
40
20
0
% in Labor Force
1960 1965 1970 1975 1980 1985 1990 1995
Year
45-54 men
55-59 men
60-64 men
65 plus men

Figure 1

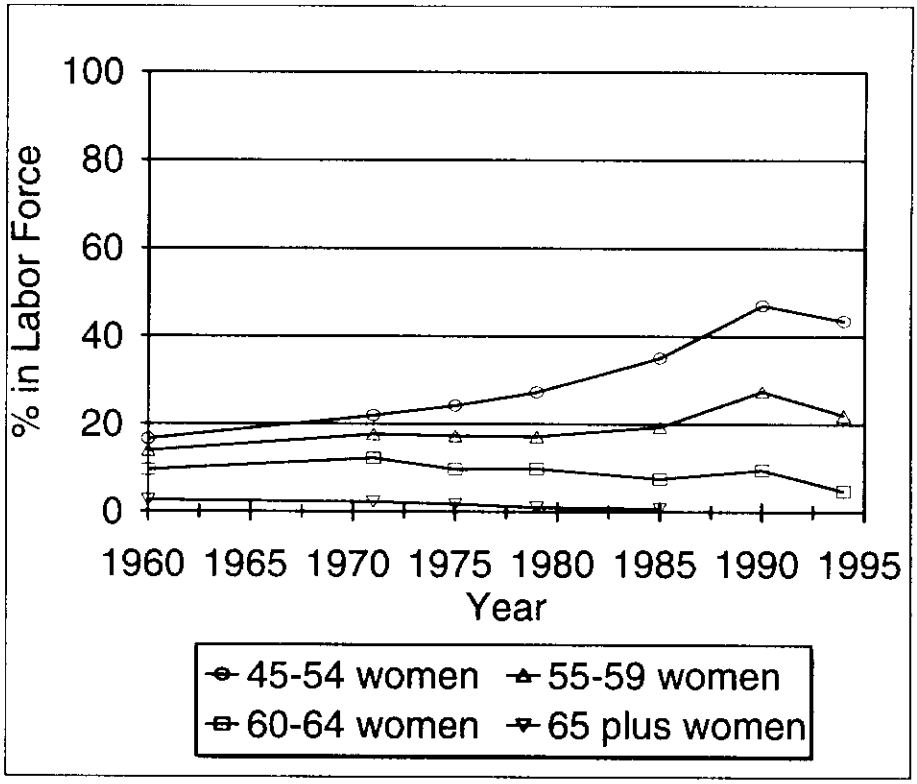

100
80
60
40
20
0
% in Labor Force
1960 1965 1970 1975 1980 1985 1990 1995
Year
45-54 women
55-59 women
60-64 women
65 plus women

Figure 2

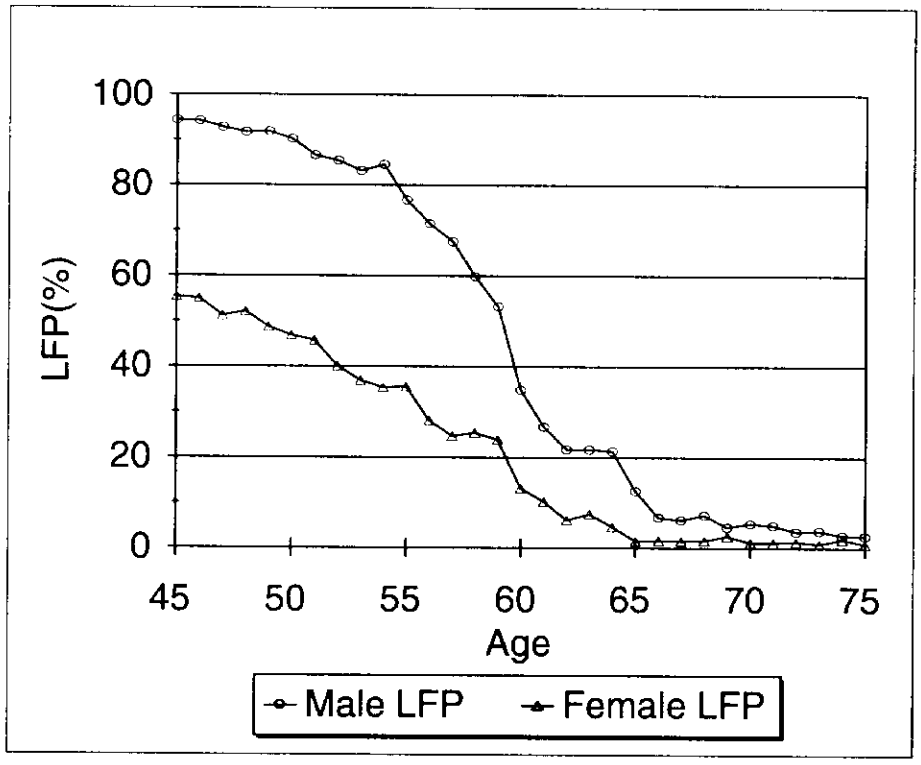


Figure 3

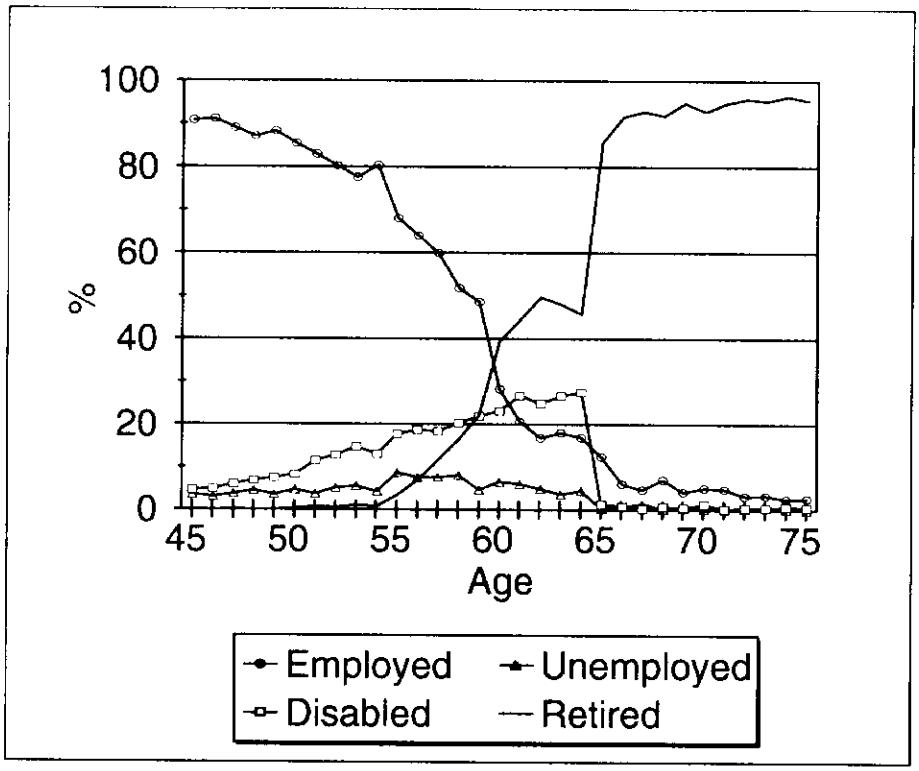

100
80
60
40
20
0
%
45
50
55
60
65
70
75
Age
Employed
Unemployed
Disabled
Retired

Figure 4

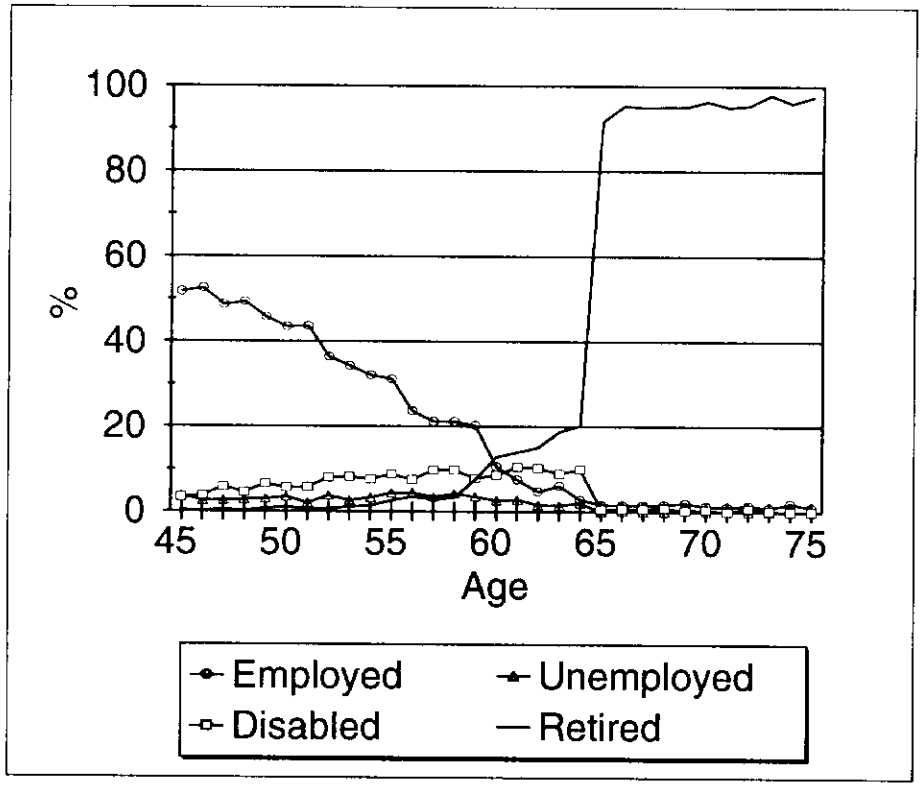

100
80
60
40
20
0
%
45
50
55
60
65
70
75
Age
Employed
Unemployed
Disabled
Retired

Figure 5

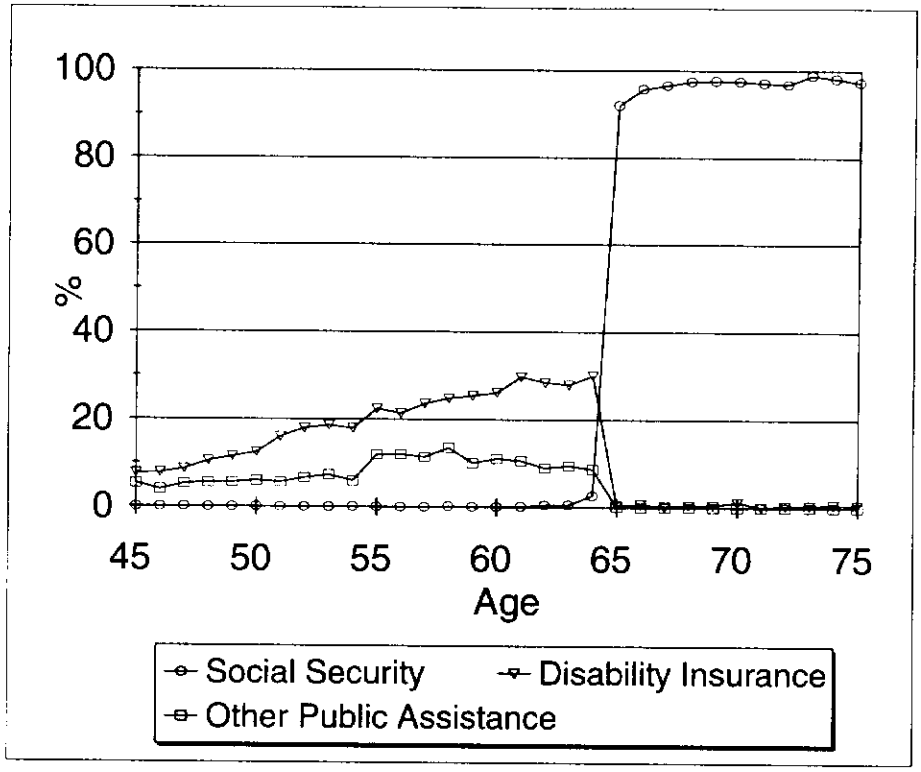

100
80
60
%
40
20
0
45
50
55
60
65
70
75
Age
Social Security
Disability Insurance
Other Public Assistance

Figure 6

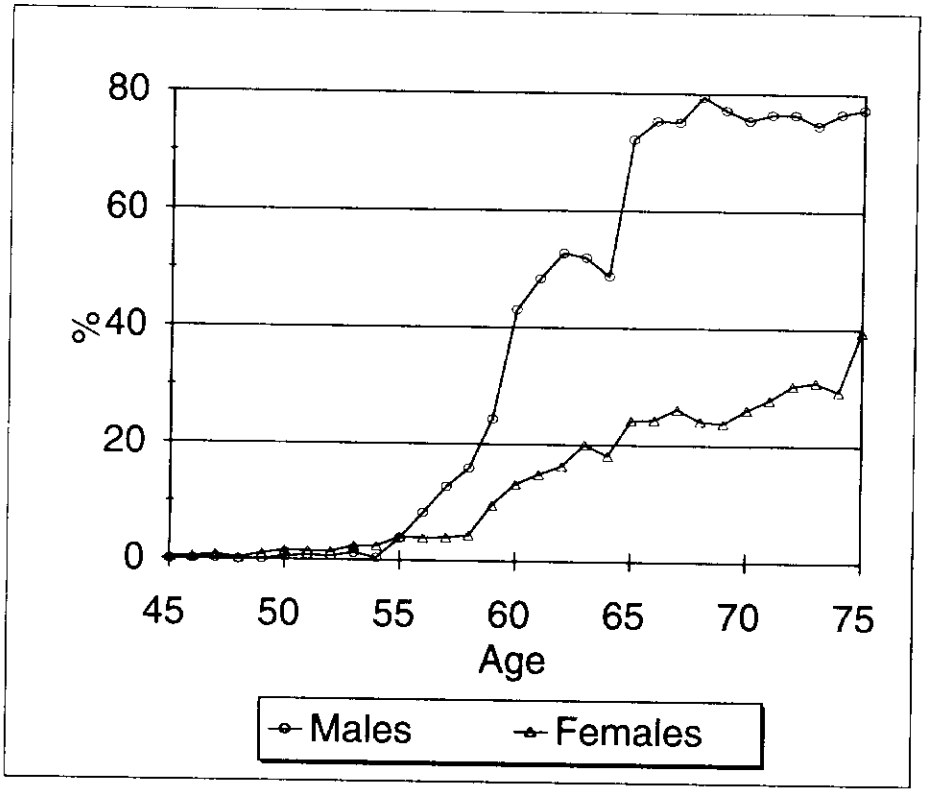


Figure 7

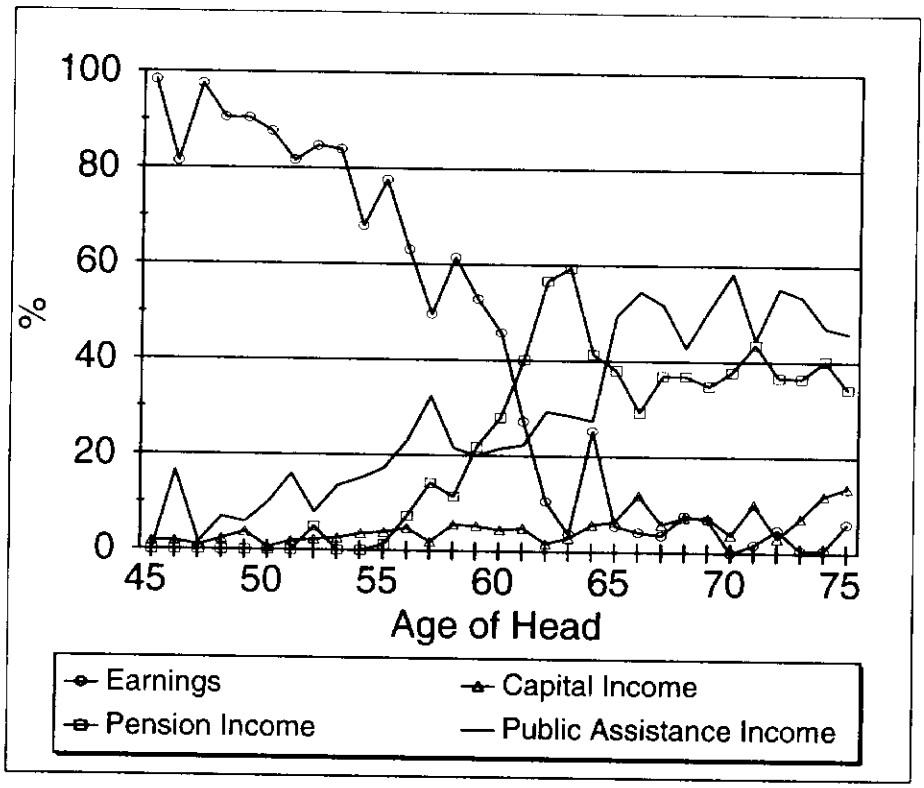

100
80
60
40
20
0
%
45
50
55
60
65
70
75
Age of Head
Earnings
Capital Income
Pension Income
Public Assistance Income

Figure 8

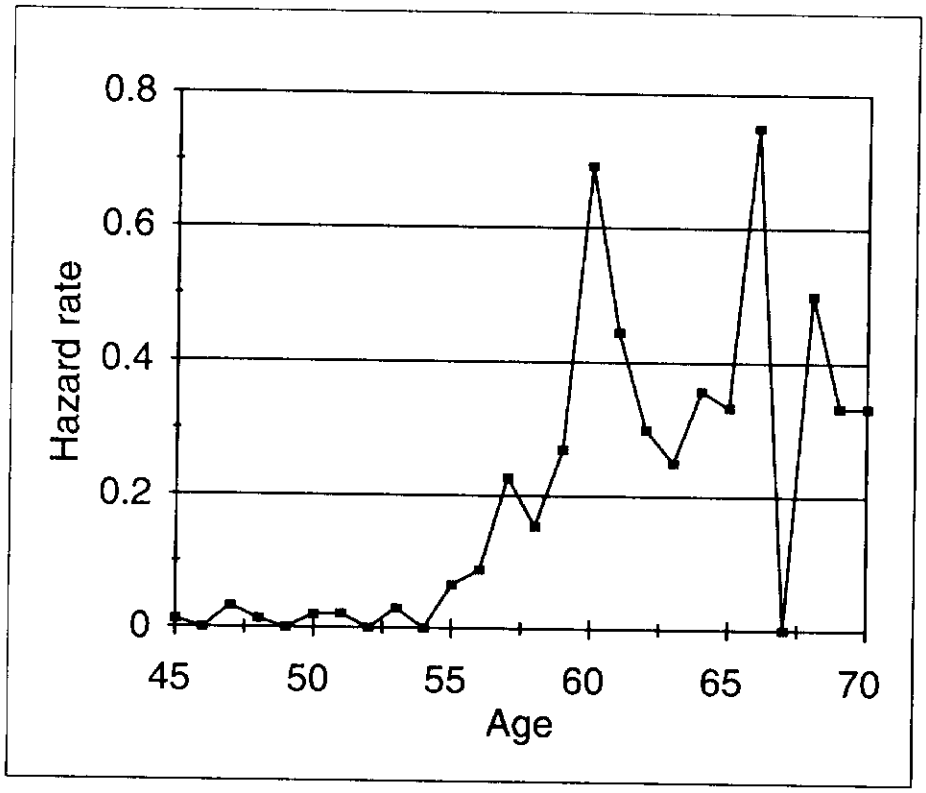


Figure 9

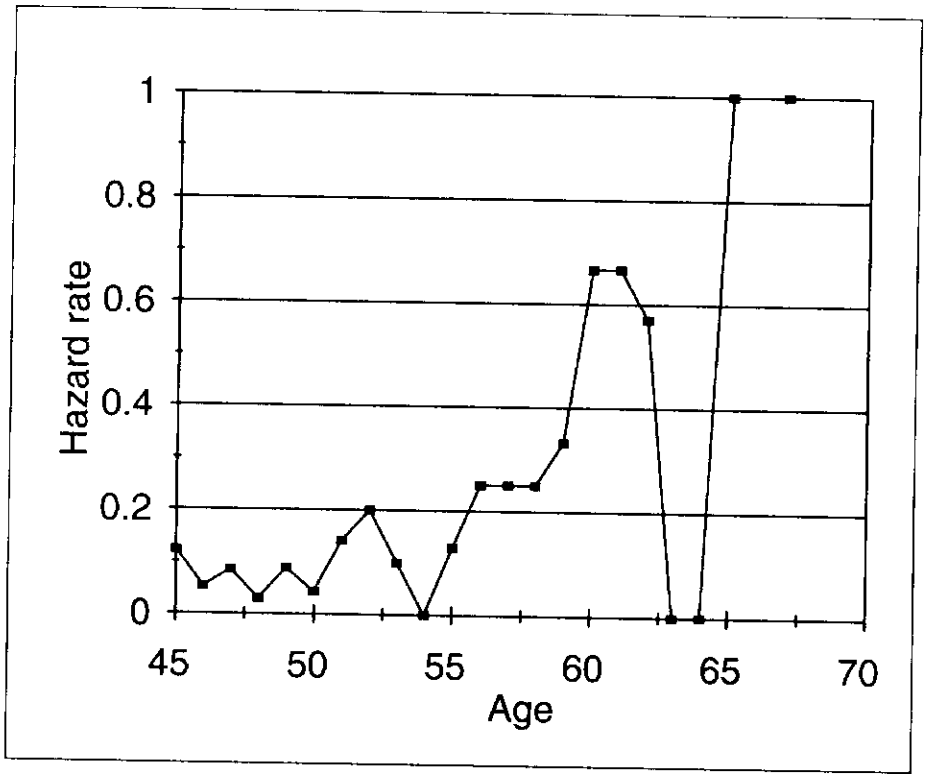


Figure 10

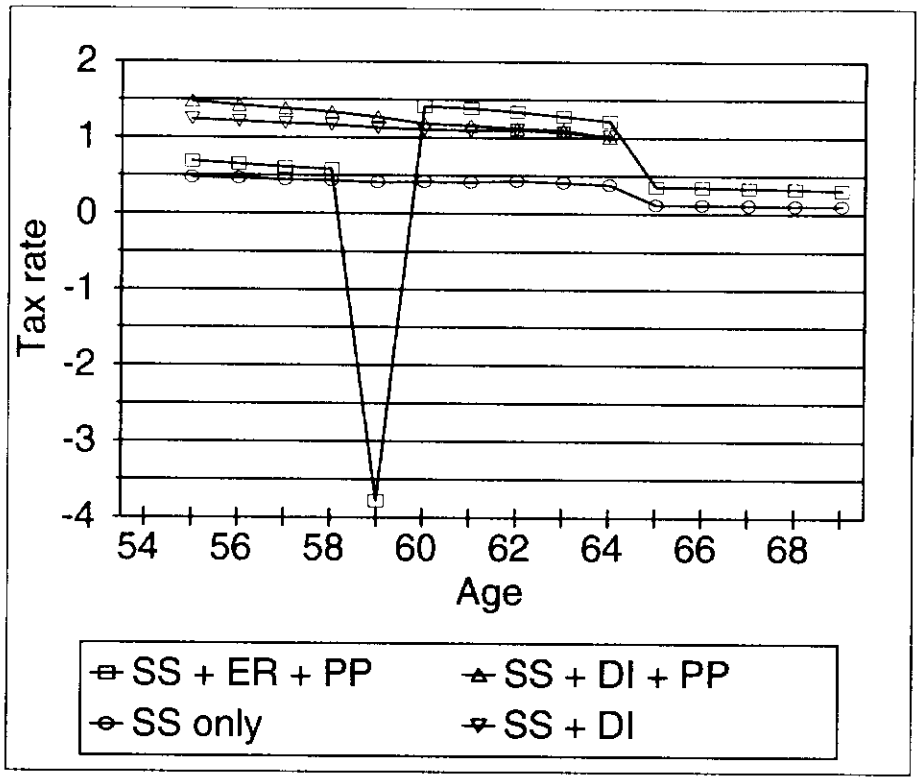
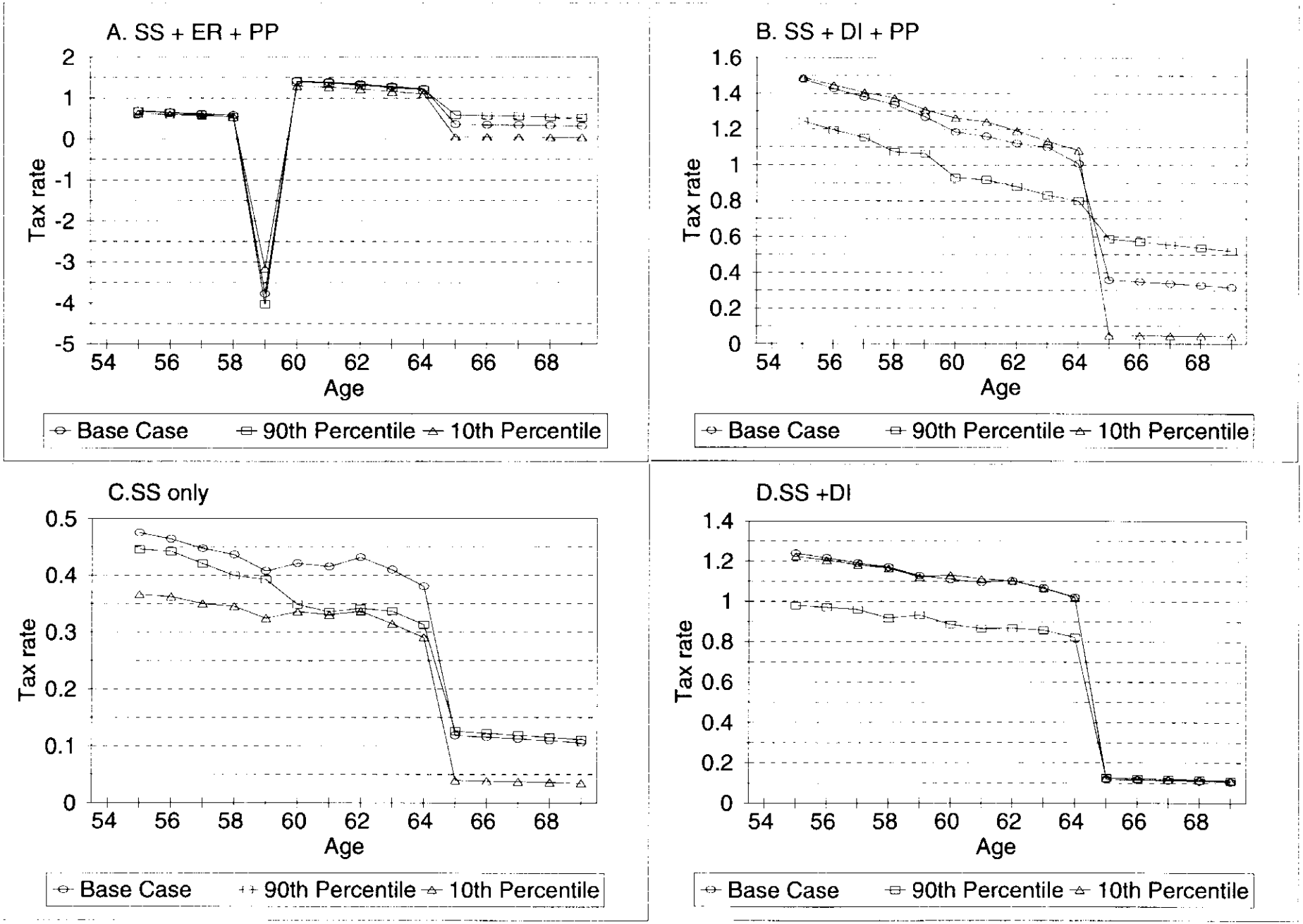

2
1
0
-1
-2
-3
-4
Tax rate
54
56
58
60
62
64
66
68
Age
SS + ER + PP
SS + DI + PP
SS only
SS + DI

Figure 11

fig 12


A. SS + ER + PP
Tax rate
Age
Base Case
90th Percentile
10th Percentile
B. SS + DI + PP
Tax rate
Age
Base Case
90th Percentile
10th Percentile
C.SS only
Tax rate
Age
Base Case
90th Percentile
10th Percentile
D.SS +DI
Tax rate
Age
Base Case
90th Percentile
10th Percentile