NBER WORKING PAPER SERIES

PENSIONS AND RETIREMENT IN THE UK

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Working Paper 6154
http://www.nber.org/papers/w6154

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 1997

The authors would like to thank Sarah Tanner and Jayne Taylor for their invaluable help in preparing this paper. Thanks are also due to the editors of this volume and authors of other papers in it for their advice and comments. Funding for the research on which this paper is based was provided by the Economic and Social Research Council through its support of the centre for the microeconomic analysis of fiscal policy at the Institute for Fiscal Studies. This paper is part of the NBER International Social Security Project. This paper is part of NBER's research programs in Aging and Public Economics. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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NBER Working Paper No. 6154
September 1997
Aging and Public Economics

ABSTRACT

Labor force participation of men over the age of 50 fell dramatically in the UK between the early 1970s and early 1990s. Despite the fact that the state retirement pension does not become available to men until the age of 65, half of men aged 60-64 were economically inactive in the mid 1990s.

The main element of the state retirement pension is flat rate, and for most people is unaffected by any potential contributions made after age 60. Additional amounts of the earnings related component, SERPS, are earned as a result of extra contributions. Overall the state retirement pension system offers no incentives for people to retire early.

However, other benefits are available to people before the age of 65. Once the age of 60 is reached there is no availability for work test for receipt of means-tested benefits and there appears to be widespread use of invalidity and sickness benefits as a route into early retirement. Once these are accounted for a substantial incentive for early withdrawal from the labor market is apparent. The combination of this with the reduced demand for, and wages available to, low skilled labor can help explain the reduced labor force participation that is observed.

The state pension system, though, is complemented by extensive occupational pension coverage. For those in the occupational system the rules of their own scheme are likely to be an important element in their retirement decision. We show that the retirement behavior of those with and without occupational pensions is substantially different. Those without are more likely to withdraw from the labor market very early. A large proportion of those with occupational pensions retires from the age of 55 when relatively generous benefits are likely to become available. In many schemes there are significant incentives to retire before age 65.

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Pensions and retirement in the UK

Introduction

Unlike most other European countries the UK's pension system is not well described by an analysis of the social security element. For 30 years or more around half the workforce have been covered by occupational pensions. something like half of the income of pensioners comes from non-social security sources, and this proportion is growing. Of the workforce in the mid 1990s three quarters are "contracted out" of the second tier State Earnings Related Pension Scheme (SERPS) into private occupational or personal pensions[1].

In fact one can probably divide the population nearing state pension age into two groups - those with and without significant private provision. For those with private provision state benefits are likely to be relatively unimportant in understanding retirement behaviour; the rules of their pension scheme will be rather more important. For the rest the state system might be much more relevant, but especially the *effective* availability of benefits, which appears to differ somewhat from what one might understand from a simple reading of the rules governing benefit availability.

Partly as a result of these facts the UK also differs from many other countries in one other important respect - its state pension system is solvent. Tax rates necessary to pay for it are not predicted to rise despite the fact that the number of people over state retirement age is predicted to rise from 10.4 million in the mid 1990s to 11.5 million in

2020 and 14 million in 2050, representing an increase from 15.7% of the whole population to over 24%[2].

In this paper we begin by describing the past and current labour market behaviour of individuals around pension age. We also consider the coverage of the various parts of the social security system. We go on to explain the structure of state pensions in the UK, before computing the incentives for retirement that the structure creates. We end by considering some of the evidence on retirement behaviour, especially with regard to the effects of occupational pensions.

Part I The Labour Market Behaviour of Older Persons in the UK

The labour market behaviour of older persons in the UK has been characterised by a severe fall in the participation of men, with younger cohorts showing distinctly less attachment to the labour market after the age of 55. The rate of participation among recent cohorts falls sharply below 80% after the age of fifty and declines rapidly thereafter. In contrast the secular rise in the participation of women has resulted in a small upward trend in participation among women in the 55-60 age bracket, with participation rates approaching those for men in that age group.

Three micro data sources are used in the following discussion. One important primary data source is the UK Family Expenditure Survey, which is available in consistent annual form for the period 1961-94. This is a continuous sample survey of some 7000 households collecting information on expenditures, incomes, labour market activity and demographics. A second source is the UK Labour Force Survey, published by the Office of National Statistics and covering some 80,000 individuals for the period from the 1970's through to the present day. Finally we make use of a new data source, the Family Resources Survey, a new household level dataset set up by the Department of Social Security and which contains detailed income information for a sample of

26,000 households. It is more than three times the size of the FES, which we traditionally use and is specifically designed to provide good quality information on incomes and benefits.

Historical Trends

To show how activity rates by age group have changed over time we make use of data from the UK Labour Force Survey.[3] This covers the period from 1971 to 1995 and shows the proportion in each age group counting as economically active - in employment or self-employment or unemployed and actively seeking work (ILO definition). The information we need is split into four age groups - 45-54, 55-59, 60-64 and 65-69.

In Figure 1 we present the picture of activity rates for men. Here the drop in participation rates is clear. Falls are recorded for each of these groups, though much less dramatically for the youngest group among whom 90% were still recorded as being active in 1995, a drop of five percentage points since 1971. For the other age groups falls in activity rates are much more dramatic - from well over 90% to 74% for 55-59 year olds and from 83% to 50% for 60-64 year olds. The changes are not smooth. There are very dramatic falls in activity rates, especially for 60-64 year olds, in the early 1980s. This seems strong evidence that the structural change in the labour market with the loss of many jobs in traditional industries where there was a predominance of older workers played an important part in the initial reduction in activity rates, though they never recovered with the economic upturn. It is also interesting to note that there have been big activity drops among 65-69 year olds but that these occurred earlier in the mid 1970s.

Figure 1 Male Activity Rates, 1971-95

Source: Published Labour Force Survey figures

The pattern of changes in activity rates for women over time is very different from that of males, as is evident in figure 2. Among the youngest age group activity rates grew virtually constantly over the period from 62% to 75%. Among 55-59 year olds activity rates were uneven over the period but generally increasing. Among 60-64 year olds the pattern seems to be slightly U shaped, falling in the 1970s and then rising in the early 1990s.

Figure 2 Female activity rates 1971-95

Source: published Labour Force Survey statistics

These time series figures by age group cloud some important date-of-birth cohort effects. We do not have an adequate run of panel data to look at an actual cohort's behaviour, but we can use the long run of cross-sectional data that we have to create "pseudo cohorts" and thereby see what happens to labour market activity within a particular date of birth cohort as the cohort ages.

Figure 3 shows labour market activity rates between the ages of 55 and 65 for three cohorts of men - the first born in 1913, reaching 65 in 1978, the second born in 1921, reaching 65 in 1986 and the third born in 1929, reaching 65 in 1994. The data is drawn from FES over the period 1968-94. Activity is defined as working or seeking work.

Figure 3: Male labour market activity for three cohorts

Source: FES microdata

The oldest group had higher activity rates at each age, with activity falling from two thirds to 20% between ages 64 and 65 for this group. For a very large portion of this cohort retirement started at state pension age. For the middle cohort the big fall in activity occurred between the ages of 61 and 65 while for the youngest cohort labour market withdrawal started earlier still.

Benefit coverage

Coverage of the UK state pension system is now virtually universal for people under state pension age. Anybody in work and earning more than £60 per week (about 15% of average male earnings) is covered, as is anybody not working who is unemployed or disabled or who is at home looking after children of school age. (A more detailed exposition of the relevant rules is set out in part 2 below). Among men universal coverage has been a fact virtually since the introduction of the current regime in the late 1940s. For women the movement towards full coverage is only just reaching completion. This is the result of three separate changes. The first is just the greatly increased levels of economic activity among women; the second is the introduction, in 1978, of *Home Responsibilities Protection* which effectively credits contributions for women with dependent children. The third is the phasing out of what is known as the *married women's rate* of National Insurance Contributions. This latter feature of the system allowed married women to pay much reduced social insurance contributions in return for foregoing rights to the basic pension in their own right. Since 1978 no new

entry to this lower rate NI band has been allowed. As a result of this by 2010 virtually all women reaching state pension age will have some entitlement to a state pension.

In sum there has been virtually 100% coverage of male workers over the past 30 years. Coverage for women has been less but is now almost 100%. No published statistics are available which allow this trend to be graphed over time.

Finally in this historical section we show how the proportions of men and women aged 55 and over in receipt of retirement pensions or Invalidity pensions has changed over time. A number of facts emerge from the picture. First, a rather higher proportion of women than men receive a pension. This, at first sight surprising, fact arises from the lower pension age for women, the higher proportion of women over 55 who are also over 60 and the receipt by married women and widows of pensions, entitlement to which was gained through their husband's contributions. Secondly, there has been a rise over time in the proportion of men and women with retirement pensions. Thirdly, for men there has been a very substantial increase in the proportion receiving Invalidity Pensions from a mere one or two per cent in the early 1970s to 10% by the early 1990s. There has been no such increase for women, though there are signs of this changing by the start of the 1990s.

Figure 4: Pension and IVB receipt - age 55 and over

Source: Social Security Statistics (various years) and Annual Abstract of Statistics

Labour Market Behaviour in 1994/1995

Participation rates by age and sex are presented in Figure 5. The vast majority (80% or so) of men in their late 40s are (full-time) workers. This proportion drops to around 40% by the age of 60. For women the pattern is similar but it should be emphasised that one sees much lower full-time working and higher levels of part-time work. Work participation among women tails off quite rapidly for the 50 year old women, falling from about 60% in the late 40s to 40% in the mid 50s, 30% in the late 50s and 20% at age 60.

Figure 5: Participation Rates by Age and Sex, 1994/95

Source: Family Resources Survey microdata

Figure 6 provides somewhat more detail than this using data from the Family Resources Survey. It considers four subsets of men: those employed working full-time (including self employed), those unemployed and seeking work, then the disabled and finally the retired. We ignore part-timers that never make up more than three per cent of any male age group.

Figure 6: Distribution of Activities of Men by Age, 1994/95

Source: Family Resources Survey microdata

The vast majority (80% or so) of men in their late 40s are full-time workers; 7-10% considered themselves unemployed and a further 7% were unoccupied, sick or

retired. The proportion in full-time work falls steadily reaching 75% of those in their early 50s, dropping to 60% of those in their late 50s, with a sharp drop to 40% of 60 year olds. This drops again to 30% by age 64 and then under 10% at 66. By age 61 the majority of men consider themselves unoccupied, retired or long term sick. 90% are in this position at age 66. Among the over 70s fewer than 5% of those in our sample are in full-time work.

Figure 7 shows the corresponding distribution of activities for women. Participation in work tails off quite rapidly in the 50s, falling from about 60% in the late 40s to 40% in the mid 50s, 30% in the late 50s and 20% at age 60. The proportion unoccupied or retired at age 59 is 59%, rising to 72%, 75% and 80% at ages 60, 61 and 62. Given that the state pension becomes available at age 60 the increase in inactivity at that age is unsurprising.

Figure 7: Distribution of Activities of Women by Age, 1994/95

Source: Family Resources Survey microdata

State pension age is five years lower for women than for men, but a higher proportion of women work past their state pension age. There are a number of possible reasons for this. One is that there is some tendency for husbands and wives to retire at the same time, so that wives might not retire until their husband reaches 65. A second is that some occupational pension schemes have normal leaving ages for both men and women of 62 or 63. Finally, because many women reach 60 without entitlement to a full basic pension they might work more years in order to defer receipt and thereby raise their eventual entitlement.

For comparison, Figures 8 and 9 present the hazard rates out of the labour force for men and women respectively. The relatively small sample sizes in the Family Resources Survey that has been used to construct these figures leads to exaggerated variation. Nevertheless the growing rate of exit for men beginning in their early fifties is clear, as is the strong peak at the official retirement age of 65. Although there is a clear rise in the hazard there is no evidence of a peak at age 55 due mainly to the very different early retirement schemes available across occupations. There is, though, a peak at 60 corresponding to retirement age in many public sector occupations and to the rules of the social security system which stop entitlement to welfare benefits being dependent on work availability from age 60. This is something we discuss further below. For women the picture has similar overall shape but displays a swift increase in the hazard up to the retirement age of 60.

Figure 8: Hazard Rate Out of Labour Force for Men, 1994/95

Source: Family Resources Survey microdata

Figure 9: Hazard Rate Out of Labour Force for Women, 1994/95

Source: Family Resources Survey microdata

Income Sources of Older Persons

Overall rates of public income recipiency for men by age group are shown in

Figure 10: Public Income Recipiency for Men, 1994/95

Source: Family Resources Survey microdata

Figure 10 for men. More detail is provided in Table 1. These figures are based on data from the Family Resources Survey data. The table shows the proportion of men in age bands from 45 upwards in receipt of particular types of state benefit[4] (excluding private pensions). The columns sum too more than 100 because it is quite possible to be in receipt of more than one benefit at a time.

Table 1

State Benefit receipt among males, percentages by age band.

(Source: Family Resources Survey 1994/95)

	45-49	50-54	55-59	60-64	65-69	70-74	75+
none	80	75	70	57	1	0	0
pension	0	0	0	0	81	99	99
IVB	4	8	17	25	17	0	0
IS	9	8	8	13	5	5	11
other sick	5	7	7	10	7	3	1
other	10	9	9	9	8	13	16

The proportion in receipt of some benefit (we exclude Child Benefit) rises gradually with age. Over 40% of 60-64 year olds receive some benefit. As well as a quarter of them receiving IVB, 13% receive the minimum means-tested Income Support and 10% receive other sorts of sickness benefits. The fact that we do not see virtually 100% of 65-69 year olds receiving retirement pension is just because 17% of them are receiving IVB. Between ages 65 and 70 it is possible to choose which to receive if IVB was being received prior to age 65. Because IVB was non-taxable until 1995 there was an incentive to continue receiving it.

Above age 75 more than one man in ten receives means-tested Income Support (the rate of receipt among women is more than double that). This reflects the fact that IS rates are actually higher than basic pension rates especially for older pensioners. In addition to these benefits administrative statistics reveal a further 11% of those over age 70 are in receipt of Housing Benefit - designed to provide help to low income individuals in rented accommodation.

Within the state welfare system itself the most dramatic changes with respect to numbers receiving benefits have been in the number of individuals, particularly pre-pension age receiving benefits initially designed for the long term sick and disabled. Invalidity Benefit (IVB) is the most important of these. IVB is a contributory benefit payable to long term sick individuals who can show they are incapable of work due to illness or disablement and have been so for at least 28 weeks. Until recently claimants have only been required to provide a certificate from their own doctor stating that they are incapable of work as a result of sickness. Since 1995 and the replacement of IVB by Incapacity Benefit the rules for entitlement have been tightened up with the express intention of halting the increase in numbers of recipients shown in table 2.

This growth in the numbers appears to be related directly to growth in unemployment rates (see Disney and Webb, 1990). Until the early 1990s the benefit provided income levels significantly in excess of other social security benefits like Unemployment Benefit and Income Support because earnings related pensions were payable in the same way as for SERPS for those over state pension age. Given that about a quarter of all men aged between 60 and 64 were in receipt of IVB in 1994 there can be little doubt that IVB has been used as an early retirement vehicle.

Table 2

Number of male IVB recipients by age

(numbers '000s)

Men	1979/80	1984/85	1989/90	1993/94
45-49	39	53	64	105
50-54	56	75	108	134
55-59	108	128	171	224
60-64	171	239	266	322
65+	47	72	177	235
all ages	506	673	917	1,217

In Figure 11 we provide a description of the proportion of men and women at each age whom are receiving private pension. As in the US this rises fairly rapidly after age 55 with a large gap opening up between men and women after the age of 65.

Figure 11: Private Pension Income Receipt by Sex

Source: Family Resources Survey

Table 3[5] gives a similar picture the proportion of various cohorts who were receiving occupational pensions in the first five years after state pension age. An increase in pension coverage for each successive cohort is evident rising from around half to two thirds of men, roughly doubling to just under a half of single women and rising from very few to about a quarter of married women. Average receipt has also risen. Among recipients mean real occupational pension levels have doubled to nearly £90 per week

for men and £60 for women. This important development in private, largely occupationally based, pensions in the UK is documented in further detail below.

Table 3

Percentage of birth cohorts recording occupational pension receipt,

by birth cohort, gender and marital status

(men age 65-69, women age 60-64)

Cohort	Male pensioners	Married female pensioners	Single female pensioners
1900-04	48	2	19
1905-09	50	2	23
1910-14	58	5	28
1915-19	64	10	31
1920-24	65	15	41
1925-29	68	23	48
1930-33	-	24	45

Source: Johnson and Stears,1995

Finally, in Figure 12 we present a picture of the distribution of family income by source. Earnings remains the main source of family income until around age 60 when the importance of public and private pension sources begins to play a dominant role.

Figure 12: Distribution of Family Income by Source

Source: Family Resources Survey

II Key features of the UK pension and social security system

As we have made clear it is hard to consider the UK state pension system in isolation from the private sector. For one thing among recently retired pensioners private pensions make up approaching half of total income in retirement - with the mean occupational pension payment (among those receiving some payment) approaching £90 per week, which compares with a basic state pension of £61.15 per week. This is just about 16% of male average earnings. More importantly for understanding the structure of the system one needs to take account of the relationship between the State Earnings Related Pension Scheme (SERPS) and the private sector. For the majority (over three quarters) of workers at any time are "contracted-out" of SERPS into private schemes.

Traditionally the state in the UK has offered just a basic pension at close to "subsistence" levels. First introduced in 1906 and reformed into something approaching its current form following the last war, the basic pension provides a flat rate benefit, unrelated to earnings levels, which was £61.15 per week for a single person in 1996. Although unrelated to earnings levels it is nonetheless a "contributory" benefit, at least in principle. Entitlement to full benefit depends on contributions being made (or credits received) for 90% of a working life. This requires 44 years of contributions or credits for men and 39 years for women (rising to 44 when pension ages are equalised at 65 in 2020).

These contributory conditions are nothing like so onerous as they appear. Any time spent unemployed or sick/disabled attracts credits - which count in just the same way as contributions - and time spent looking after children has, since 1978, reduced the effective number of years of contributions required through a system called Home Responsibilities Protection (HRP). Virtually all men aged 65 and over receive a full basic pension on the basis of their own contributions. The coverage of women

currently over 60 is less comprehensive. Fewer than 60% receive a full pension and the majority of them do so only on the basis of contributions made by their deceased husband. However married women without rights of their own are entitled to a dependant's addition to their husband's pension, worth £36.60 per week in 1996.

Low rates of entitlement among married women reflect long periods spent out of the labour market by older cohorts, along with an option which married women used to be able to exercise which reduced their National Insurance Contributions in return for a loss of pension rights. Later generations have benefited from the introduction of Home Responsibilities Protection (in 1978); they have also seen higher levels of female labour market participation. The consequence is that by the early years of the next century the vast majority of women as well as of men will retire with entitlement to a full basic pension.[6]

Perhaps the most important feature of the basic pension is its low level. It represents just 16% of average male earnings. With indexation in line with the Retail Price Index its level *relative to* earnings is falling - it was 20% of the male average in the late 1970s. With continued price indexation we can expect it to fall to just 7 or 8% of the male average by 2030.

Currently entitlement to the basic pension depends only on contributory record and age - there is no retirement test. It is possible though to defer pension receipt by up to five years to "state retirement age" (65 for women, 70 for men). Deferral results in an increase in pension entitlement of 7.5% per year. This is more valuable to women than to men because of their higher life expectancy. Possibly as a result of this 17% of female pensioners and 11% of males receive increments to their basic pensions as a result of deferral. There is no provision for the payment of retirement pensions before 65 (men) or 60 (women).

Deferral is becoming less widespread following the abolition, in 1989, of the "earnings rule" which effectively meant that those (women aged 60-64, and men 65-69) earning more than £75 per week (in 1989) had their pension entitlement reduced. The reduction was 50p for every £1 between £75 and £79 of earnings and £1 for every £1 thereafter. Virtually all those affected deferred their pension receipt rather than taking a reduced amount. The fact that nearly a quarter of men and a third of women over 80, with pension entitlement in their own right, have pension increments as a result of deferral indicates that this was a relatively important provision when many younger pensioners worked, as they did in the 1960s and 1970s.

One might have expected the complete abolition of this rule to lead to significantly changed behaviour among those in the relevant age ranges. However, as Whitehouse (1990) points out, there was limited evidence that the rule was having much impact during the 1980s. We present new evidence here based on earnings distributions in the FES in 1987/88 and in 1991/92. It should be stressed that we have only very small samples of men in work in these age groups - just 72 individuals in the two years 1987 and 1988 and 66 individuals in 1991 and 1992.

The graphs are presented with earnings shown in nominal terms. The maximum on each graph is set such that it is effectively scaled up by nominal earnings growth - of 40% over the period. In other words £165 in 1991/92 becomes £115 in 1987/88 when deflated by nominal earnings growth. For ease of presentation the graphs exclude those individuals earning over these maxima. This excludes 20% of the working individuals in 1987/88, but a third of those in 1991/92.

Even with this small sample there is clear evidence of bunching at the earnings rule level of £75 per week in 1987/88. The majority of those in work were, though, earning well below this level and, as we noted about a fifth were earning well in excess

of it. There is no such obvious peak in figure 14. The increased proportion earning over £170 might also be evidence of people being freed from the effects of the earnings rule. However, such conclusions should be treated with considerable caution, given the sample sizes in the data.

figure 13 Weekly earnings of men aged 65 to 69 in 19897 and 1988 FES

Source: Family Expenditure Survey microdata

Figure 14 Weekly earnings of men aged 65-69 in 1991 and 1992 FES

Source: Family Expenditure Survey microdata

The basic pension remains by far the most important element in social security spending on the elderly. There are also, however, important income related benefits. 1.5 million of the 10 million pensioners in the UK are dependent on the minimum means-tested benefit Income Support, which is available at higher levels than the state pension. In addition, a similar number receive means-tested help with their housing costs. This means that the minimum social security income for a single 65-year-old is not the £61.15 available from the basic pension but the £67.05 available from Income Support *plus* Housing Benefit to cover any rent.

The contributory benefit system was originally designed as a purely flat rate arrangement intended only to provide a bare minimum income level. Until the early

1960s contributions were also paid at a flat rate. As they became partially income related so an earnings related "graduated pension" was introduced. No further accruals were earned after 1975. Never generous, this pension is now a virtual irrelevance as its design purposely failed to allow for indexation. Although 7.5 million pensioners receive it average receipt is just £2 per week. It can be safely ignored.

The same is not true of its successor SERPS - the State Earnings Related Pension Scheme. SERPS was introduced only in 1978, with the intention that it would start paying out full benefits 20 years hence. Between 1978 and 1999 there would be a very gradual building up of maximum SERPS benefits as each successive cohort of retirees would have built up one more year of benefit entitlement.

It was originally designed, broadly speaking, to provide a pension equal to one quarter of earnings during the best 20 years of earnings, with full inheritance by surviving spouses. The earnings on which the pension is calculated are bounded by the Lower Earnings Limit (approximately equal to the basic pension) at the lower end and the Upper Earnings Limit (£455 per week, or just 20% above male average earnings, in 1996). Along with the basic pension these earnings limits move up each year in line with prices. The result is that an increasing proportion of contributors has earnings above the UEL, which is itself not far in excess of male average earnings. Current contribution rates are 10% for employees and 10.2% for employers. The UEL caps contributions from employees but not from employers.

At present SERPS entitlements are calculated as follows. Earnings above the NI UEL are ignored. Earnings in each financial year since 1978 are revalued to the year in which the individual reaches pensionable age by an index of economy wide average earnings. From this figure the NI LEL in the year prior to retirement is deducted. The total revalued earnings net of the LEL are then multiplied by an accrual

factor to arrive at the additional pension entitlement. The accrual rate is determined by the year in which pension age is reached. It is currently 25/20 (1.25% or 1/80th). It is this accrual rate which determines the relationship between level of SERPS entitlements and earnings levels. The current 1/80th accrual rate is what allowed the scheme when introduced to provide a pension of a quarter of earnings over 20 years. In other words the calculation would be number of years entitled divided by 80 and multiplied by the total level of revalued average earnings.

From 1999 onwards the SERPS accrual factor will gradually fall reaching 20/49 (0.41% or 1/244th) by 2027-28. So for people retiring after 2027-28 SERPS will be 49/244 (=20%) of average revalued earnings over their entire working life if they work for each of the available 49 years between 16 and 65. Shorter working lives will reduce the numerator accordingly and thereby reduce the proportion of revalued earnings, which will form the SERPS payment.

This fall in accrual rate was introduced in the Social Security Act of 1986 following concerns about the generosity of SERPS and the ageing population resulting in unsustainable levels of expenditure in the future. The main effect of the changes will be to move from a benefit formula producing a pension worth 25% of best 20 years earnings to one producing 20% of lifetime average revalued earnings, and a reduction in survivors benefits from 100% of the SERPS payment to 50% of it.

As with the basic pension there is no provision for the early receipt of SERPS, but receipt can be deferred on the same basis as can the basic pension. Deferral, though, is rare.

The result of the introduction of SERPS, especially for the generation retiring in the years around 2000, will be significantly to increase the social security income, and thus total income, *of those without a private pension*. The retirement income of

those in occupational pension schemes will have been largely unaffected by its introduction, however, because from its inception such schemes have been able to *contract out* of SERPS. People in schemes which guarantee a certain level of benefit can give up rights to SERPS and pay lower NICs as a result. Since 1988 not only have traditional final salary occupational pensions been able to contract out in this way but so also have group money purchase and Personal Pension schemes. So now about three quarters of eligible workers (i.e. those earning over the LEL) are not covered directly by SERPS. Half are in occupational schemes and another quarter are in Personal Pensions. The coverage of Personal pensions is particularly high among young men for whom the advantages of joining, given a rebate that is not age related and a SERPS system that is becoming less generous, are considerable. Occupational pension coverage is less clearly associated with a particular age group, though those who are covered tend to work for large employers and to be relatively well off.

These facts must be borne in mind when considering the impact of social security on retirement. There can be no question that for many people it is the size of, and policies followed by, their particular occupational schemes that matter. In the future Personal Pensions will become much more important (very few have reached maturity) in this context.

V Retirement Incentives

In this section we look at the retirement incentives within the UK social security system by considering example workers with specific sets of characteristics that are relevant to the calculation of state benefit income entitlement in retirement. The analysis reveals a number of interesting features of the UK retirement benefit system. In particular it demonstrates the role of benefits available before state pension

age and the rather wide range of incentives created for different individuals depending on their earnings, age and marital status.

In our simulations we consider the incentives facing a man born in 1930 and so reaching state retirement age of 65 in 1995.

The first thing that matters in order for us to make the calculations, is a work and earnings history. We actually only need this from 1978. We do not need to look beyond that because state pension entitlement only became dependent on earnings after that date[7]. For our base case we take the median earnings of a male worker up to age 50 and then project these forward by average earnings growth over the following 20 years.

This results in a smooth increase in real earnings over time. But it does fail to take account of the falls in real earnings that one does observe in a cohort once the early to mid 50s are reached. To some extent this fall is a result of selection. Those with occupational pensions, and higher earnings, are more likely to retire early. Which means that the lower earnings recorded for older individuals are probably closer to the ones actually faced by those people most dependent on the state system. We also considered an individual facing the actual median earnings of his cohort through to age 65. The results were very similar, except that the lower earnings resulted in higher replacement rates. The results are set out in the appendix.

With this information we can calculate the amount of SERPS + basic pension to which the individual would be entitled in the first and subsequent years of retirement. Given life tables (supplied by the government actuary's department) and an assumed discount rate we can then calculate an expected net present discounted value of social security wealth. This is done, in the base case, for a married man. Under current rules he would be entitled to a dependant's addition to the basic pension if (as

we assume) his wife had no rights of her own. If she outlived him his wife - who we assume is three years his junior - would inherit the full amount of his benefits, (including SERPS benefits and excluding the dependant's addition). We take account of this by using mortality data on women as well and looking at the joint probabilities of one/both of them living to any age (up to 100).

The rules for SERPS that we use are those pertaining to people reaching pension age in 1995. That means they receive one eightieth of revalued earnings for every year of work from 1978. The spouse is assumed to have rights to the full SERPS pension on the death of her husband. The effects of changes in policy reducing the value of SERPS for individuals retiring after the year 1999 are not considered.

So our base case individual, results for whom are shown in table 4, is a married man, on cohort median earnings up to age 50 with earnings then rising with the national average. For the moment we assume that he would receive no early retirement benefit if he were to retire before age 65, as is implied, in theory, by the structure of the benefit system. We later consider the effects of relaxing this assumption by looking at the case of an individual who becomes entitled to Incapacity Benefit at age 60. We have already seen that a very high proportion of individuals receive this benefit before the age of 65.

In table 4 five measures are presented. The first is simply the replacement rate. This is a measure of pension income in the first year of retirement divided by available *net* earnings in that year. So if the individual concerned could earn £10,000 (after tax) at age 65 and could receive £5,000 in pension benefits he would have a replacement rate of 50%. For years before it is possible to draw a state pension the replacement rate is not defined.

The second is a measure of *Social Security Wealth*. At all points this is wealth considered from the point of view of a 55-year-old, so it is discounted to age 55. It is calculated by adding together pension entitlement from each year of assumed retirement to age 100, conditioned on probability of living to that age. Since probability of living to an old age is small the contribution of discounted wealth at these ages is negligible. Survivors' benefits are also included in this calculation conditioned on probability of death of the husband and survival of the wife.

Social security wealth is itself a net concept, in this case net of projected National Insurance Contributions. If someone retires at 65 they receive benefits from that year on, but will have paid NICs in each year up to then. We measure net SSW as the difference between the discounted sum of projected benefits and the discounted sum of projected NICs (including employer contributions).

The third measure is SSW *accrual*. This, very straightforwardly, is the difference between SSW in the year before retirement and the year of retirement. It is just a measure of how SSW changes. A positive number means that an extra year of work will increase social security wealth, a negative number means that an earlier retirement date would maximise the wealth. Accrual *rate* is just the *proportionate* change in SSW between the same two years.

The final numbers presented are tax/subsidy rates, which are the absolute accrual amount divided by the earnings available in that year. So if your SSW were to rise by £1,000 over the year and your earnings were £10,000 you would have a 10% subsidy on your earnings to work that extra year. Positive numbers, arising from negative SSW accruals, effectively indicate a tax on the projected earnings. Positive is tax, negative is subsidy.

Table 4

. Base case incentive calculations

last year of work	Replace-ment rate	SSW	Accrual	Accrual rate	Tax/ subsidy
54		66,464			
55		66,232	-233	-0.004	0.02
56		66,154	-78	-0.001	0.01
57		65,830	-323	-0.005	0.03
58		65,499	-331	-0.005	0.03
59		65,179	-320	-0.005	0.03
60		64,878	-300	-0.005	0.03
61		64,708	-171	-0.003	0.02
62		64,526	-182	-0.003	0.02
63		64,309	-216	-0.003	0.02
64		64,108	-201	-0.003	0.02
65	0.464	64,011	-97	-0.001	0.01
66	0.491	63,818	-193	-0.003	0.02
67	0.519	63,489	-329	-0.005	0.03
68	0.549	63,004	-485	-0.008	0.05
69	0.581	62,345	-659	-0.011	0.07

Simulation results

Taking our base case first, table 4 shows the results for a married man born in 1930, with a wife three years younger and entitled to no pension in her own right, and with the base case smoothed earnings profile described earlier.

The pattern of results is quite striking. In each year up to age 65 the accrual of social security wealth is slightly negative. Net SSW conditional upon retiring at age 65 is about £2,000 less than that conditional on retiring at 55. This difference is small. It

reflects two features of the UK system and of our calculations. Until age 65 this individual will be paying 10% of his earnings in NICs each year, and his employer will be paying an additional 10%. So the cost to working an extra year is substantial. The benefit of working an extra year, in terms of SSW, comes through extra SERPS being accrued. Basic pension entitlement, which makes up the greater part of the total state pension, is unaffected by extra years of work. The loss in net income to higher NICs is significant for each extra year of work but only adds on once. The extra amount of SERPS earned is small for each year, but payable for many years, especially given the existence of a younger wife. These values come close to cancelling each other out, but the negative effect of extra NICs is just the greater.

The accrual *rate* is small - SSW falls at less than 1 per cent a year. The effective tax on employment averages out at about 2% of salary each year.

This pattern is constant up to state pension age. Further pension deferral increases the available pension, both basic and SERPS, by 7.4%. This increase would be inherited by the widow of our example man in the (likely) event that he were to die first. But of course a full year's pension is sacrificed. By the time the man reaches his late 60s the cost of not claiming the pension is beginning to become more substantial, though still not great.

In this example, and in what follows, we see no great change in accrual rates at age 65 which would be likely to explain the very great observed retirement hazards at this age. This would seem to be evidence of the importance of social norms, of employer determined retirement dates and the fact that all employment protection comes to an end once people pass their 65th birthdays.

It is also worth noting here that the assumption that the spouse has no rights of her own is rather important. If she had full rights of her own then she would not be able to inherit her husband's full rights in the event of his death.

In table 5, where we consider the case of a single man, the importance of marital status for these calculations is demonstrated quite clearly. Pension wealth at any age is only around half of that for the married man. This reflects both the higher pension rights of the married man and the higher survival expectations of his (younger) spouse who is in a position to inherit the whole of his pension. In addition accruals from extra work are substantially more negative at all ages; each extra year of work costs just as much in NICs but the return is lower because there is no spouse to inherit SERPS. Before age 65 these negative accruals effectively impose an extra tax rate of about 10% on earnings in each extra year of work.

Accruals and tax rates become much more negative after age 65 as the deferment rules are not generous enough to compensate the single man for the loss of each year's pension. Again the fact that deferral rates are the same for men and women, married and single, significantly disadvantages single men.

Table 5

Incentive calculations - single worker

last year of work	Replace-ment rate	SSW	Accrual	Accrual rate	Tax/ subsidy
54		33,951			

55		32,875	-1,077	-0.03	0.10
56		31,944	-930	-0.03	0.09
57		30,794	-1,150	-0.04	0.10
58		29,626	-1,169	-0.04	0.10
59		28,465	-1,161	-0.04	0.10
60		27,339	-1,126	-0.04	0.10
61		26,330	-1,008	-0.04	0.09
62		25,333	-997	-0.04	0.09
63		24,328	-1,005	-0.04	0.09
64		23,356	-971	-0.04	0.09
65	0.358	22,478	-879	-0.04	0.09
66	0.379	20,491	-1,986	-0.10	0.20
67	0.401	18,404	-2,087	-0.11	0.21
68	0.424	16,220	-2,185	-0.13	0.22
69	0.449	13,942	-2,278	-0.16	0.23

The other comparison between the single and married man that is worthy of note is the comparison between replacement rates. Replacement rate at age 65 for the married man is 46%; for the single man it is 36%. This is the effect of the dependant's addition to the basic pension, which is available to the married man.

As tables 6 and 7 show, the incentive effects for high and low earners are remarkably similar to those for middle earners. Tax/subsidy rates for extra years of work are very similar. Levels of SSW are also much alike, largely as a result of the mainly flat rate nature of the UK benefit system. Replacement rates, though, are very different, being very much higher for the low earner.

Table 6

Incentive calculations - 90th percentile earnings

last year of work	Replace-ment rate	SSW	Accrual	Accrual rate	Tax/ subsidy
54		75,942			
55		75,543	-489	-0.01	0.03
56		75,107	-345	-0.00	0.02
57		74,468	-639	-0.01	0.03
58		73,736	-732	-0.01	0.04
59		72,930	-806	-0.01	0.04
60		72,133	-798	-0.01	0.04
61		71,511	-622	-0.01	0.03
62		70,955	-556	-0.01	0.03
63		70,330	-624	-0.01	0.03
64		69,748	-583	-0.01	0.03
65	0.333	69,300	-447	-0.01	0.03
66	0.353	68,503	-797	-0.01	0.05
67	0.373	67,557	-946	-0.01	0.06
68	0.394	66,442	-1,116	-0.02	0.07
69	0.417	65,134	-1,308	-0.02	0.08

Table 7

Incentive calculations - 10th percentile earnings

last year of work	Replace-ment rate	SSW	Accrual	Accrual rate	Tax/ subsidy
54		61,046			
55		61,143	98	0.00	-0.01
56		61,394	250	0.00	-0.03
57		61,427	33	0.00	-0.00
58		61,450	23	0.00	-0.00
59		61,469	19	0.00	-0.00
60		61,482	13	0.00	-0.00
61		61,309	-173	-0.00	0.02
62		61,353	44	0.00	-0.01
63		61,363	10	0.00	-0.00
64		61,369	5	0.00	-0.00
65	0.631	61,204	-165	-0.00	0.02
66	0.668	61,318	114	0.00	-0.02
67	0.706	61,310	-8	-0.00	0.00
68	0.747	61,163	-147	-0.00	0.02
69	0.791	60,862	-301	-0.00	0.05

In table 8 we consider the most important divergence from the base case, and one that may better describe the incentives facing most individuals who would be dependant on the state for their pension income. Thus far we have taken the rules of the UK social security system literally and modelled incentives as though there is no early retirement option. However, the reality is that virtually anybody dependent just on state provision would be able to leave work earlier and receive state benefits. This is made explicit to some extent in the social security system in that from age 60 onwards

there is no "availability for work test" which has to be satisfied before Income Support will be paid out. Furthermore, as we saw in the previous section, a very large fraction of men in their early 60s receives Incapacity Benefit (previously Invalidity Benefit).

With this in mind we have performed the same calculations as above, but on the assumption that benefits become available at age 60. In particular we have assumed that Incapacity Benefit becomes available, though it is similar enough in level to Income Support that the results are almost identical if one chooses to model IS instead.

The effects of introducing this possibility are dramatic indeed. Once age 60 is reached, each extra year of work means foregoing a full year's benefits with only a small future increase in SERPS as compensation. The pattern until age 60 is familiar. After age 60 the effects of an extra year of work are to reduce SSW by about £8,000 per year. This is equivalent to a tax rate of more than 70% on the year's earnings, and means a fall in SSW of around 10% or more for each year of work.

Until now it has been hard to understand why the benefit system might create significant incentives to leave work early. Introducing this extra element of realism it is much easier to see its potential role. The penalty for working past 60 can be great indeed. To the extent that individuals are able to claim invalidity pensions before age 60 these arguments could, for some people, extend backwards even further. It is also worth saying that until the beginning of the 1990s SERPS additions were payable in respect of invalidity pensions as well as in respect of retirement pensions. So for the period up to then incentives to retire before 65 would have been greater still.

Table 8

Incentive calculations, counting Incapacity benefit at 60 as an early retirement benefit

last year of work	Replace-ment rate	SSW	Accrual	Accrual rate	Tax/ subsidy
54		90,346			
55		90,878	532	0.006	-0.05
56		91,566	688	0.007	-0.06
57		91,994	428	0.005	-0.04
58		92,424	431	0.005	-0.04
59		92,869	444	0.005	-0.04
60	0.521	93,319	450	0.005	-0.04
61	0.484	84,814	-8,505	-0.100	0.75
62	0.456	76,555	-8,258	-0.108	0.73
63	0.441	68,529	-8,026	-0.117	0.72
64	0.425	60,761	-7,767	-0.128	0.71
65	0.412	53,256	-7,505	-0.141	0.71
66	0.436	52,978	-278	-0.005	0.03
67	0.461	52,584	-393	-0.007	0.04
68	0.488	52,061	-524	-0.010	0.05
69	0.517	51,389	-672	-0.013	0.07

For low earners the effects of being eligible for benefits at 60 are even more spectacular. The tax rate on an extra year's work reaches 91% at age 61 for a married man at the tenth percentile of earnings. For high earners the effects are somewhat less dramatic with the effective tax rate reaching a maximum of 60%. The potential incentives for low to middle earners to leave the labour market are very considerable indeed.

These observations raise interesting issues about the structure of the UK benefit system, and appear to fit rather well with the observed behaviour of many older men. Especially for the low paid there are significant incentives to retire early. But it is harder to implicate the social security system alone in the *change* in activity rates since the 1970s, for there have been no major changes that could have had such an effect. Put together with the fall in demand for lower skilled workers, though, the relative generosity of the social security for older groups, especially through apparently easy access to Invalidity Benefit, can explain the observed fall in participation rates among older less skilled workers.

Occupational Pensions

As we have stressed throughout, for a large part of the population social security pensions play only a secondary role in providing retirement income, and presumably also in the retirement decision. In the private sector the standard occupational pension offers a pension equal to one sixtieth of final salary of each year of membership in the scheme. This was true of nearly two thirds of private sector schemes in 1990. So after 40 years of service one could expect a pension of two thirds of final earnings. Of course very few people actually stay in schemes that long.

There are a variety of post-retirement indexation provisions. Only about 20% of members of private schemes were guaranteed post retirement benefits to match inflation, a third could expect inflation matching subject to a maximum of 5%, a further quarter were promised inflation up to 3 or 4%. This variety of indexation promises is further complicated by the fact that many schemes operate a degree of discretion in actual awards made.

In the public sector a number of schemes provide a pension of one eightieth of final salary for every year of service, but are payable from age 60 and guarantee full inflation indexation.

This range of schemes makes a "typical" pension promise hard to value. It is made infinitely harder by the range of early retirement provisions. Here "early" means prior to the scheme's "normal pension age". This normal pension age has traditionally been 65 or 60 - largely 60 for women and 65 for men. European equal treatment legislation has resulted in equalisation between men and women often at the lower age. Voluntary early retirement usually attracts less generous terms than early retirement at the employer's request. Early retirement on health grounds is often extraordinarily generous. "Many schemes calculate the pension on the basis of the member's earnings at the time of retirement, but as if employment had continued until normal retirement age. This produces a substantially greater benefit than an ordinary early retirement".[8] Employers have made use of these generous provisions to ease older individuals out of work.[9] Given that the rules defining exactly what counts as ill health grounds for early retirement are often unclear there is also scope for employees to make use of them.

In cases other than ill health the complex situation is summarised in table 9.

Table 9

Proportion of scheme members covered by particular early retirement rules (1990)[10]

	Early retirement at request of employer (%)	Voluntary early retirement (%)
No provision	2	9
Accrued pension actuarially reduced	11	58
Accrued pension reduced favourably	15	14
Accrued pension with no reduction	20	8
Accrued pension plus extra payment	24	-
Other	28	11

Where retirement is at the request of the employer at least 44% receive their full-accrued pension with no actuarial reduction, or better. Given that this is often offered as part of a voluntary redundancy package, the fact that this is designated "at the request of the employer" should not be taken to indicate that the employee has no scope for decision making in the face of such incentives. Even where the retirement decision is purely voluntary at least a fifth of employees face better than actuarially fair reductions in benefits.

When early retirement is available it is often available on generous terms that clearly result in losing pension wealth by working longer. The only group for whom this is unlikely to be true are those who might expect substantial pay increases in the years approaching normal retirement age. Otherwise there is clear potential for

redistribution of resources in occupational schemes towards earlier retirees, as well as towards those whose earnings do increase sharply right at the end of their careers.

Occupational schemes and retirement behaviour

Given the detail we have shown on the effects of state pensions on incentives and the fact that occupational schemes clearly provide different incentives there is clear value in considering the actual retirement behaviour of each group.

The differing nature of the rules governing occupational pension schemes and those governing state pensions clearly induce different incentives to retire before the standard retirement age. On becoming eligible the most obvious impact of occupational pension schemes operates through a wealth effect. Individuals eligible for early retirement are less likely to work when their pension income is higher. However, occupational pensions also may give an incentive to work longer since continued employment increases eventual pension entitlement, when pensions are typically linked to final earnings.

These differential incentives should show themselves in observed transition rates out of employment for those nearing retirement. To analyse this we consider results from the 1988-1989 UK Retirement Survey. This data source covers some 2500 households in the age range 55-69. It gives detailed employment and pension life histories. It is a retrospective work history data set unique in the UK and records all job spells for each individual in the household and carries health information based on a detailed description of medical symptoms.

Figure 15 Retirement Probabilities of men by OP status

Source: Retirement Survey microdata

Figure 15 shows *retirement probabilities* for men at each age between 40 and 65, separately for those with and without an occupational pension. (These are *not* retirement hazards). Retirement is defined as leaving work and never re-entering before age 65. It is clear that the probably of retirement before age 55 is greater for those without an occupational pension. From age 55 those with a pension are more likely to retire at each age. This pattern in part reflects the composition of the two groups – those without an OP tend to be less skilled and more likely to be forced out of the labour market very early. Those with OPs start to be able to take attractive levels of pensions from age 55. The spike at age 60 is much more apparent for those with OPs reflecting the substantial proportion for whom this is the scheme's normal retirement age.

Figure 16 Retirement Probabilities of women by OP status

Source: Retirement Survey microdata

The equivalent picture for women is shown in figure 16. Here the biggest difference is in the size of the spikes at age 60. Those with occupational pensions are more than twice as likely as those without to retire at age 60. At first sight this appears surprising given that those without OPs are dependent just on the basic pension, for which normal pension age is exactly 60. But many will not have full entitlement in any case, within OPs the most common normal retirement age for women is 60 and general attachment to the labour market is likely to be much lower for those without an OP.

The gains from working until 60 for those with OPs are much greater than for those without.

Disney, Meghir and Whitehouse (1994) demonstrate similar effects using retirement hazards from the same data. They too find that the structure of pension benefits shifts the retirement probabilities, deterring individuals from retiring just prior to the earliest potential receipt of benefits. Once eligible for benefits, the hazard rate and probability of labour market exit is significantly increased.

Figure 17: Retirement Survival Functions for men by Occupational Pension Status

Source: Disney, Meghir and Whitehouse (1994)

Figure 18: Retirement Survival Functions for women by Occupational Pension Status

Source: Disney, Meghir and Whitehouse (1994)

Survival functions for men are plotted in figure 17 and for women in figure 18. The figures show the probability of survival in the labour force at each age from 40 to 65 according to occupational pension status. They demonstrate very clearly for both men and women that those with OPs are much more likely to remain in the labour market at least until age 60 than are those without.. From age 60 the survival probabilities converge for both men and women..

The labour market experience of the two groups is shown to be profoundly different. The lower retirement hazards at earlier ages among the occupational pension sample, resulting from both a lower exit rate and a lower probability of never subsequently working, mean that a large gap opens up between the two pension groups. After age 55 the gap begins to close. These survival functions confirm the importance of the incentives provided by occupational pension schemes: the survival probability is considerably higher just before retirement benefits may become due (either "full" or early retirement), and thereafter the survival probability falls much more rapidly than that of those not covered by pension schemes. One result is that retirement behaviour is considerably more heterogeneous for those without occupational pensions. Retirement ages cover a larger age range and have a broader distribution.

The differences in this survival to retirement functions are consistent with what we would expect given the incentive structure built in occupational pensions. Since OPs give a benefit related to final pay earned while a member of the plan, leaving before the youngest age at which they can draw the pension involves a penalty to pension benefits. OPs therefore deter individuals from retiring prior to the earliest potential receipt of benefits. Whilst a number of schemes actuarially reduce benefits on early retirement to reflect the longer period of payment, in many the discounted present value of expected pension benefits is larger if the individual retires early. This is likely to explain the acceleration in the labour market exit rate after age 55 for those in OPs.[11]

Conclusions

There have been significant changes in labour market behaviour among older individuals in the UK since the 1970s. Participation and activity rates, especially among men over 55 have fallen dramatically. While it is hard to see any *changes* to the social security system that might have caused this, the social security system does provide significant incentives to retire early if, as is often the case, benefits can be received before age 65. For those who can get invalidity benefits, and they account for more than 40% of non-working 60-64 year olds, the system comes close to working as providing early retirement benefits with no actuarial reduction. The same is true for individuals who are entitled to Income Support in this age group. One in eight men receive this benefit. The relative generosity of these benefits and the incentives which they create, combined with the reduced demand for unskilled labour, must play a part in explaining the observed fall in labour market participation.

Among those with occupational pensions significant increases in pension wealth could have had an important effect on increased early retirement, as could the relatively generous treatment of early retirement by many occupational schemes. We have shown that the retirement behaviour of occupational pensioners differs significantly from that of those without OPs in ways that are consistent with the former taking advantage of generous early retirement benefits.

Appendix I

Evidence on the effect of state pensions on retirement

Although there is a large international literature that has addressed the issue of estimating models of retirement behaviour,[12] there is little evidence for the UK. Here we draw on the recent study by Meghir and Whitehouse (1995) that uses the UK Retirement Survey data described above to examine the impact of various features of the pension system as well as earnings and demographic and health variables on the transition into retirement. The only previous econometric study for the UK was that by Zabalza, Pissarides and Barton (1980). It used an earlier retirement survey but presented a purely static model of labour market participation at retirement in relation to the "earnings rule" discussed in Section II above.

It is difficult to argue that retirement in the UK can be modelled as a well defined labour market state distinct from other spells out of work. On the one hand men within the state pension scheme can only draw a pension after the age of 65; even this can be deferred at any point in time at a (more or less) actuarially fair rate. However, as we have seen, in addition to own savings the state social security system including invalidity benefit provides an important source of income out of work before that age. Those with occupational pensions are not prohibited from working even after drawing a pension early so long as they change employer. Thus the obvious approach to modelling the age at which individuals leave the labour market is to study the transitions in and out of work up to the age of 65 beyond which only very few men work. This is the approach followed in Meghir and Whitehouse (1995) and Disney, Meghir and Whitehouse (1994). It is also followed recently by Blau (1994) for the US.

In their reduced form equations Disney and Whitehouse show that, among other variables, health and the aggregate unemployment rate both have a strong and negative effect on the exit rate while education increases the exit rate. The occupational variables included relate to the ones observed in the previous job. Professional/managerial workers have lower exit rates back to work and clerical workers higher vis-à-vis manual workers; nevertheless these differences seem completely insignificant. When unobserved heterogeneity is taken into account the effects of health and the unemployment rate increase. The exit rate elasticity with respect to aggregate unemployment for a manual worker at the start of the spell with mean education and age 54 is -1.16.

These results imply that age, health and the labour market conditions are important determinants of early retirement, as defined above. They affect the exit rate from jobs and change the rate of return to work in opposite directions. Thus older men and men in poor health are likely to retire earlier and the incidence of early retirement becomes more prevalent in periods of high unemployment. It is possible that both these effects are operating through the wage. But it is very likely that the aggregate unemployment rate and health both operate through the job arrival rate. Further, health is also likely to change the tastes towards work.

"Structural" transition equations, including earnings and benefits out of work were also estimated. Social security benefits were shown to have a negative effect on the rate of return back to work while earnings have a negative effect in the transition out of work and a positive effect on the rate of return back to work. The most significant being the effect of earnings on the job exit rate. Again, health and age have important effects.[13]

These results do indicate that incentive effects may play an important role in determining the age of retirement. The overall impact of benefits on the probability of retirement at a particular age (i.e. job exit at that age and non-return to work thereafter) can be calculated from a combination of the two estimated transition models. Based on the results, which control for unobserved heterogeneity, the elasticity with respect to benefits is about -0.36. In terms of these results the job exit rate elasticity (the job exit rate elasticity with respect to earnings is -0.54) with respect to earnings is the strongest indication that economic incentives may affect the retirement age even for individuals without an occupational pension, indicating that the lower paid individuals do drop out of the labour market first.

FOOTNOTES

1. See Dilnot, Disney, Johnson and Whitehouse for an overview of the UK pension system

2. These figures include the effect of the equalisation of state pension age at 65 for men and women, a change that will be phased in between 2010 and 2020.

3. *Labour Market Trends*, May 1996.

4. Housing Benefit is not included. Other includes categories like war pensions, special payments and a host of small-scale benefits.

5. Drawn from Johnson and Stears, 1995 based on Family Expenditure Surveys, 1961-93.

6. See Johnson and Stears (1996).

7. As we have already noted the previous "graduated pension" scheme resulted in benefits so small as not to be worthy of consideration.

8. Pension Law Review Committee, 1993, 2.2.39.

9. *ibid* 4.15.10.

10. Source: National Association of Pension Funds, 1990.

11. Since the allocation to an OP may be related to unobserved characteristics and in general to heterogeneity which we have not accounted for here the differences will also reflect the fact that individuals with an OP sort themselves to other types of job than the non OP workers and possibly have stronger labour market attachment.

12. Including Berkovec and Stern (1988), Stock and Wise (1990) and Rust (1989) on the US and, in Europe, Borsch-Supan (1993).

13. Health could partly capture the impact of eligibility for invalidity benefit (see part II for a discussion of the importance of Invalidity Benefit), since the reduced form benefit equations do not include health; the FES from where the benefits are imputed does not contain health information.

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Figure 1

Male activity rates, 1971-95

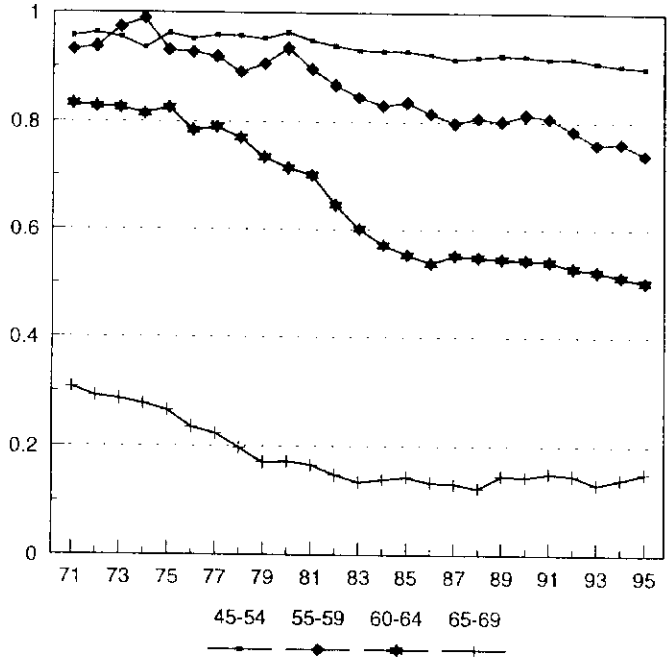

Figure 2

Female activity rates, 1971-95

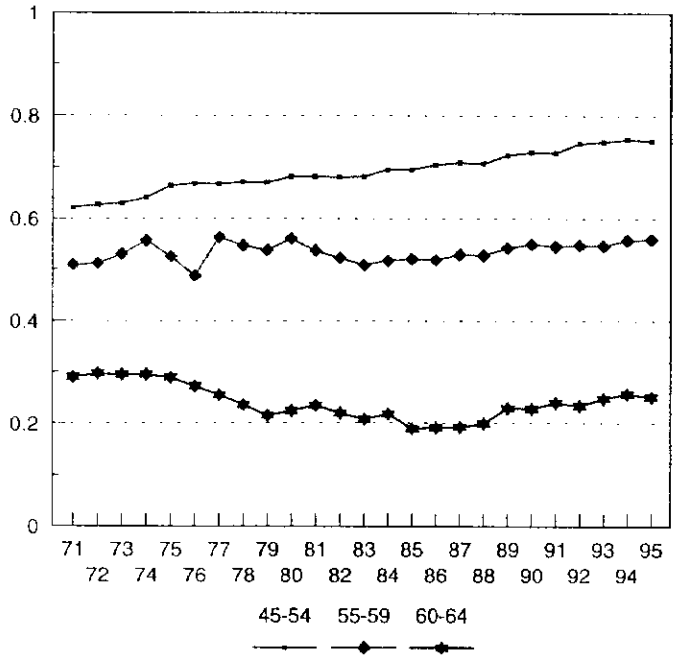

Figure 3

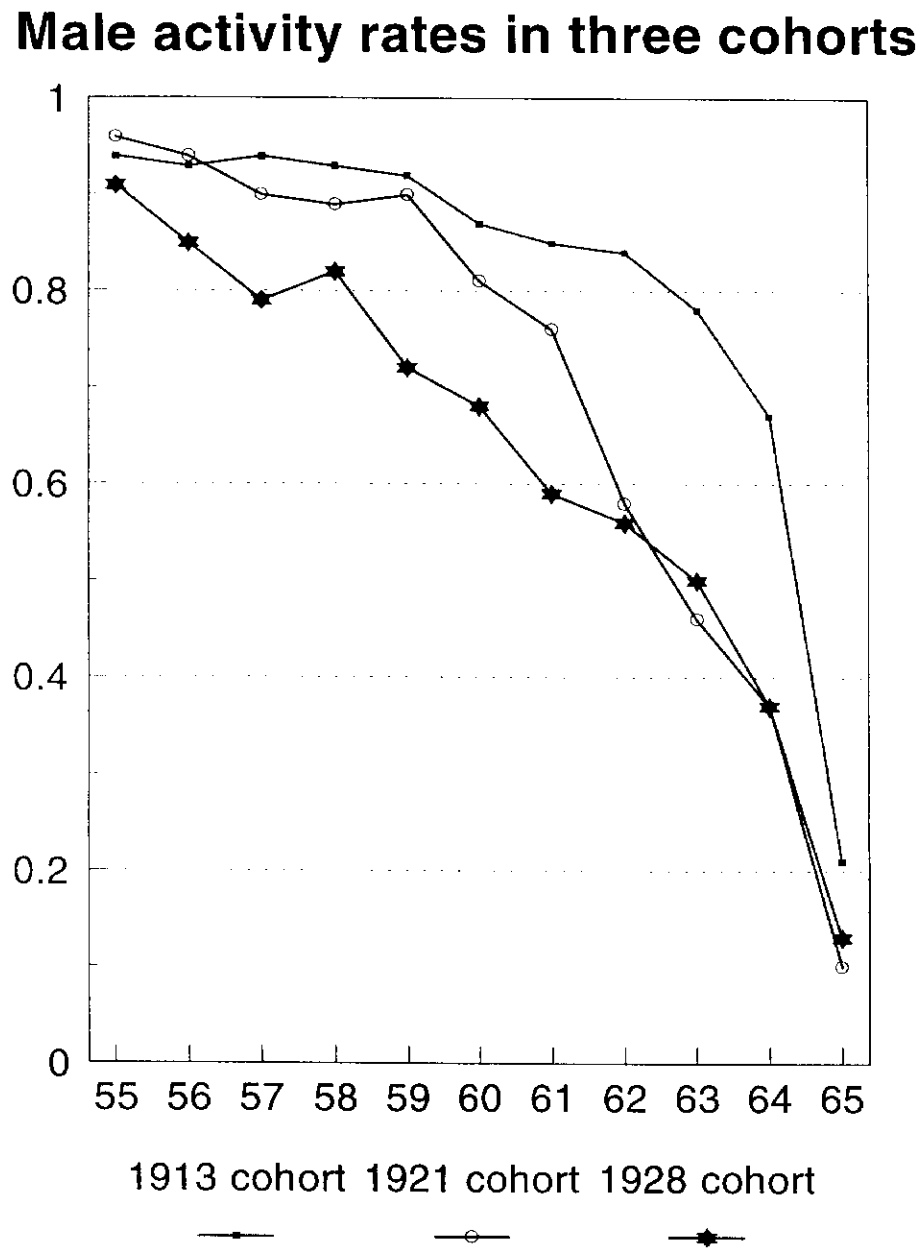
Male activity rates in three cohorts
1
0.8
0.6
0.4
0.2
0
55 56 57 58 59 60 61 62 63 64 65
1913 cohort 1921 cohort 1928 cohort

Figure 4

Pension and IVB receipt among over 55s

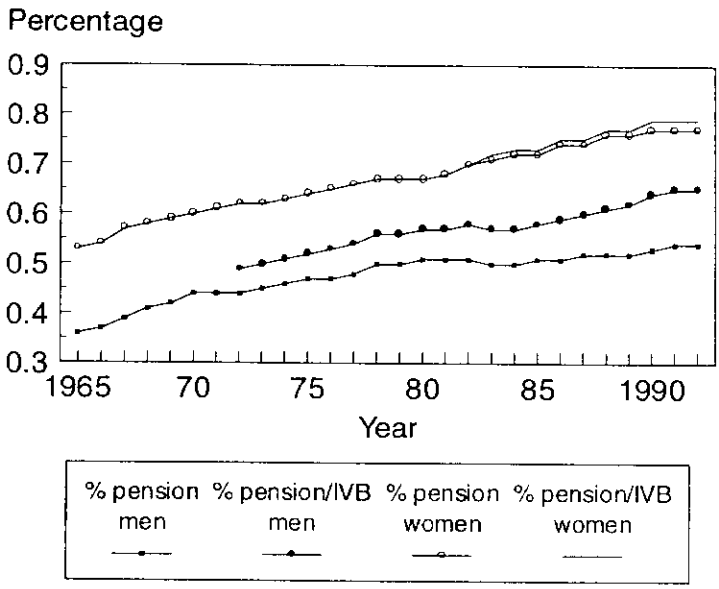

Figure 5

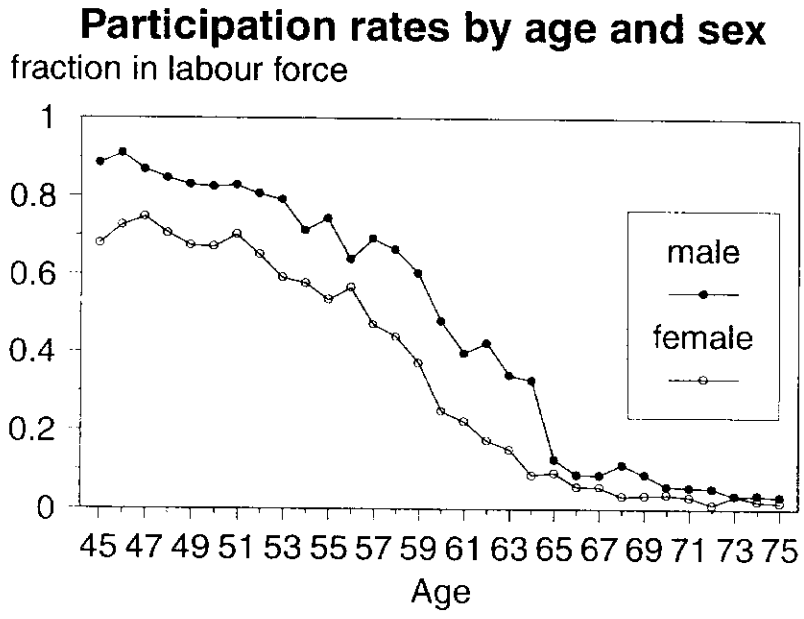
Participation rates by age and sex
fraction in labour force
1
0.8
0.6
0.4
0.2
0
male
female
45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75
Age

Figure 6

Economic activity of men by age

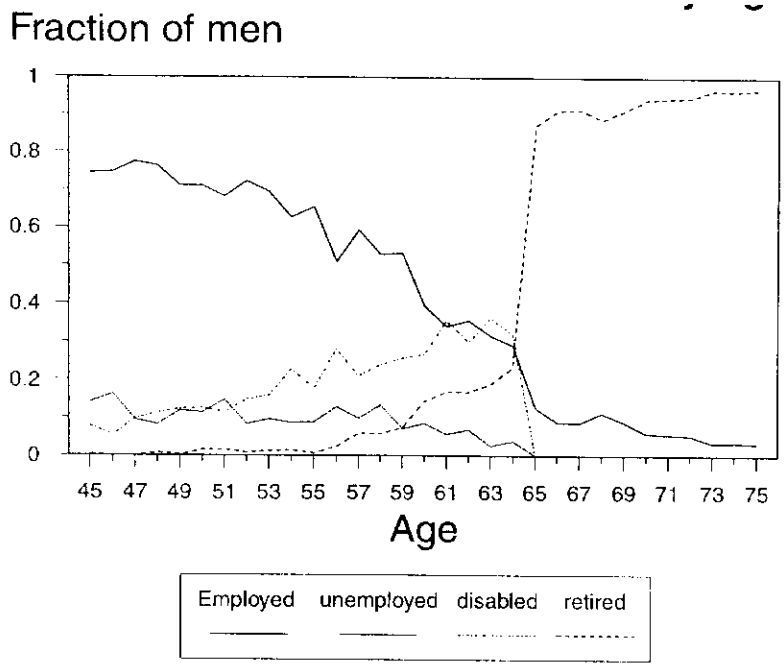

Figure 7

Economic activity of women, by age

Figure 8

Hazard rate out of the labour force for men

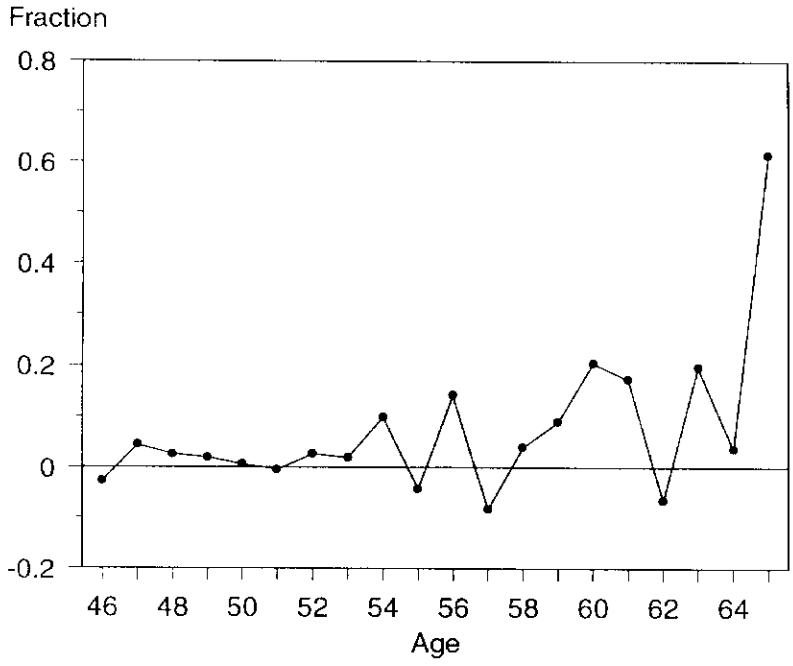

Figure 9

Hazard rate out of labour force for women

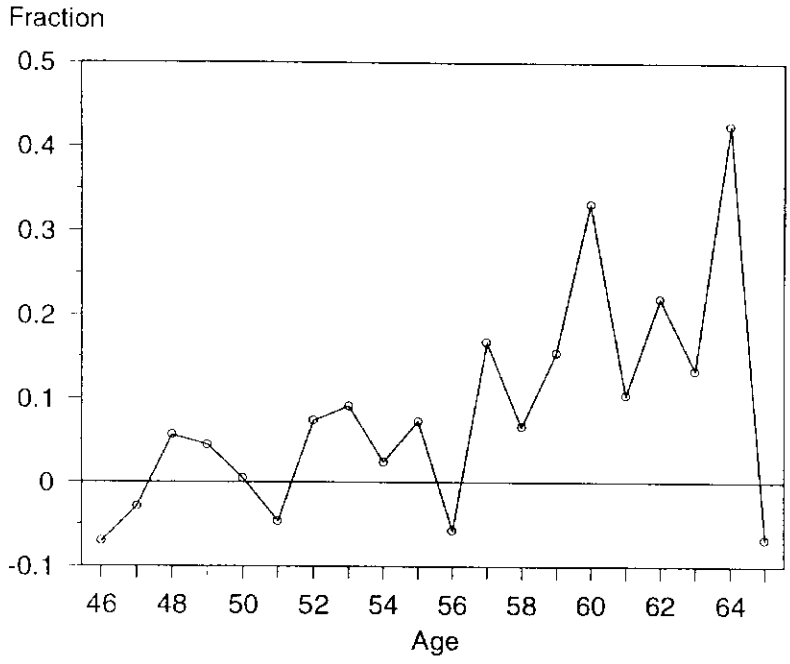

Figure 10

Public income recipiency for men

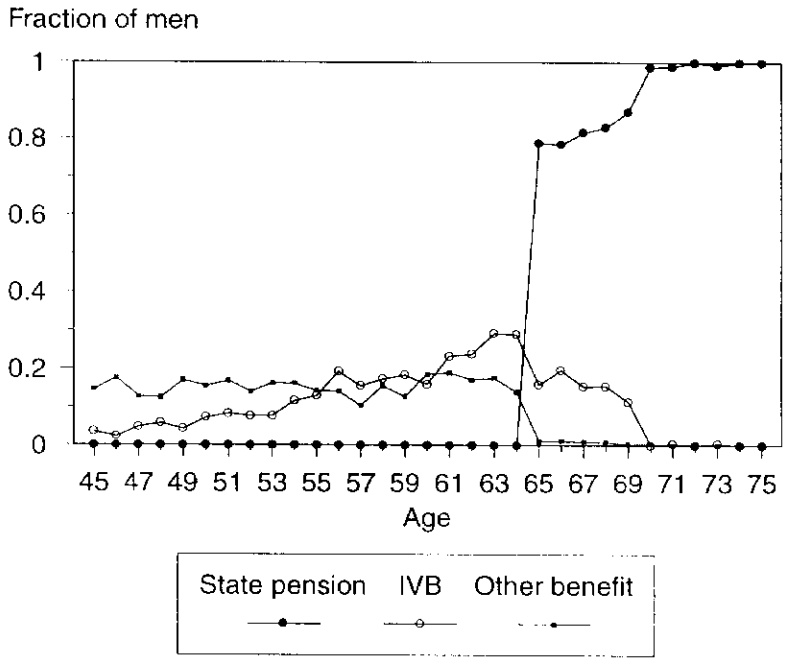

Figure 11

Private pension receipt by sex

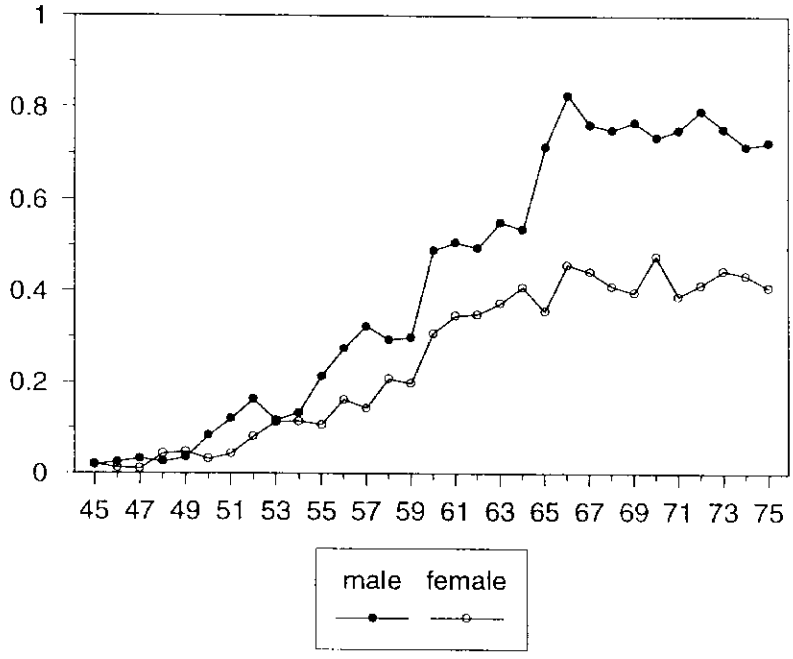

Figure 12

Composition of family income by age

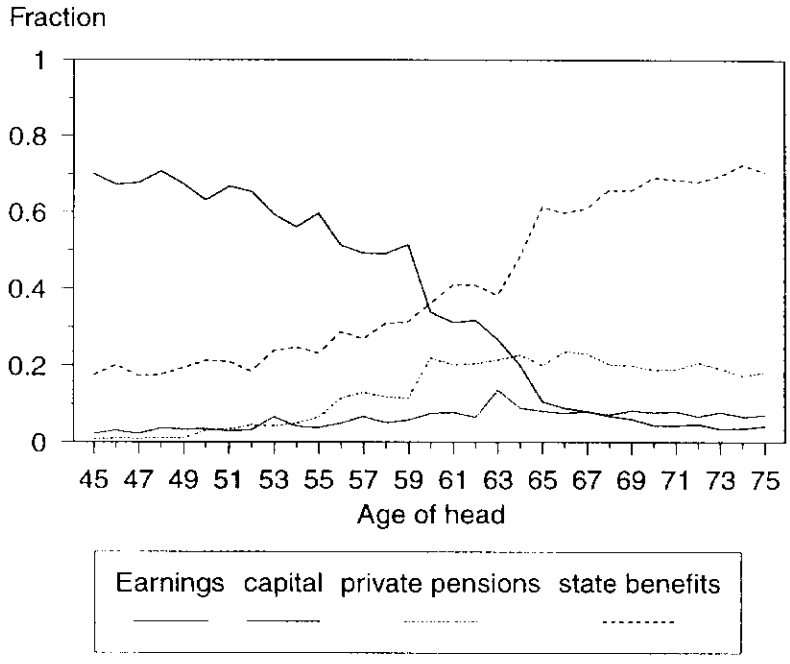

Figure 13

Weekly earnings of men aged 65 to 69 in 1987 and 1988 FES

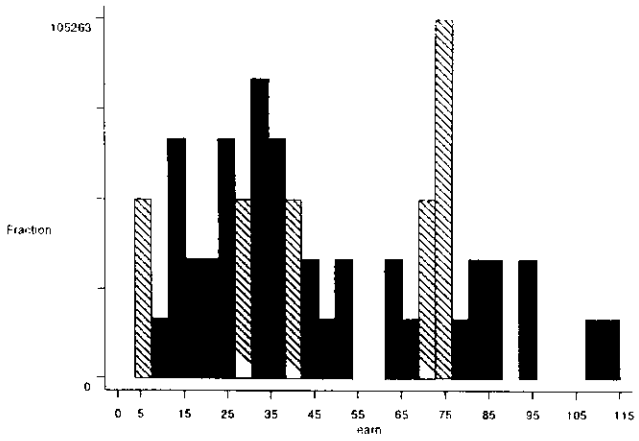

Figure 14

Weekly earnings of men aged 65 to 69 in 1991 and 1992 FES.

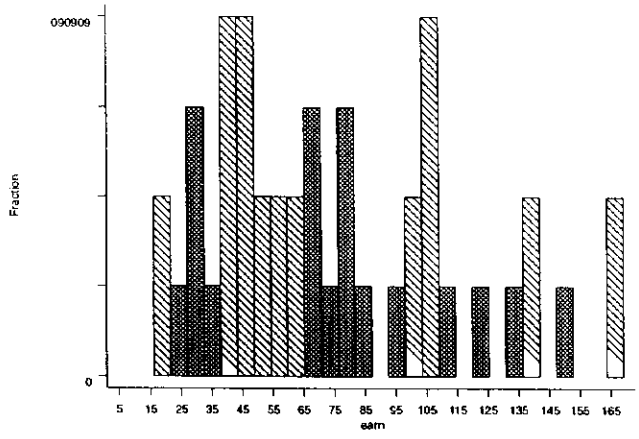

Figure 15

Retirement probabilities for men

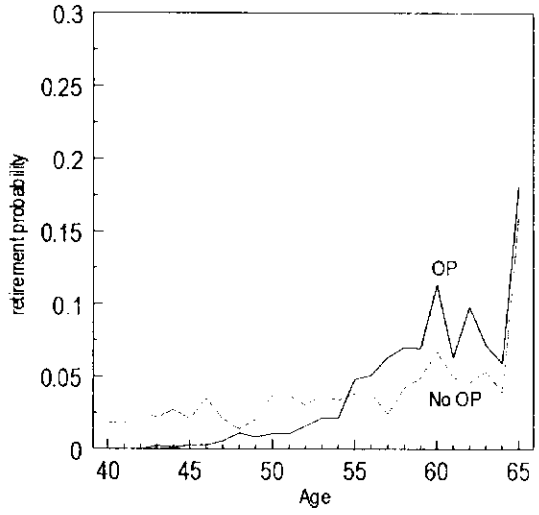

Figure 16

Retirement probabilities for women

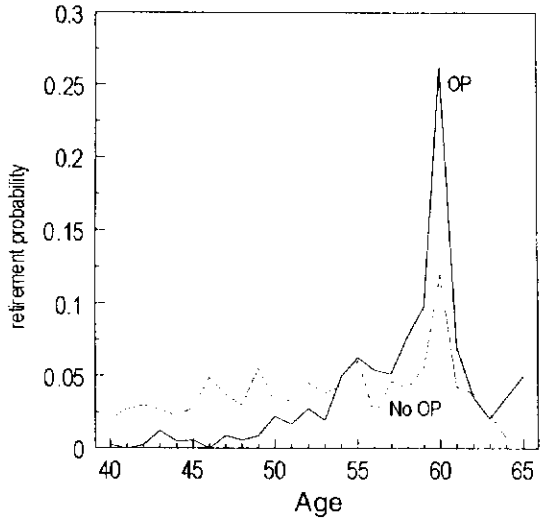

Figure 17

Survival functions for men

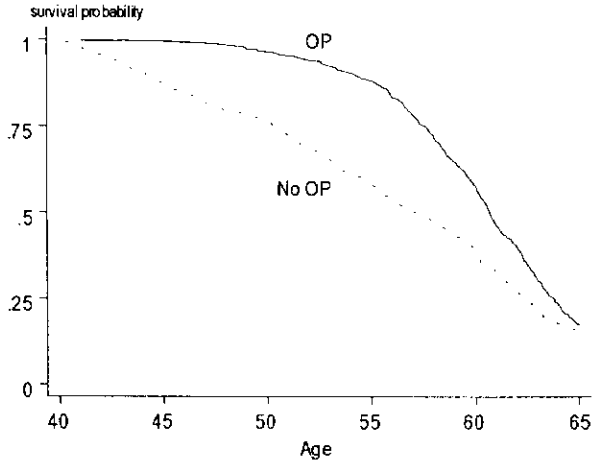

Figure 18

Survival functions for women