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Microeconometric Analysis
of the Retirement Decision:
United Kingdom

**Raffaele Miniaci,
Elena Stancanelli**

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**by
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ABSTRACT/RESUMÉ

The purpose of this paper is to investigate the retirement decision in the United Kingdom. We distinguish four retirement routes: retirement, unemployment, long-term sickness and other states. The focus of the paper is the impact of pension benefits on retirement transitions. We estimate multinomial logits and Cox proportional hazard rate models, separately for men and women. We conclude that participation in an occupational pension scheme increases the retirement hazard rate for men. The results for women are less clear-cut given the relatively small number of women entitled to an occupational pension scheme.

Cet article a pour objectif l'analyse de la décision de partir à la retraite au Royaume-Uni. Nous distinguons quatre voies de retrait du travail pour les personnes âgées: retraite, chômage, maladie de longue durée et autres. Le papier porte plus particulièrement sur l'impact des pensions professionnelles sur les transitions vers la retraite. Nous estimons des modèles logits multinomiaux et des modèles de Cox à taux de risque proportionnel, séparément pour les hommes et les femmes. La conclusion que nous en tirons est que la participation à un régime de retraite professionnel accroît, chez les hommes, le taux de risque de retraite. Les résultats concernant les femmes sont moins précis étant donné le nombre relativement faible de femmes affiliées à un régime de retraite professionnel.

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MICROECONOMETRIC ANALYSIS OF THE RETIREMENT DECISION: UNITED KINGDOM

Raffaele Miniaci and Elena Stancanelli¹

1. Introduction

1. In this paper, we study the retirement decision in the United Kingdom. Studies in this area for the United Kingdom have mostly concentrated on the retirement behaviour of men. We include both women and men in our sample and we estimate separate models for them.

2. We focus on the impact of pension benefits on retirement transitions. In particular, we are interested in investigating how entitlement to different pension schemes affects the age of retirement. This is very important for policy analysis. The main UK pension schemes are described in the next Section.

3. We adopt a reduced form approach to model the retirement decision. This has the advantage of not having to rely on strong *a priori* assumptions on the parameters of interest. Reduced form models are widely used for the analysis of labour market transitions. The empirical analysis is based on data drawn from the British Household Panel Survey, a longitudinal data set that includes, to date, five (yearly) waves, from 1991 to 1995. The survey is a random sample of the UK population. Information on individual labour market histories before 1991 was collected retrospectively at the time of the third survey interview.

4. We distinguish four retirement routes: retirement, unemployment, long-term sickness and other states. We conducted a non-parametric analysis of the retirement transitions using Kaplan-Meier methods and parametric estimations of multinomial logit models and hazard rate models. The hazard rate model specified is a Cox proportional hazard rate model. This model has the advantage of allowing for as much flexibility as possible in the specification of the baseline hazard rate. The baseline hazard rate captures the dependency on time of the probability of making a transition out of employment. Since we are especially interested on the timing of the retirement transitions, this seems the most appropriate approach².

5. The explanatory variables considered can be grouped as follows:

1. Raffaele Miniaci works at the Economics Department of Padua University; Elena Stancanelli works at the OECD and at Tilburg University. The authors are grateful to Stefano Scarpetta for valuable comments.

2. Alternatively, a piecewise linear baseline hazard rate could have been specified. The advantages of a Cox proportional hazard relative to a piecewise linear hazard is that the Cox ensures more flexibility in the baseline hazard, at least with a limited number of observations. The estimated baseline hazard under a piecewise linear hazard specification is sensitive to the number of 'pieces' (time periods) specified. This may be a problem especially because of the degree of freedom restrictions and of the relatively small number of observations that exit in each time period.

- Individual socio-demographic characteristics: age, marital status, family size, education level, birth cohort.
- Job characteristics: white-collar worker; part-time worker; self-employed; temporary job; industrial sector (manufacturing, mining, energy, transports, trade, and agriculture); public sector job.
- Institutional characteristics: occupational pension scheme; state National Insurance pension.
- Partner's labour market participation³.

6. We do not consider here the impact of previous earnings and/or benefits levels. It is unclear at which point in time earnings and benefits should be measured. Moreover, in our data set, previous earnings are not available for those who have retired before the interview was conducted. Imputing earnings and benefits may introduce errors into the model. These variables will be endogenous in a reduced form model and they will be strongly determined by the other variables included in the model, such as education levels and job characteristics⁴.

7. The structure of the paper is as follows. First, the main UK pension schemes are briefly described. This is a very important issue since different institutional arrangements may have a different impact on individual retirement decisions. Next, the data are described and descriptive statistics of the retirement routes, pension benefits and other variables considered are provided. Results of estimation of the non-parametric hazard rates, the multinomial logit and the hazard rate models are discussed in the following section, where we focus on the last transition out of a job (if any) made before the age of 70 for men and 65 for women. Possible re-entries into the labour market are investigated in the following Section, where a multiple spells model is specified and estimated. In the last Section of the paper, we simulate the impact on the retirement decision of changes in the rules that govern eligibility to occupational pension plans.

2. Pension Schemes

8. In the UK, there are three main pension schemes: state pensions, occupational pensions, and personal pension plans:

3. This is only available if the partner was still alive at the time of the survey interview (1991). Given that women tend to live longer than men, one has to keep this in mind when interpreting the estimated impact of this variable on the retirement transitions.

4. Meghir and Whitehouse (1997) impute earnings and benefits and develop a retirement model that controls for their potential endogeneity. The authors conclude that social security benefits have a negative effect on the rate of return back to work while earnings have a negative effect on the transition out of work and a positive effect on the rate of return back to work. They estimate a job exit elasticity of earnings of about -0.54 and back to work elasticity of social security of -0.36. The authors use the OPCS 1988-89 retirement survey to estimate a model of retirement transitions and the Family Expenditure Survey to impute earnings and social security benefits.

- State pensions are payable to individuals that have paid National Insurance (NI) contributions for a long enough period⁵ and have reached pension age (65 for men, 60 for women). Reduced rate pensions are under certain conditions payable when individuals have reached pension age with less than enough contributions. The basic state pension is flat rate. Additionally, state pensioners are entitled to income support⁶, housing benefits and community charge benefits. There is also a State Earnings Related Pension Scheme (SERPS). Individuals earning above the lower earnings limit for the purpose of the National Insurance pension scheme pay first class rate contributions and are entitled to this additional earnings-related pension payment. However, only individuals who are not members of any occupational pension scheme or personal pension plan can pay SERPS contributions into the system.
- Occupational pensions are operated by employers. They are payable upon having worked for an employer for a long enough period. The pension benefits payable are normally a function of the time spent with an employer and of the last salary payment. Individuals who are drawing an occupational pension may continue to work as long as they change employer. This is a key feature of the UK retirement system.
- Personal Pension Plans are private pension schemes which are owned by individuals and the amounts payable depend on individual contributions and on the specific pension investment funds. They were promoted in 1988 by the UK government which offered NI contribution reductions⁷ to individuals taking up Personal Pension Plans. Although they are very recent (and therefore they will not be important for any of the retirees in our sample) they seem to have a fairly wide take up (Disney and Whitehouse, 1992).

9. A key feature of the UK pension system is that individuals drawing an occupational pension may still be working and, consequently, cannot be really classified as ‘retirees’. A somehow similar pattern of spells in and out of work of older workers has been observed in the United States (Blau, 1994), where many individuals drawing pensions may be found back at work. Therefore, it is important to allow for re-entry into the labour market of “retirees” (see, for example, Meghir and Whitehouse, 1997).

3. The data set

10. The data we use for the analysis are drawn from the British Household Panel Survey (BHPS). This is a representative sample of the British population (living south of the Caledonian Canal). The BHPS is not a survey specifically designed to study retirement but, nevertheless, it collects information on individual characteristics and labour market transitions that allow one to run a reliable empirical analysis of the retirement decision. We make use of information collected at the time of the first survey interview (1991) and of retrospective information on individual labour market histories, that was collected in the 1993 wave. In particular, the time of exit from the labour market, the different exit routes and the

-
- 5. Normally this corresponds to 9/10 of standard working lives. There are special provisions that reduce the number of years necessary for entitlement to a state pension; for example, home responsibility protection for the years spent bringing up children.
 - 6. Income support rates are higher than the flat rate of the basic state pension. Income support is the means-tested social assistance benefit.
 - 7. Individuals that subscribe Personal Pension Plans can opt out of the SERPS scheme and pay lower NI contributions.

characteristics of the last job are well defined in the retrospective section of the questionnaire. This retrospective record allows us to reconstruct transitions in and out of jobs and to identify the last job spell experienced by the respondent.

11. The sample selected for the analysis includes women over 50 and men over 55. These are heads of household and their partners. Their reported status, at the time of the first survey, is illustrated in Table 1. About 41 per cent of the men in the sample (aged between 55 and 70 in 1991) were in-work and, of them, 24 per cent drew an NI retirement pension and/or an occupational pension. About 45 per cent of the women in the sample were in-work and 17 per cent of these drew a pension. The percentage of the unemployed or LT sick was higher among men than women (15.9 per cent vs. 6.4 per cent). In care of family was reported as a labour market status by 1/5 of the women and by almost no men.

12. Among those individuals out of work, many drew more than one type of benefit (Table 2). The most common combination was the one in which NI retirement pensions and occupational pensions were jointly drawn (Table 3). Interestingly, about 62 per cent of the respondents on invalidity benefits drew a labour-related pension (Table 4), in most of the cases an occupational pension.

3.1 *Definitions and caveats*

13. For the purpose of the analysis carried out in the next Section, we select the last job spell that started before the age of 65 for women and 70 for men. This excludes the possibility of re-entry into a job after retirement age. The time of exit from the labour market is defined as the time at which the last job spell ended, if this happened before the age of 65 (70). If individuals are still in work at 65 (70), we define them as right-censored and set the length of their last job spell accordingly. We define four exit routes:

1. Retirement;
2. Unemployment;
3. Long-term sickness or invalidity;
4. Other reasons.

14. The individual exit route is actually defined on the basis of answers to a question on the motivation for leaving the last job. There may be scope for recall error or misreporting since we use retrospective history data as well as current information provided in the 1991 wave. For example, some respondents may re-classify motivations when exit into retirement or family care was preceded by a period of unemployment, or long-term sickness. It should be noticed that such a definition of the exit route does not depend on whether any benefits or pension payments were drawn at the exit time or at the time of the first interview.

3.2 *Descriptive statistics*

15. Descriptive statistics of the retirement routes for men and women in the sample are reported in Tables 5 and 6. Of our sample of 692 men, 25.6 per cent are still employed, 11.7 per cent exited into unemployment, 52.7 per cent have retired and 10 per cent left their last job for health reasons. Due to the insignificant number of men having left their last job for "other reasons" we considered only three exit routes for men.

16. The following facts are worth noticing: 18 per cent of the sample of males still at work held a part-time job and 34 per cent were self-employed; 55 per cent of those in-work had an employer pension plan; 11 per cent of the unemployed entered unemployment after a temporary job; 80 per cent of the retirees drew an occupational pension; 65 per cent of the men in the sample had no qualifications above compulsory education.

17. Occupational pensions were less common among women: only one third of the 964 women in the sample were entitled to an employer pension. Women had, on average, relative to men: shorter job tenure and a lower level of education ; they were more likely to hold a part-time job or a job in the public sector and/or in the other services sector; 10 per cent of women reported to have left their last job for family care reasons⁸. It should be noticed that this is a cohort of women that were aged at least 50 in 1991. However, the activity rate among women in the sample was higher (33 per cent) than among men. This might be explained by the fact that most women in the sample were not on an occupational pension plan and had, therefore, to work till compulsory retirement age in order to gain entitlement to a state pension.

4. The multinomial logit model

18. The multinomial logit estimates (reported in Appendix 1m and 1f) show the relative probability, for each respondent, to be observed in any of the exit states considered. For men, the probability of being unemployed (relative to the probability of working) is negatively correlated with the following characteristics: home ownership outright, a working spouse, self-employment, part-time work, and last job in the service sector. Job tenure and participation in an occupational pension plan do not reduce the unemployment risk but they do increase the retirement probability. For men, the presence of a working spouse reduces the retirement probability. Individuals in self-employment or part-time employment are less likely to exit into long-term sickness while the industrial sector does not matter. Cohort dummies pick up a mixture of time and age effects (see retirement exit).

19. The results for women are generally not too different. However, here, job tenure reduces the risks of unemployment and of exiting from the labour force for family caring. Exit into retirement or into "other states" is less likely for women with larger families. This is probably a spurious effect, due to the fact that younger women tend to have more dependent children. Home ownership reduces the probability of exiting from employment (into any exit state). Post-compulsory education affects only (negatively) exit into long-term sickness.

5. Non-parametric estimates of the hazard functions

20. The baseline hazard rates for the different exit routes were estimated separately for men and women. They are plotted in Figures 1 and 2. The hazard rate for the retirement exit for men show a spike at age 65. For the other two exit routes there is some evidence that the hazard rate increases with age. The unemployment hazard rate ranges from 1 per cent to 3.5 per cent at ages 60 to 65 but falls thereafter. This is likely to be explained by the fact that men can draw a state pension only after reaching the age of 65. Exit into long-term sickness is almost as important as exit into unemployment. For women, the retirement hazard rate follows basically the same pattern as for men, but the pattern is shifted 5 years

8. Information on the spouse's labour supply at the time of the last job spell is only available for spouses that were still alive at the time of the interview. The family size variable used in the analysis is measured at the time of the interview.

backwards. Instead, the hazard of exiting into unemployment or long-term sickness is much less important for women.

6. Parametric estimates

21. As a further step of our analysis, we estimated hazard rate models that allow for the impact of covariates on the hazard rate. The hazard rate was specified as a Cox proportional hazard. The model was estimated, separately, for men and women. We distinguished three exits for men: retirement, unemployment and long-term sickness. We did not estimate exit into other states given the small number of observations concerned. For women, we considered the following exit states: retirement, unemployment; long-term sickness and other reasons. Here, the main component of the “other reasons” exit was family care.

22. When interpreting the results of estimation (Appendix 2m and 2f) one has to bear in mind the small number of individuals who exit into states other than retirement. The results of estimation of the retirement hazard indicate, for both men and women, that: the presence of a working partner has a positive impact on the retirement decision; occupational sector effects are not very significant; white collar workers tend to retire earlier; the self-employed, part-time workers and workers in temporary jobs tend to retire later. Home ownership outright has a significant impact on the retirement hazard of women but not on that of men. On the other hand, the education dummies, household size and tenure in the last job play a significant role for the retirement hazard of men but not of women. Tenure in the last job has a positive effect on the retirement hazard. The quadratic specification indicates that the effect becomes negative for men with more than 28 years of job tenure.

23. We also found that men with an occupational pension plan are likely to retire earlier. The estimation sample consists of men aged between 55 and 70. Usually, occupational pensions give higher benefits if drawn after the age of 55. There is some evidence that workers under 55 that have cumulated rights to an occupational pension have a lower hazard rate (see Meghir and Whitehouse, 1997). Cohort dummies indicate that younger workers retire earlier.

24. The unemployment hazard rate of men is lower for home owners, the self-employed, part-time workers and workers in the service sector; it is, instead, higher for workers in temporary jobs. Job tenure and occupational pensions have an insignificant impact on the unemployment hazard. For women, the picture is slightly different: job tenure reduces the unemployment probability while workers in the manufacturing sector have a higher unemployment risk. Positive cohort dummies indicate that, at any point in time, younger women are more likely to exit from employment into unemployment than older women.

25. Occupational pension plans and cohort effects are the only (significant) determinants of the long-term sickness hazard rate for men. For women, a larger family size increases the hazard of exiting into sickness while higher education reduces it.

26. For women, the hazard of exiting into family care is quite important: about 10 per cent of the women in the sample reported to have left their (last) job for family caring reasons. Marital status has a positive impact on the probability of exiting into family care. By contrast, job tenure and occupational pension rights have a significantly negative impact.

27. It is remarkable that for all exits but family caring, the estimated parameters on the cohort dummies are monotonically decreasing with age: for any exit route, the younger generation leave the labour market earlier.

7. Multiple spells

28. In the United Kingdom, individuals appear to cycle in and out of jobs frequently, even during the last years of their working life. For example, Disney, Meghir and Whitehouse (1994), using data drawn from the OPCS retirement survey of 1988-89 and for a cohort born in 1919-28, observed that only 26 per cent of men and 23.8 per cent of women made just one transition from the job they held at the age of 40 out of the labour force. The authors conclude, therefore, that *'the stylised view of stable long-term employment followed by retirement is largely untrue'* (page 31).

29. In this Section, we investigate individual patterns of labour market transitions, including not only the "last" job spells observed but all spells observed for the individuals in the sample (women aged above 50, men aged above 55 in 1991). We use information on the retrospective work history to construct spells out of work and we specify and estimate a multiple spells model. By using multiple spells for each respondent, we are able to observe a larger number of exits into unemployment. This allows us to obtain better estimates of the unemployment hazard that suffered earlier from the small number of observations. In particular, we can then compare the estimates of the retirement routes obtained allowing for multiple spells with those obtained under the assumption that exit from the labour market (after the age of 65-70) is permanent.

30. We consider three exit routes: retirement, unemployment and other exits. We exclude job-to-job transitions that are treated as one long employment spell. We do not control for individual unobserved heterogeneity and assume that the exit-specific parameters are functionally independent. This leads us to writing the problem as the maximisation of a 4*3 "transition specific" partial likelihood.

31. Let us specify the following equations:

$$L_p = L_p^{ER} \cdot L_p^{EU} \cdot L_p^{EO} \cdot L_p^{RE} \cdot L_p^{RU} \cdot L_p^{RO} \cdot L_p^{UE} \cdot L_p^{UR} \cdot L_p^{UO} \cdot L_p^{OE} \cdot L_p^{OR} \cdot L_p^{OU}$$

where E, R, U, O stand, respectively, for employment, retirement, unemployment and other exits and L_p is the partial likelihood. We are only interested in the first part of the overall partial likelihood⁹. We estimate three hazard rates for each gender. The results of estimation are presented in Tables 3m and 3f in the Appendix.

32. The results of the estimations indicate that most of the conclusions drawn with respect to the "last" retirement spell (as reported in the previous Sections) do still hold: participation in an occupational pension scheme increases the retirement hazard rate; workers in younger cohorts and men white collar workers tend to retire earlier; the self-employed and male part-timers retire later; a working spouse

9. Transitions RE, OE, UE (from not working status to employment) are not relevant for the current research program and transitions across states out of the labour force (UO, UR, OR, etc.) cannot be observed with the BHPS.

increases the retirement hazard; lower educated individuals have a higher probability to retire earlier. We also find that jobs that were started at a relatively younger age tend to last longer. There is significant evidence that men in the manufacturing sector are more likely to retire earlier.

33. The results of the estimation of the unemployment hazard¹⁰ signal that workers on an occupational pension scheme are less likely to enter unemployment; jobs that started relatively later in time have a higher hazard to end in unemployment; the self-employed, part-timers and workers in the service sector have lower unemployment risks. Interestingly, higher education reduces significantly the hazard of unemployment for women. Younger generations are more likely to experience shorter job spells that end in unemployment.

34. The “other exits” hazard include jobs that ended because of long-term sickness and any other reasons. Only occupational pension schemes and cohort dummies have a significant impact on the other exits hazard. This is in line with the findings for the “last” retirement spell, illustrated in the previous Section.

35. The survivor functions for the different retirement routes are plotted in Figure 3. Interestingly, the probability of leaving the “last” job (Figures 1 and 2) does not differ substantially from that of leaving any job (Figure 3), at least after the age of 45-50. Indeed, Figures 1, 2 and 3 indicate that the retirement patterns over time are very similar, whether one considers the “last” job spell or previous job spells. In particular, in Figure 3, the retirement hazard for men shows a change in the slope at about the age of 60 and a sharp fall at the age of 65. The survivor function of women lies below that of men.

8. The impact of occupational pension schemes

36. On the basis of our estimates, we are able to conclude that entitlement to an occupational pension increases significantly the retirement hazard rate and reduces significantly the probability of exiting into other states. In particular, from the estimates of the (last job) retirement hazard for men (Appendix 2m), we can conclude that the probability of retiring is 36.7 per cent higher for workers with an occupational pension scheme, at any age. The corresponding estimate for women (Appendix 2f) is smaller (11.9 per cent) and statistically insignificant.

37. At any age, all things being equal, occupational pensions reduce significantly the probability of exiting into long-term sickness (by -43.8 per cent), for men, and the probability of exiting into family care (by -61 per cent), for women.

38. To get a better grasp of the impact of institutional characteristics on the retirement behaviour of individuals, we allowed the baseline hazard, in the Cox proportional hazard, to vary for individuals entitled to an occupational pension plan. We could, then, estimate how entitlement to an occupational pension plan affects the decision to retire over time. The impact of covariates other than entitlement to an occupational pension was assumed not to vary across the two groups of individuals: those on occupational pension plans and the others. The survivor functions derived from the estimates of the (semi-parametric) Cox baselines for the two groups are plotted in Figures 4 and 5.

39. The two retirement survivor functions overlap, for men, until the age of 58, after which the survivor function of workers with an occupational pension decreases much faster than that of workers with no occupational pension. After the age of 65, the two functions follow a similar pattern. These

10. Notice the higher incidence, here, of unemployment exits than in the case of the “last” retirement spell only.

findings indicate that the differential impact of entitlement to an occupational pension plan is concentrated in the age range 58-65, for men. For women, instead, the two curves differ from each other only after the age of 60, when the survivor function of those with an occupational pension falls below the other.

40. Under the assumptions that any difference between the two survivor curves is due only to differences in pension entitlements and that the age at which an occupational pension can be claimed is moved forward to 65 (as the standard retirement age for state pensions), we simulate the retirement route of workers with rights to an occupational pension scheme. Under these assumptions, the survivor function would be equal to that of workers with no occupational pension until the age of 64 and to the survivor function as plotted in Figure 4 from the age of 65 onward. Clearly, the shift in the age at which it is possible to claim an occupational pension affects the expected retirement age of workers with an occupational pension. The gap between the expected retirement age of workers with and without an occupational pension is reduced from 16 to 8 months. The expected retirement age for a worker with an occupational pension shifts from 62.6 to 63.3 years against 63.9 years for a similar worker with no rights to an occupational pension.

9. Conclusions

41. In this paper, we have investigated the decision to retire in the United Kingdom. The data for the analysis have been drawn from the British Household Panel Survey. In particular, we have exploited the longitudinal features of the survey and the retrospective questions on individual labour market histories, collected at the time of the third survey interview.

42. Four labour market states have been distinguished: employment, unemployment, long term sickness and retirement. We have estimated non-parametric retirement routes by Kaplan-Meier methods and parametric multinomial logit models and hazard rate models. The hazard rate model specified is a Cox proportional hazard rate model. We have estimated the last transition out of a job (if any) made before the age of 70 for men and 65 for women. We have then gone further and estimated also transitions out of work made earlier on, using a multiple spells approach. Finally, we have simulated the impact on the retirement decision of changes in the rules that govern age eligibility to occupational pension plans.

43. We concluded that participation in an occupational pension scheme increases the retirement hazard rate; workers in younger cohorts and male white collar workers tend to retire earlier; the self-employed and male part-timers retire later; a working spouse increases the retirement hazard; the lower educated have a higher probability to retire earlier.

44. The results of the estimation of the unemployment hazard rate signal that workers on occupational pension schemes are less likely to enter unemployment; jobs that started relatively later in time have a higher hazard to end in unemployment. The self-employed, part-timers and workers in the service sector have lower unemployment risks. Higher education reduces significantly the hazard of unemployment for women. Younger generations are more likely to experience shorter job spells that end in unemployment.

45. We find that only occupational pension plans and cohort dummies affect significantly the other exits hazard (long-term sickness and other reasons). For women, a larger family size increases the hazard of exiting into sickness while higher education reduces it.

46. The hazard of exiting into family care is important for women: about 10 per cent of women left their job for family caring reasons. Marital status has a positive impact on the hazard of exiting into family care. Instead, job tenure and occupational pension rights have a significantly negative impact.

47. For all exits, except family care, the estimated parameters on the cohort dummies are monotonically decreasing with age. This implies that for any exit route, younger generation leave the labour market earlier.

48. We find that entitlement to an occupational pension increases significantly the retirement hazard rate and reduces the probability of exiting into other states. On the basis of the results of estimation of the (last job) retirement hazard for men, we conclude that the probability of retirement is 36.7 per cent higher for workers on an occupational pension scheme than for the other workers, at any age. The corresponding estimate for women is smaller (11.9 per cent) and statistically insignificant. Entitlement to an occupational pension reduces significantly the hazard of exiting into long-term sickness (by -43.8 per cent), for men, and the probability of exiting into family care (by -61 per cent), for women.

49. Finally, we have simulated the retirement route of workers with rights to an occupational pension scheme, under the assumptions that the age at which an occupational pension can be claimed is moved to 65. The shift in the age at which it is possible to claim an occupational pension affects the expected retirement age of workers with an occupational pension: The gap between the expected retirement age of workers with and without an occupational pension is reduced from 16 (under the current age eligibility rules) to 8 months (under the simulated age eligibility rule). The expected retirement age for the reference worker with an occupational pension shifts from 62.6 to 63.3.

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Table 1: Men aged 55-70, women aged 50-65 in 1991

	Benefit: NI retirement pension and/or occupational pension					
	Men		Women		Total	
	%	% with benefit	%	% with benefit	%	% with benefit
Blue collars	18.13	16.35	16.17	19.76	17.07	18.09
White collars	12.31	30.55	24.49	15.02	18.90	19.67
Self employed	10.49	29.34	4.55	17.02	7.28	25.18
Unemployed	6.50	31.57	2.13	0.00	4.14	22.78
Retired	40.48	91.83	24.10	75.90	31.52	85.26
Family care	0.23	0.00	21.68	23.21	11.83	23.00
LT sick	9.35	40.24	4.26	20.45	6.60	33.33
Other	2.51	0.00	2.61	3.70	2.57	2.04
Total	100	59.12	100	31.03	100	44.26

Source: BHPS.

Table 2: **Retired or long-term sick receiving more than one benefit**
(per cent of total)

	Men	Women	Total
Retired	61.69	40.96	53.14
LT sick	53.65	38.63	48.41
Total	60.18	40.61	52.32

Table 3: **Recipients of NI retirement pension with other benefits**
(per cent)

	Men	Women	Total
Occupational pension ¹	69.41	43.14	58.60
Private pension	7.31	3.92	5.91
Widow benefit ²	0.00	13.07	5.38
Invalidity benefit ³	8.68	2.61	6.18
Income support	2.28	7.19	4.30

Source: BHPS.

1. Pension from a previous employer.
2. Widow benefits are: pension from a spouse's previous employer; Widow's or War Widow's Pension, Widowed mother's allowance.
3. Invalidity benefits are: Severe Disablement Allowance; Invalidity Pension, Benefit or Allowance; Industrial Injury or Disablement Allowance; Attendance Allowance; Mobility Allowance; Invalidity Care Allowance; War Disability Pension.

Table 4: **Recipients of any invalidity benefit with other benefits**
(per cent)

	Men	Women	Total
NI retirement pension	12.84	7.55	11.44
Occupational pension	57.43	32.08	50.75
Private pension	2.03	1.89	1.99
Widow benefit	0.68	7.55	2.49
Income support	8.78	13.21	9.95

Source: BHPS.

Table 5: **Descriptive statistics: men**

	Working	Unemployed	Retired	LT sick	Total
%	25.57	11.71	52.71	10.00	692
Duration (years)	7.83	5.68	7.70	4.65	7.19
Tenure in the last job (years)	17.75	15.74	23.86	18.48	20.81
With occupational pension (%)	54.75	64.63	79.74	50.00	68.71
Married (%)	83.05	77.21	85.55	76.81	83.09
Family size (at the time of the interview)	2.17	2.00	1.93	2.06	2.01
Working spouse	49.72	29.26	32.79	41.43	37.57
Outright home owner (%)	35.19	25.60	32.24	30.00	32.00
With mortgage (%)	38.54	29.26	29.99	28.57	31.42
No qualifications (%)	65.92	71.95	61.25	80.00	65.57
O level (%)	16.76	15.85	16.80	15.71	16.57
A level (%)	5.03	7.32	7.32	2.86	6.29
Hnd, hnc, etc. (%)	3.91	3.66	8.40	0.00	5.86
University degree (%)	8.38	1.22	6.23	1.43	5.71
Born before 1914 (%)	13.97	4.88	17.34	4.29	13.71
Born in 1915-1919 (%)	7.26	8.54	18.43	1.43	12.71
Born in 1920-1924 (%)	10.61	23.17	31.17	21.43	24.00
Born in 1925-1929 (%)	16.20	34.15	23.85	37.14	24.43
Born in 1930-1941 (%)	51.96	29.27	9.21	35.71	25.14
Born in 1935-1941 (%)	10.36	3.39	0.81	0.00	3.52
White collars (%)	41.34	35.36	44.17	27.14	40.71
Self employed (%)	34.07	6.09	9.21	17.14	16.00
Part time (%)	17.87	7.31	4.87	4.28	8.42
Temporary job	12.29	10.97	2.71	2.85	6.14
Agriculture (%)	2.79	4.88	1.63	2.86	2.43
Energy (%)	2.23	4.88	5.42	4.29	4.43
Mining and quarrying (%)	4.47	6.10	5.15	2.86	4.86
Manufacturing (%)	21.79	39.02	27.10	24.29	26.86
Constructions (%)	7.82	9.76	7.86	18.57	9.14
Trade (%)	16.76	8.54	8.94	8.57	10.86
Transports and communications (%)	11.17	7.32	10.84	10.00	10.43
Financial sector (%)	12.85	3.66	7.32	8.57	8.43
P.A. and other services%)	20.11	15.85	25.75	20.00	22.57

Source: BHPS.

Table 6: **Descriptive statistics: women**

	Working	Unemployed	Retired	LT sick	Other	Total
%	32.99	8.40	43.14	5.12	10.35	964
Duration (years)	10.08	5.56	8.77	6.34	5.17	8.43
Tenure in the last job (years)	14.15	8.89	15.39	13.60	8.97	13.68
With occupational pension (%)	30.12	24.39	40.85	36.00	13.86	32.88
Married (%)	62.26	72.15	64.11	61.22	81.00	65.76
Family size (at the time of the interview)	1.96	1.89	1.57	1.86	1.73	1.74
Working spouse (spouse alive at the time of the interview %)	36.33	29.26	28.50	26.00	32.67	31.45
Outright home owner (%)	31.36	25.60	20.90	22.00	20.79	24.79
With mortgage (%)	35.71	32.92	24.94	26.00	24.75	29.20
No qualifications (%)	68.94	78.05	73.16	86.00	77.23	73.26
O level (%)	19.57	14.63	13.54	8.00	12.87	15.27
A level (%)	3.73	2.44	4.04	4.00	8.91	4.30
Hnd, hnc, etc. (%)	4.66	4.88	6.65	2.00	0.00	4.92
University degree (%)	3.11	0.00	2.61	0.00	1.00	2.25
Born before 1914 (%)	12.11	2.44	15.20	8.00	11.88	12.40
Born in 1915-1919 (%)	10.87	6.10	13.30	4.00	8.91	10.96
Born in 1920-1924 (%)	11.49	10.98	26.84	14.00	25.74	19.67
Born in 1925-1929 (%)	12.73	17.07	22.09	26.00	17.82	18.34
Born in 1930-1941 (%)	52.80	63.41	22.57	48.00	35.64	38.63
White collars (%)	55.90	54.87	56.32	46.00	58.41	55.84
Self employed (%)	8.07	3.65	5.22	8.00	7.92	6.45
Part time (%)	55.27	45.12	43.23	50.00	59.40	49.38
Temporary job	8.07	12.19	4.04	0.00	9.90	6.45
Agriculture (%)	1.24	0.00	1.19	0.00	1.98	1.13
Energy (%)	0.31	1.22	1.19	0.00	0.00	0.72
Mining and quarrying (%)	1.55	2.44	2.85	2.00	2.97	2.36
Manufacturing (%)	10.87	28.05	15.58	8.00	16.83	15.68
Trade (%)	25.16	24.39	20.19	24.00	31.68	23.57
Transports and communications (%)	0.93	2.44	1.66	4.00	0.00	1.43
Financial sector (%)	8.70	4.88	2.61	4.00	1.00	4.71
P.A. and other services(%)	51.24					

Source: BHPS.

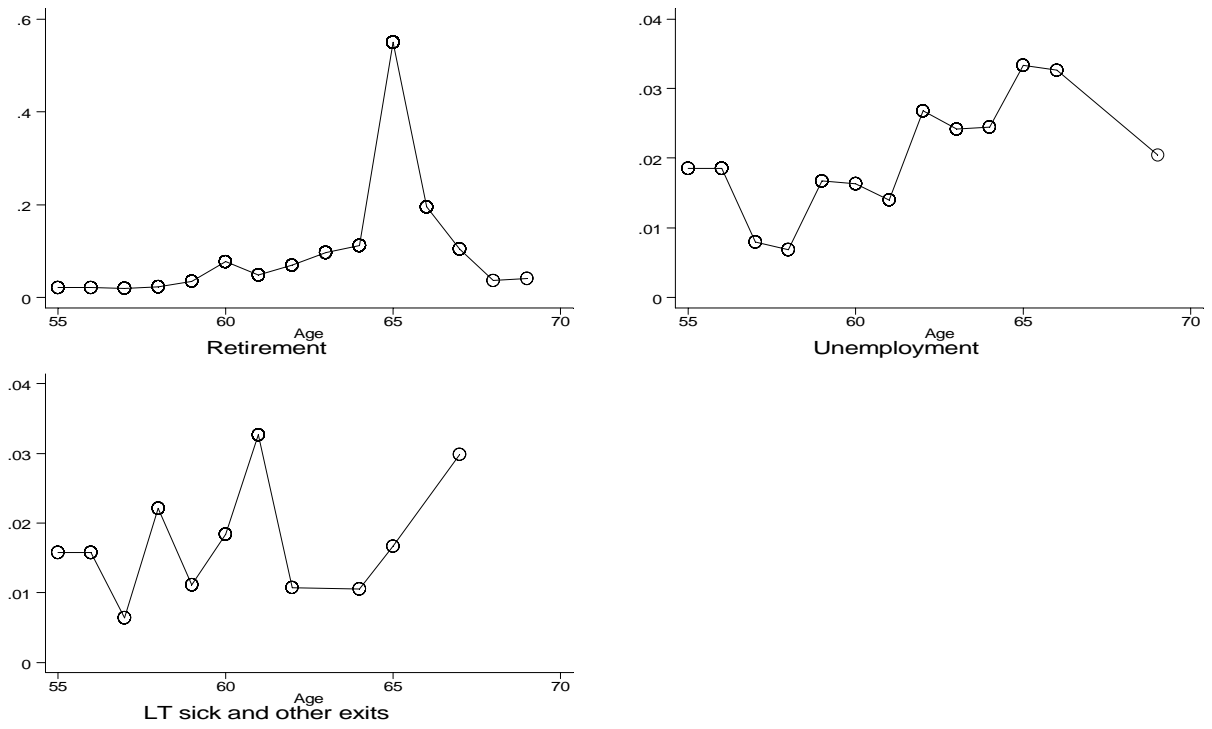


Figure 1: Men hazard rates

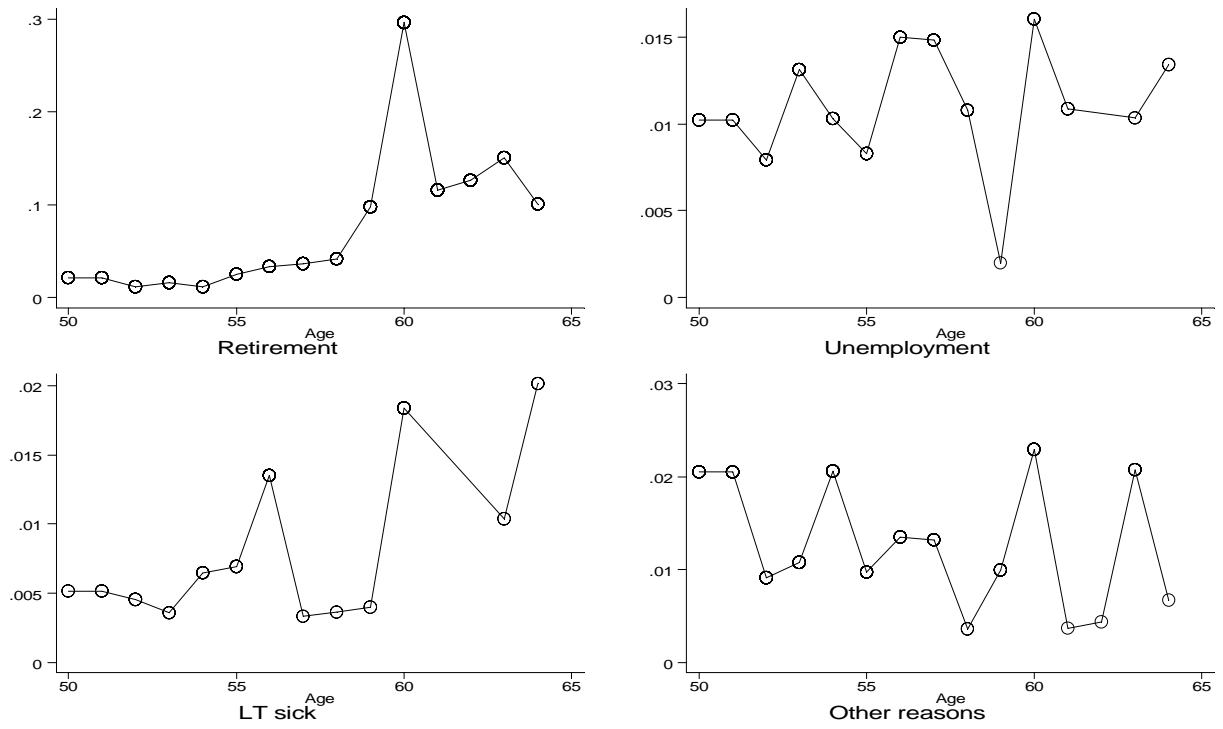


Figure 2: Women hazard rates

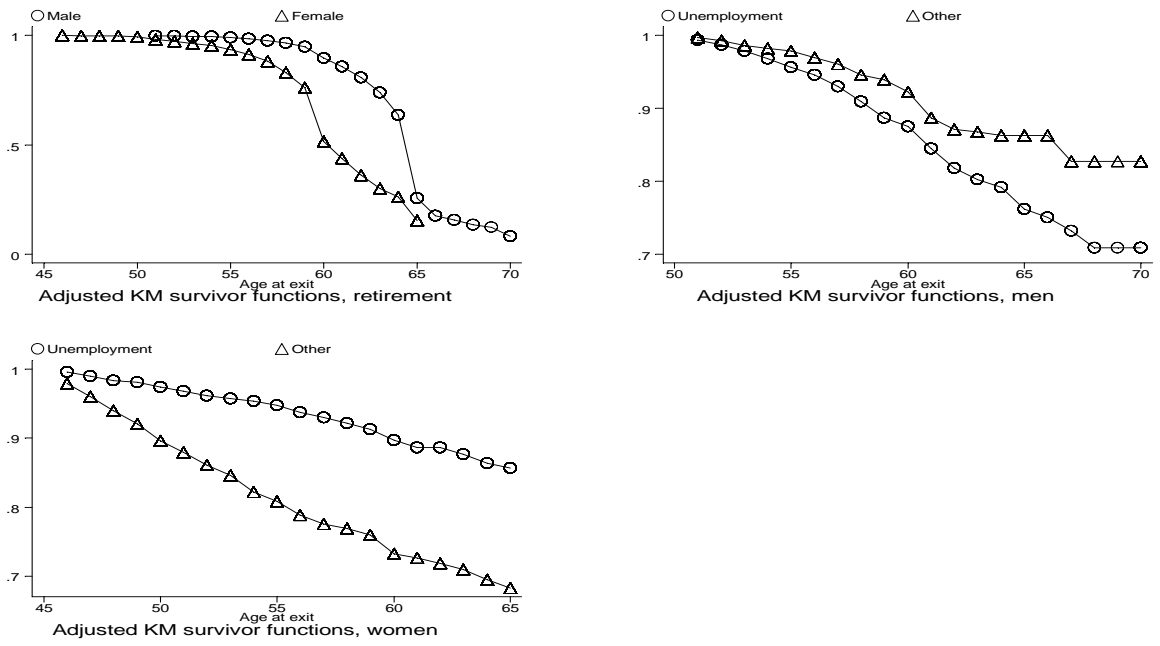


Figure 3: Multiple spells

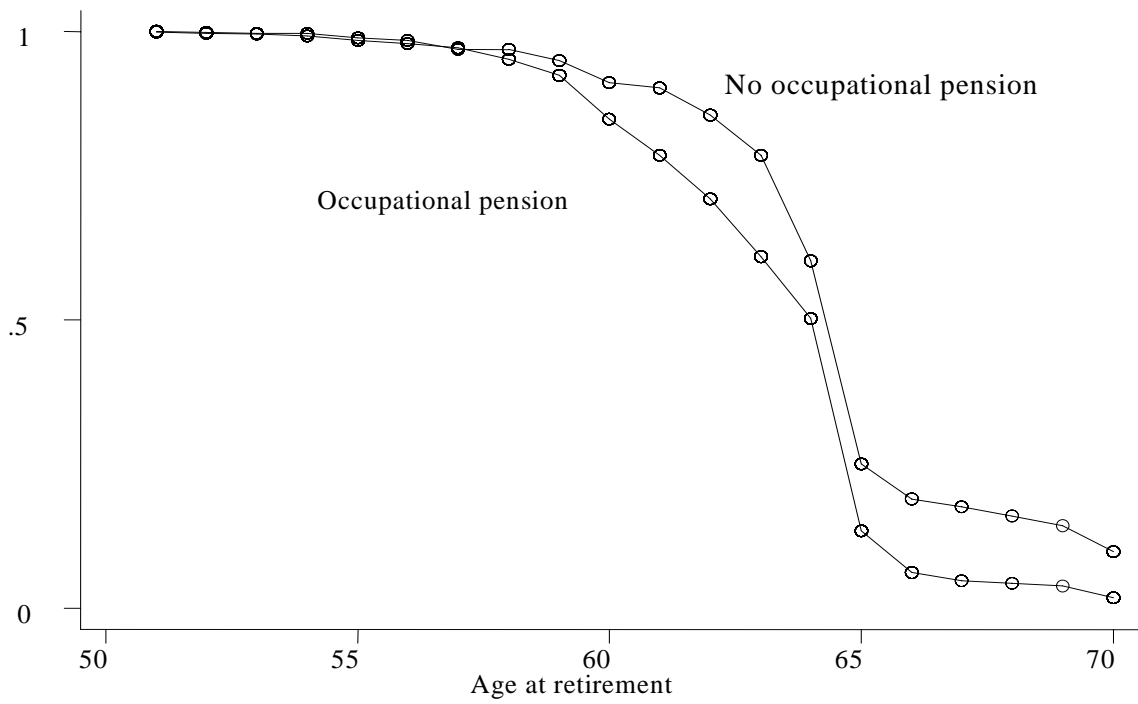


Figure 4: Adjusted KM survivor functions, men

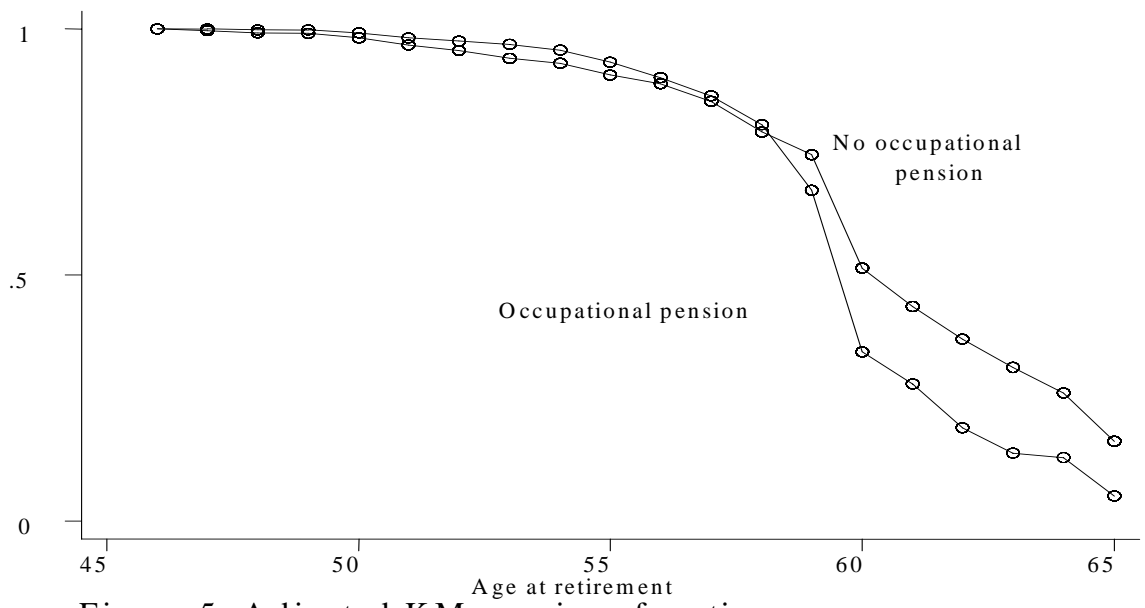


Figure 5: Adjusted KM survivor functions, women

List of variables:**Demographics:**

Ahhsiz	: current family size
Married	: 1 if the respondent was married at the time of his/her retirement
Ieduca_1	: 1 if university degree
Ieduca_2	: 1 if Hnd, hnc, etc. (teaching schools, midwives, nurses, etc.)
Ieduca_3	: 1 if A level
Ieduca_4	: 1 if O level
Ieduca_5	: 1 if no qualifications after compulsory school
withqua	: 1 if not Ieduca_5
Icc_15	: 1 if born before 1915
Icc_20	: 1 if born in 1916-1920
Icc_25	: 1 if born in 1921-1925
Icc_30	: 1 if born in 1926-1930
Icc_35	: 1 if born in 1931-1941
onotm	: 1 if the household owned its current home without a mortgage at the time of respondent's retirement
owithm	: 1 if the household owned its current home and it was still paying the mortgage at the time of respondent's retirement
housown	: onotm + owithm
work	: 1 if the spouse was working at the time of respondent's retirement. If the spouse was dead at the time of the interview no information is available on his/her labour history
t	: tenure in the last job
t2	: t squared/10
es	: age at the beginning of the job spell - 40
white	: 1 if white collar in the last job
self	: 1 if self employed in the last job
part	: 1 if last job was a part time job
temp	: 1 if last job was a temporary job
Isecto_0	: primary
Isecto_1	: energy
Isecto_2	: mining and quarrying
Isecto_3	: manufacturing
Isecto_4	: constructions
Isecto_5	: trade
Isecto_6	: transport and communications
Isecto_7	: financial sector and real estate
Isecto_8	: p.a. and other services
service	: 1 if in Isecto_5 - Isecto_8
manufac	: 1 if Isecto_3

Appendix 1m
 Multinomial regression
 MEN

	Unemployment			Retired			Long term sickness		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
onotm	-0.707	0.395	*	0.110	0.310		-0.436	0.404	
owithm	-0.625	0.429		0.263	0.338		-0.460	0.438	
married	0.225	0.452		0.487	0.354		0.120	0.463	
work	-0.911	0.340	***	-0.595	0.257	**	-0.448	0.339	
occpen	0.203	0.363		0.833	0.295	***	-0.364	0.361	
t	-0.007	0.045		0.077	0.032	**	0.007	0.044	
t2	-0.007	0.010		-0.017	0.006	***	-0.005	0.009	
ahhsize	-0.094	0.235		-0.225	0.190		-0.176	0.235	
white	0.273	0.364		0.310	0.283		-0.124	0.382	
self	-2.783	0.595	***	-2.064	0.370	***	-1.461	0.471	***
part	-2.617	0.621	***	-2.564	0.448	***	-2.234	0.724	***
withqua	-0.013	0.372		0.339	0.289		-0.449	0.412	
temp	0.722	0.624		-0.665	0.533		-0.750	0.848	
service	-1.058	0.396	***	-0.552	0.297	*	-0.355	0.383	
manufac	-0.091	0.392		-0.463	0.329		-0.284	0.422	
Icc_20	1.296	0.772	*	0.478	0.464		-0.416	1.229	
Icc_25	1.886	0.687	***	0.595	0.420		1.942	0.744	***
Icc_30	2.021	0.671	***	-0.059	0.412		2.101	0.723	***
Icc_35	0.057	0.698		-3.008	0.454	***	0.589	0.740	
_cons	0.407	0.859		1.319	0.627	**	0.076	0.909	
Log Likelihood	= -604.4								
Number of obs	= 692								
chi2(57)	= 400.4								
Pseudo R2	= 0.25								

Appendix 1f
Multinomial regression
WOMEN

	Unemployment			Retired			Long term sickness			Other		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
onotm	-0.503	0.358		-0.856	0.219	***	-0.936	0.425	**	-0.966	0.332	***
owithm	-0.669	0.357	*	-0.569	0.225	**	-1.040	0.433	**	-0.957	0.335	***
married	0.938	0.355	***	0.832	0.215	***	0.428	0.401		1.652	0.343	***
work	-0.776	0.327	**	-0.134	0.216		-0.733	0.415	*	-0.449	0.296	
occpent	-0.127	0.331		0.442	0.195	**	0.464	0.373		-0.682	0.349	*
t	-0.110	0.039	***	0.044	0.023	*	-0.029	0.039		-0.093	0.035	***
t2	0.013	0.010		-0.012	0.006	**	0.005	0.009		0.008	0.009	
ahhsize	-0.028	0.192		-0.392	0.148	***	0.167	0.225		-0.331	0.210	
white	0.361	0.300		0.208	0.186		-0.066	0.357		0.438	0.278	
self	-1.418	0.678	**	-0.526	0.353		0.276	0.640		-0.425	0.514	
part	-0.772	0.301	**	-0.437	0.187	**	-0.143	0.362		-0.165	0.284	
withqua	-0.510	0.345		0.036	0.201		-0.903	0.464	*	-0.140	0.311	
temp	0.401	0.452		-0.655	0.358	*	-	-		-0.148	0.436	
service	-0.222	0.325		-0.068	0.200		0.175	0.384		-0.208	0.287	
manufac	0.901	0.399	**	0.487	0.283	*	-0.334	0.636		0.423	0.395	
Icc_20	1.164	0.891		0.120	0.321		-0.469	0.916		0.093	0.540	
Icc_25	1.929	0.843	**	0.836	0.303	***	0.929	0.696		1.391	0.466	***
Icc_30	2.374	0.830	***	0.698	0.315	**	1.638	0.658	**	1.072	0.499	**
Icc_35	2.145	0.804	***	-0.720	0.302	**	0.792	0.652		0.285	0.479	
_cons	-1.943	0.866	**	0.560	0.391		-2.056	0.795	***	-0.571	0.583	
Log Likelihood	=	-1101.9										
Number of obs	=	964										
chi2(76)	=	340.5										
Pseudo R2	=	0.13										

Appendix 2m
Cox proportional hazard models
MEN

	Retirement		Unemployment		Long term sickness				
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.			
onotm	-0.064	0.137	-0.821	0.296	***	-0.491	0.317		
owithm	0.241	0.153	-0.673	0.322	**	-0.439	0.347		
married	0.309	0.183	*	-0.040	0.347	-0.243	0.376		
work	0.290	0.119	**	-0.006	0.267	0.269	0.279		
occpen	0.313	0.157	**	-0.088	0.273	-0.577	0.280	**	
t	0.056	0.016	***	-0.048	0.034	-0.025	0.035		
t2	-0.010	0.003	***	0.004	0.008	0.003	0.008		
ahhsize	-0.200	0.117	*	0.081	0.202	-0.014	0.208		
Isecto_1	0.875	0.495	*						
Isecto_2	0.398	0.492							
Isecto_3	-0.056	0.446							
Isecto_4	0.180	0.463							
Isecto_5	-0.099	0.461							
Isecto_6	0.002	0.460							
Isecto_7	-0.239	0.477							
Isecto_8	0.151	0.453							
withqua			-0.231	0.287		-0.557	0.353		
service			-0.830	0.302	***	-0.237	0.299		
manufac			0.008	0.280		-0.161	0.333		
white	0.329	0.133	**	0.226	0.273	-0.193	0.311		
self	-0.686	0.210	***	-1.387	0.505	***	-0.160	0.375	
part	-1.047	0.274	***	-1.054	0.486	**	-0.895	0.633	
Ieduca_2	0.783	0.297	***						
Ieduca_3	0.156	0.305							
Ieduca_4	0.528	0.270	*						
Ieduca_5	0.335	0.262							
temp	-0.503	0.352		0.835	0.451	*	-0.755	0.756	
Icc_20	0.360	0.180	**	0.882	0.635		-0.816	1.160	
Icc_25	0.484	0.169	***	1.508	0.564	***	1.432	0.649	**
Icc_30	0.636	0.193	***	2.174	0.565	***	2.115	0.647	***
Icc_35	1.390	0.267	***	3.528	0.621	***	3.423	0.684	***

Log Likelihood = -2797.18233

Appendix 2f
Cox proportional hazard models
WOMEN

	Retirement			Unemployment			Long term sickness			Other reasons		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
onotm	-0.494	0.138	***	-0.216	0.312		-0.495	0.391		-0.595	0.282	**
owithm	-0.066	0.135		-0.229	0.297		-0.454	0.390		-0.496	0.275	*
married	0.324	0.131	**	0.272	0.302		-0.220	0.368		1.042	0.295	***
work	0.364	0.137	***	-0.250	0.283		-0.220	0.385		0.011	0.239	
occpen	0.113	0.120		-0.355	0.288		0.157	0.331		-0.942	0.309	***
t	0.024	0.015		-0.119	0.034	***	-0.020	0.035		-0.091	0.031	***
t2	-0.006	0.004	*	0.016	0.009	*	0.005	0.008		0.009	0.009	
ahhsiz	-0.270	0.113	**	0.230	0.160		0.380	0.207	*	-0.161	0.179	
Isecto_1	0.632	0.666										
Isecto_2	-0.092	0.556										
Isecto_3	-0.141	0.482										
Isecto_5	-0.363	0.484										
Isecto_6	-0.240	0.613										
Isecto_7	-0.824	0.565										
Isecto_8	-0.304	0.478										
withqua				-0.329	0.307		-0.893	0.440	**	-0.028	0.264	
service				-0.081	0.288		0.286	0.353		-0.097	0.240	
manufac				0.602	0.323	*	-0.650	0.593		0.129	0.317	
white	0.130	0.118		0.164	0.262		-0.140	0.329		0.266	0.233	
self	-0.388	0.240		-1.266	0.614	**	0.406	0.584		-0.166	0.435	
part	-0.443	0.115	***	-0.868	0.266	***	-0.145	0.338		-0.058	0.239	
Ieduca_2	0.125	0.363										
Ieduca_3	-0.163	0.398										
Ieduca_4	-0.129	0.340										
Ieduca_5	-0.199	0.324										
temp	-0.245	0.260		0.747	0.384	*				0.266	0.350	
Icc_20	0.017	0.190		0.850	0.843		-0.627	0.879		-0.143	0.453	
Icc_25	0.339	0.166	**	1.244	0.795		0.331	0.651		0.649	0.371	*
Icc_30	0.452	0.182	**	1.873	0.782	**	1.164	0.611	*	0.475	0.407	
Icc_35	0.990	0.196	***	3.016	0.766	***	1.870	0.626	***	0.917	0.404	**

Log Likelihood = -3823.37

Appendix 3m
Cox proportional hazard models
MEN

	Retirement			Unemployment			Other reasons		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
housown	0.039	0.098		-0.238	0.183		-0.783	0.222	***
married	0.056	0.114		0.194	0.205		-0.149	0.308	
work	0.228	0.105	**	-0.107	0.182		-0.030	0.242	
ahhsize	-0.155	0.083	*	0.068	0.123		0.274	0.168	
es	-0.017	0.003	***	0.025	0.007	***	0.011	0.009	
es2	0.000	0.000		0.002	0.001	***	0.001	0.001	
occpn	0.446	0.139	***	-0.615	0.188	***	-0.810	0.243	***
service	-0.093	0.114		-0.872	0.238	***	-0.228	0.260	
manufac	+0.276	0.116	**	0.128	0.193		-0.205	0.261	
white	0.205	0.104	**	-0.202	0.183		-0.180	0.261	
self	-0.819	0.196	***	-1.672	0.406	***	-0.032	0.307	
part	-0.582	0.224	***	-1.820	0.695	***	-0.064	0.611	
withqua	0.199	0.113	*	0.080	0.190		-0.238	0.282	
temp	-0.629	0.527		1.517	0.438	***	0.125	0.684	
Icc_25	0.295	0.116	**	0.316	0.287		0.645	0.432	
Icc_30	0.971	0.141	***	1.001	0.271	***	1.248	0.443	***
Icc_35	1.671	0.208	***	1.711	0.316	***	2.484	0.504	***
Icc_40	3.236	0.361	***	2.909	0.353	***	1.733	0.722	**

Log Likelihood = -3566.67

Appendix 3f
Cox proportional hazard models
WOMEN

	Retirement			Unemployment			Other reasons		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
housown	-0.221	0.100	**	-0.327	0.228		-0.635	0.147	***
married	0.194	0.116	*	0.026	0.235		0.450	0.157	***
work	0.309	0.125	**	0.059	0.234		0.058	0.166	
ahsize	-0.110	0.097		0.129	0.130		-0.017	0.114	
es	-0.020	0.005	***	0.029	0.011	***	0.029	0.009	***
es2	0.000	0.000		0.001	0.001		0.001	0.001	
occpn	0.313	0.102	***	-0.586	0.223	***	-0.334	0.170	**
service	-0.082	0.120		-0.443	0.231	*	-0.134	0.156	
manufac	0.039	0.147		0.808	0.230	***	-0.163	0.196	
white	0.148	0.098		0.180	0.208		0.100	0.137	
self	-0.490	0.269	*	-0.815	0.473	*	0.310	0.235	
part	-0.114	0.105		-0.286	0.205		0.239	0.140	*
withqua	0.102	0.114		-0.593	0.262	**	-0.055	0.155	
temp	0.077	0.247		0.495	0.446		0.404	0.260	
Icc_25	0.165	0.119		-0.211	0.373		0.103	0.209	
Icc_30	0.307	0.133	**	0.834	0.347	**	0.378	0.218	*
Icc_35	1.108	0.163	***	1.192	0.384	***	0.592	0.236	**
Icc_40	1.398	0.301	***	1.896	0.444	***	0.944	0.271	***
Icc_45	2.301	0.605	***	2.414	0.505	***	1.199	0.333	***

Log Likelihood = -4876.93

Appendix 4
Stratified baseline hazard

	Males		Women			
	Coef.	Std. Err.	Coef.	Std. Err.		
housown	0.039	0.110	-0.201	-1.907	*	
married	0.009	0.129	0.220	1.843	*	
work	0.226	0.112	**	0.337	2.611	***
ahhsize	-0.117	0.086		-0.134	-1.431	
es	-0.016	0.004	***	-0.018	-3.782	***
es2	0.000	0.000		0.000	0.520	
service	-0.146	0.121		-0.088	-0.712	
manufac	-0.217	0.126	*	0.102	0.679	
white	0.131	0.114		0.155	1.519	
self	-0.830	0.203	***	-0.562	-2.060	**
part	-0.602	0.236	**	-0.129	-1.186	
withqua	0.208	0.121	*	0.023	0.192	
temp	-0.527	0.541		0.021	0.079	
Icc_25	0.296	0.122	**	0.155	1.282	
Icc_30	0.967	0.150	***	0.307	2.199	**
Icc_35	1.738	0.224	***	1.069	6.425	***
Icc_40	3.042	0.474	***	1.448	4.590	***
Icc_45				2.154	3.481	***

Log Likelihood = -3503.57

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