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of the Retirement Decision:
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ITALY
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**by
Raffaele Miniaci**

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ABSTRACT/RÉSUMÉ

This paper exploits an Italian microeconomic data set to study retirement behaviour of women and men using survival analysis techniques. After a brief introduction to the Italian pension system and to the Bank of Italy survey, different specifications of a Cox proportional hazard model are estimated. These show clearly that younger generations retire earlier, more educated and self-employed workers retire later, and women tend to postpone exit from the labour force beyond the standard entitlement age. The timing of retirement is inelastic to replacement rates: a 20% reduction of the replacement rate would cause a delay of 2-6 months.

Cet article utilise un ensemble de données micro-économiques italiennes pour étudier, en utilisant des techniques d'analyse de survie, le comportement d'hommes et de femmes vis-à-vis de la retraite. Après une brève introduction au système de retraites italien et à l'enquête de la Banque d'Italie, l'on estime différentes spécifications d'un modèle de Cox à hasard proportionnel. Celles-ci montrent clairement que les jeunes générations prennent leur retraite plus tôt, que les travailleurs indépendants et ceux qui sont plus instruits le font plus tard, et que les femmes ont tendance à repousser leur sortie du marché du travail après l'âge officielle de la retraite. Le moment de prendre la retraite n'est pas étroitement lié aux taux de remplacement : une réduction de 20 pour cent de celui-ci entraînerait un retard de 2 à 6 mois.

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MICROECONOMETRIC ANALYSIS OF THE RETIREMENT DECISION: ITALY

Raffaele Miniaci¹

1. Introduction

1. The ageing of the population in Italy is receiving growing attention for its consequences on public finances and it has been at the top of the government's agenda since 1992. Despite the relevance of the topic, little empirical microeconomic evidence has been produced on the retirement behaviour of Italian workers². This paper is a first attempt to exploit an Italian micro economic data set to study the determinants of retirement behaviour of women and men using standard techniques for the analysis of survival data. The focus is on how the characteristics of workers affect their age of retirement, in order to identify which group of workers can react to which policy reform.

2. The Italian pension system is characterised by heterogeneity and has been undergoing reform since 1992. It is a system where exit from the labour force before the normal retirement age is a common practice and where an impressive number of invalidity benefits are paid, often to persons not entitled to them. Pension rights vary considerably according to the different collective labour agreements, in particular before the ongoing reform started to make rules more homogeneous across sectors.

3. The information available in the data set (the 1995 Bank of Italy Survey on Income and Wealth of Italian Households) is not sufficiently detailed to define exactly the position of each respondent in what is called "the Italian pension jungle". Although some degree of approximation was necessary in the procedure, the results are nevertheless likely to be reliable for the core of the sample used (employee, old age and retirement pensioners).

4. Estimation of duration models shows clearly that younger generations retire earlier, more educated and self-employed workers retire later, and women tend to postpone exit from the labour market beyond the standard entitlement age. Some expectations were not fulfilled by the results: once controlled for other observable characteristics, the idea that workers in the public sector retire earlier than those in

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2. An exception is the paper by Agar Brugiavini (1997), "Social Security and Retirement in Italy" NBER Working Paper No. 6155) It is based on the panel of Banca d'Italia and on a sample drawn from the private employees administrative archive of the INPS (Social Security National Institute). Almost all the other empirical works focus on the computation of pension wealth, intergenerational redistribution and the effects of pension reforms on savings, consumption and public finances. An exhaustive reference list is given in Brugiavini (1997).

the private sector was not confirmed, along with the concept of a wider diffusion of pensioners drawing only invalidity benefits in the South of Italy.

5. An example is given in the paper of how this kind of model can be used to simulate the effects of reforms on the behaviour of individuals: on the basis of the replacement rate observed for current pensioners, a replacement rate to current potential pensioners was imputed and the effect of a 10-20% reduction in the replacement rate on the expected retirement age was simulated. The results show that a 20% reduction would cause a delay in retirement of 2-6 months according to the level of the starting replacement rate.

6. The paper is organised as follows. After a brief introduction to the evolution of the Italian pension system, the data set used and the definitions adopted are described. This is followed by descriptive statistics and estimation results of a multinomial logit model. The remaining sections are devoted to the analysis of the retirement time; first non-parametrically, and then by estimating a multiple exits Cox proportional model. Finally, the effect of the replacement ratio on the retirement age is analysed.

2. A brief description of the Italian pension system

7. Until the mid-nineties, the Italian pension system was still characterised by heterogeneity and changing scenarios. Although all citizens were covered by the social security system, eligibility rules for a State pension, contributions to the schemes, and formulas to compute the value of the benefit were not homogeneous across working sectors. After 1992 the overall system began to change. The Amato pension reform in 1992 enforced the principle that the dynamic of the pension burden should be consistent with the growth of the economy and it started to make retirement age and eligibility criteria more restrictive. The following Dini reform in 1995 gave further strength to the process: it changed the rules for retirement pensions³, it started the relevant process of harmonisation across different pension funds, and it introduced the contribution system for new employees.

8. The following overview is aimed at offering a picture of the main characteristics of the system and its ongoing reforms, in particular focusing on the peculiarities of the system which mainly affect retirement behaviour, i.e. retirement age, eligibility rules, replacement ratio, etc. Much of the information reported in the following is drawn from Brugiavini (1997), F.E.E. (1995) and Il Sole 24 Ore (1998)⁴ where more details can be found.

9. All citizens are eligible for a state pension under the social security system. Alternative pension schemes (occupational, industry-wide and private pensions) are rare and only apply to particular groups of workers (e.g. lawyers and journalists). The ongoing reform regulates and encourages the constitution of occupational and industry-wide pension schemes. In theory, since 1993 workers have had the option to make additional voluntary contributions to pension funds and industry-wide pension funds. These are managed by the National Institute for Social Security (INPS), insurance companies, real estate companies

3. In the following we call *old age pensions* those pension benefits paid to workers retired at (or after) the normal retirement age having fulfilled the eligibility rules. By *retirement pensions* we identify those benefits drawn by workers who have met the eligibility criteria before the retirement age. *Early retirement benefits* are those paid to workers before retirement age without having met the standard eligibility criteria.

4. Fédération des Experts Compatibles Européens, 1995, *FEE Survey of Pension and Other Retirement Benefits in EU and non-EU Countries*, London: Routledge.

5. Il Sole 24 Ore (eds.), 1998, *Guida alle pensioni*. Milano: Il Sole 24 Ore.

and societies authorised to deal in securities. Instead of making their contributions to pension funds, employees could pay contributions to private pension schemes managed by insurance companies. The establishment of private pension funds has not materialized due to the lack of rules for their supervision⁵, the high up-front taxation of the collected funds and to the partial non-deductibility of the contributions for the purposes. Nevertheless, the new framework is particularly relevant for employees recruited after April 1993, whose whole amount provided as a leaving-indemnity in the financial statement of the employer will be transferred to occupational funds.

10. Two main schemes within the state pension scheme can be distinguished:

Compulsory pension schemes:

- a) *the compulsory contribution scheme for private sector employees and for self-employed workers* (craftsmen, traders, farmers and share-farmers), whose rates of contributions are determined according to different collective labour agreements;
- b) *the compulsory contribution scheme for state employees*, local government unit employees, public corporation employees, nursery and primary school teachers, process-servers and employees of health institutions.

11. Before 1992 the two schemes differed in many aspects including the retirement age, the possibilities for early retirement, contribution rates and rates of return. This caused problems for the sustainability and the equity of the pension system. The Amato reform (1992) started an important process of harmonisation between the two schemes, which are now slowly converging.

12. *The social pension scheme*: this is a scheme managed by INPS for Italian citizens, resident in Italy, older than 65, who do not reach a threshold income level. The benefit is paid with no penalty in the absence of other incomes, or only partially if some resources are available below the income cut-off⁶.

13. Other social security benefits include:

- a) *survivor benefits*: beneficiaries include the surviving spouse; children younger than 21 if in secondary school and younger than 26 if attending college, or of any age if disabled; and conditional on none of the above being alive, dependent parents or single dependent sisters and brothers. In order to claim the survivor benefit the worker should have contributed at least 15 years to the pension scheme. The benefit paid is a percentage of the benefit the deceased worker would have received at that age.
- b) *disability pensions*: the INPS Administration paid⁷ in 1993 a number of disability pensions or provisions corresponding to approximately 7% of the resident population. It is well known that disability benefits have played the role of unemployment/poverty safety net until 1984, when a law passed by Parliament greatly limited the eligibility and increased frequency and quality of screening. Before 1984 these benefits were granted to workers who proved to be physically unable to carry out their job, with their "earnings ability" reduced by 2/3, who had contributed at least 5 years to the

6. The 1997 Budget Law tried to solve this problem. It also gave the possibility to state employees to use their severance pay fund to contribute to occupational pension funds.

7. The benefit, and the cutoff income for a single person was 4.6 million Lit. in 1995, the income threshold was 19 million Lit. for a couple. 1 USD = 1780 Lit.

8. Therefore excluding disability pensions drawn by public sector employees.

scheme. Benefits were computed in the same way of old age and retirement benefits. In fact there was a strong incentive to claim disability insurance to achieve early retirement. After 1984 the “earnings ability” requirement became much tighter, and benefit claims had to be renewed every three years. The government is currently involved in a massive program of screening of disability benefit claimants: the 1997 Budget Law requested 100,000 random controls in order to check if the health requirements were fulfilled.

14. Before the 1992 Amato reform the “normal” retirement age was 60 for men and 55 for women, and to be entitled to a State pension the worker had to have contributed to the scheme for 15 years. These requirements are changing: the retirement age is gradually increasing to 65 for men and 60 for women and the minimum number of years of contribution will be 20 years in 2002. Prior to the 1992 reform, private and public pension schemes provided the possibility for employees to retire before normal retirement age: a private sector worker could claim public retirement benefits at any age if they had already contributed for 35 years to the scheme. The requirements were much more generous for public sector employees who needed only 20 years of contributions (15 for women). This difference has been modified by the Amato reform by slowly moving the requirements of the public sector in line with those of the private sector⁸. With the 1995 Dini reform, once fully implemented, pensions will be available in both sectors, from the age of 57 onwards if the claimant has contributed for at least 40 years to the fund.

15. Retirement is not mandatory and before the 1992 reform a worker could postpone retirement (up to the age of 65 in the private sector) if this would allow him to complete 40 years of contributions. The 1992 reform encouraged workers to postpone retirement (even if the 40 years of contributions had been completed) by providing a slightly higher return in the benefit computation formula.

16. Pensioners can cumulate benefits and earnings. Before 1994, full benefits could be drawn in the presence of any amount of self-employment earnings; only the basic⁹ benefit due to old age or invalidity could be drawn if employment earnings were present, while retirement benefits and employment earnings were incompatible. Since 1994 also self-employment earnings are taken into account to determine the amount of benefit paid to the pensioner. Let y be self-employment earnings, b the basic pension, and p the full pension benefit the claimant is entitled to, if $y < 0.5(p-b)$ then $b + 0.5(p-b) - y$ is the benefit owed to the pensioner, otherwise they get only b . The same criteria apply for employment earnings and old age and invalidity benefits. Retirement benefits and employment earnings continue to be incompatible.

17. Particular early retirement schemes are offered to employees of industrial enterprises in a state of crisis, which have contributed for 30 years and to employees of enterprises with problems related to downsizing. In these cases compensation payments normally include compensation for the eligible pensionable service benefits forgone by the employee as a result of the reduction in years of service following the enforced redundancy, and compensation for the period of service between early retirement and planned retirement. When an employee decides to retire before retirement age, and they have fulfilled the requirement on years of contribution, they should receive the pension one month after their request.

18. Employers pay contributions to the State pension scheme for their employees, but the pension benefits are paid by the State. Law determined contribution rates to the State pension scheme and both the

9. For public employees with more than 8 years of contribution the minimum number of years moved from 20 to 25 (from 15 to 20 for females), but with penalty on the drawn benefit proportional to the difference between 35 and the actual number of years of contribution. Only for public employees with less than 8 years of contribution did the the threshold jump to 35.

10. See below for the definition of *basic benefit*.

employee and the employer make contributions to the scheme. The tax base for contribution was not capped, while until 1988 earnings entering benefit computation were capped. Since 1988 the constraint is less stringent as a lower rate of return is applied to earnings in excess of a given limit. Until the 1995 Dini reform the Italian pension system was a defined benefit scheme in which pension payments were based on the salary level. The amount of pension paid was determined as follow: $benefit = r \times N \times W$, where r is the rate of return (made homogeneous across sector by the Amato reform, negatively correlated with earnings, from 2% to 0.9% in 1998), N represents the number of years of service (at most 40) and W is the average of the last 5 yearly salaries of the employee (the last year for public employees). The benefit was indexed to salary growth until 1992, afterward is indexed to the rate of price inflation. Since 1992, the number of years to be taken into account in determining pension benefit has gradually increased from 5 to 10, or to all working life for people with less than 15 years of contribution on 1992 in all sectors. The 1995 reform adopted a “contribution based” method of benefit calculation. This only applies to the benefit computation while the financing method is still on a *pay-as-you-go* basis.

19. If the benefit formula delivers a pension level below a given threshold, the benefit itself is set in line with that threshold, the so-called *basic benefit*. Up to 1983 this provision could be applied to more than one pension for the same retiree, while it now affects only one pension for each retiree, leaving the others at their computed level. This supplement, paid to make up at least the basic benefit, is conditional on means testing, where the income tested was the individual claimant’s income till 1992, while after the reform the income of the family is considered.

20. Another key feature of the Italian social security system is the presence of a severance pay fund: a considerable fraction (7-8%) of yearly earnings is earmarked by employers towards an end-of-job one-off payment.

3. The data set

21. The following analysis is based on the 1995 Survey on Income and Wealth of Households (SIWH), a survey which is run every two years by the Bank of Italy¹⁰. It contains detailed information on the current demographic, labour supply, and income variables for a sample of about 8000 households representative of the Italian population.

22. The choice of using the SIWH was dictated by the lack of specific surveys on retirement in Italy and by the limitations of the use of administrative data sets. The Italian pension system is run by different institutes, therefore any sample drawn from a single archive cannot be regarded as representative of the whole labour force. Furthermore, administrative archives contain no information on the family structure and the family labour supply. Finally, it is difficult to predict the possibility of linking different data sources and supplementing this information with a specific survey.

23. As the Bank of Italy survey is not specifically designed to study retirement behaviour, some of the definitions adopted to identify pensioners and their retirement time could be questionable. Some of the relevant information is missing (in particular exit time for the unemployed and housewives). On the

11. Details on the Bank of Italy’s surveys in Brandolini, A. and L. Cannari (1994) “Methodological Appendix: The Bank of Italy’s Survey of Household Income and Wealth”, in Ando, Guiso and Visco (ed.) *Saving and the Accumulation of Wealth, Essays on Italian Household and Government Saving Behaviour* Cambridge (UK): Cambridge University Press; and Banca d’Italia “I bilanci delle famiglie italiane negli anni 1977-1993”, supplements at *Bollettino Statistico* (Norme metodologiche ed informazioni statistiche), various issues.

other hand, it is a representative sample and gives detailed information about the level and relevance of the benefits received by each respondent.

24. Our duration analysis refers to the heads of households and their partners, who retire (because of old age, invalidity or other reasons) after the age of 45 (for women) and 50 (for men), or who are still working. Housewives not receiving any pension benefits are excluded (no information is available either on the time when they left the labour market, or on their previous jobs), as well as pensioners with no labour experience (mainly widows with no labour experience), and the unemployed (there is no information on the transition time).

25. Benefits can be cumulated with earnings: as shown in Table 1, 6.5 per cent of blue-collar workers, 3.3 per cent of white-collar workers and 18.9 per cent of the self-employed aged 45-70 in 1995 received a pension while supplying hours of work. This proportion is particularly high among self-employed males, and not negligible among employees. Note that the SIWH questionnaire does not make a distinction between regular and irregular jobs¹¹, which probably means that a considerable portion of pensioners/employees is occupied in the irregular sector. In the remainder of this paper, people who receive a pension but are still working are considered as active.

26. Obviously, benefits can be cumulated with other benefits: more than 13% of retired persons received benefits from two or more sources in 1995 (Table 2). Looking at Table 3 it is clear that the role played by the widow benefit is to increase the percentage of women receiving benefits from more than one source. It is also important to note that more than 20% of people drawing an invalidity benefit also receive a retirement or old age pension (Table 4).

3.1 *Definitions and caveats*

27. The SIWH does not contain any information on the time the worker left their last job. Therefore, in order to have a duration analysis the **exit time** (from the labour force) must be defined as the time when the pension benefit started to be paid. If the pensioner receives benefits from two or more sources, the following procedure was implemented:

1. If a retirement pension (*pensione di anzianità*) or an old age pension (*pensione di vecchiaia*) is paid, then this determines the exit time.
2. Otherwise the exit time is determined by the first alternative benefit paid (*invalidità, reversibilità, sociale*).

28. It should be noted that there could be some measurement error if there is some delay between the time that the individual leaves the last job and the time they receive the first pension payment, or if the pension is paid to an active person. While no information is available on the first source of measurement error, in the second case, Table 1 gives an idea of the dimension of the problem.

29. Due to data limitations, the following exit routes have been considered: retirement to labour pension (*anzianità* or *vecchiaia*), retirement for invalidity and other pensions.

-
12. Jobs are considered irregular if either the employer and/or the employee do not pay contributions to the pension system. Such jobs are widespread in Italy, and they mainly involve people at the beginning of their working life, older workers whose marginal advantage of further contributions to the pension system is small, and retired workers who are still willing to work.

30. Inactive women with widows' benefits (*pensione di reversibilità*) or social security benefits (*pensione sociale*) are considered only if the pension was not paid at the age of 45 and if they had some work experience during their lives. Within this sub-sample it was assumed they were active in the labour market until the benefit was paid for the first time. There is the possibility that they could have left the labour market earlier, and that even if they were in the labour market at the age of 45, an unemployment spell could have been experienced between the last job and the retirement time, which produces a further measurement error. The real alternative would have been to drop all these women from the sample, introducing a self-selection bias in the sample.

31. Information on the last job is not available for people receiving benefits other than "labour" pensions. This implies that for the multinomial logit model and the duration models, where this exit route is present, we adopted a specification where the characteristics of the jobs are not included. When information on the last (or current job) was exploited, all the "other" pensioners were dropped from the sample.

32. Duration in the state of employment is defined as the age at the time of leaving employment minus 45 for women and 50 for men. Given data availability, exits from employment are considered up to 65 (women) and 70 (for men). Although the demographic variables should refer to the time of retirement, this is not possible with respect to marital status and family size. These variables are recorded at the time of the interview only, and no retrospective information is available. It should also be noticed that information on the labour market status of the partner at the time of the respondent's retirement is available only if the partner is still alive at the time of the interview. Once again, due to different rates of mortality, this problem affects particularly the result on the sub-sample of women.

3.2 *Descriptive statistics*

33. Due to the relevant differences of definition and reliability between male and female sub-samples, all the descriptive and estimation results were presented by gender (see Tables 5 and 6).

34. The sample of 2887 men was composed of 60% of early retired workers or old age pensioners, of 37 per cent of people still working and about 3 per cent of invalidity pensioners (74 respondents). It is worth mentioning that the definition of old age pensioners *vs.* invalidity pensioners relies on the self-definition of the respondent, which means that some of the invalidity pensioners receive an old age pension and *vice versa* (see Tables 3 and 4).

35. As we have already mentioned, when models which exploit information on the last job are estimated, all the "other" pensioners must be dropped from the sample. But given the limited number of people self-defined as invalidity or social security pensioners, and the fact that some of them also receive labour related pensions, the results obtained with these models can be considered as representative for the whole sample of workers.

36. A few other figures are worth considering: the self-employed are under-represented among the retired as they tend to continue to work even after they started to receive pension benefits; the distribution of the retired across cohorts is consistently decreasing with age (with a relevant portion of people working over 60 and 65); and the distribution across sectors reflects the evolution of Italian industries, which witnessed a decline of primary and secondary sectors and a growth of the service sector.

37. It is important to note that in the female sample, the age of retirement is significantly affected by widowers and social pensions. For the female sample the measurement error could be particularly serious, and it justifies spikes in the estimated hazard rates.

4. The multinomial logit model

38. This section presents the results of a multinomial logit model, which analyses the role of socio-economic and demographic characteristics on the retirement age and the destination out of employment, given that the respondent was active when aged 45 for women (50 for men). The details of the estimation results are reported in Appendix 1m for males and Appendix 1f for females.

4.1 Multinomial logit results for men (Appendix 1m)

39. Years of contributions to the pension system positively related with the probability of old age retirement, while it is not monotone if the alternative exit routes are taken into consideration. To be married (at the time of the interview) does not play a role in the case of old age retirement while it does in the case of invalidity, but this result must take into account the spouse labour supply dummy (see the caveats in the previous section). Therefore, the net effect of marital status is positive in the case where the spouse was working and negative if the spouse was still alive and not working at the exit time. The size of the family is negatively correlated to the exit probability: this result might be affected by the timing of the measure, and it reflects the fact that younger households (in the age range considered) are larger. Homeownership and educational attainments have a negative effect on the exit probability. Cohort dummies clearly pick up an age effect.

40. There is debate in Italy on the role of invalidity pensions as a source of income support in the Southern regions. The multinomial logit shows that there is no significant effect on the regional dummies for the probability of moving from employment to disability retirement. This could be the result of three different factors:

1. The number of male recipients of this benefit is too small to have robust results.
2. We have seen that many invalidity pensions are paid to people receiving retirement or old age pensions. All these pensioners are not classified as invalidity pensioners.
3. Some invalidity pensioners are too young or have never had a work experience: in both cases they are not included in the sample.

41. In general, it is important to remember that the focus is on the pensioners, while much of the debate is on the number of benefits paid.

4.2 Multinomial logit results for women (Appendix 1f)

42. The specification adopted for the female sample is slightly different because the years of contribution to the pension system enter only linearly (the second order polynomials proved to be insignificant) and there was only a dummy for upper secondary school and university degrees (no women with university degrees are retired for reasons other than retirement or old age pensions). Here the years of contribution increase the relative risk of being a labour pensioner and decrease the probability of the alternative exit. This could be due to the nature of the alternative exit, which is not strictly related to the

labour experience. Cohort dummies show a non-linear effect, due to the presence of older women still in the work force.

5. Non-parametric estimates of the hazard functions

43. The baseline hazard rate obtained from a Cox model with no covariates was plotted for all the exits and by different exit routes (Appendix 2m and 2f).

44. The overall hazard rate for men has two spikes at age 60 and 65, which was expected given the rules of the pension system. Between the age of 55 and 59 the hazard rate is about 10 per cent for exits toward old age and retirement pensions, it reaches about 40 per cent at 60 and more than 50 per cent at 65. The hazard rate for invalidity or other reasons is extremely low, with a peak of 1 per cent at age 65. It should be noted that there were only 74 respondents in this exit, and therefore the results are not reliable.

45. For women there are three spikes, at ages 55, 60, and 65. Looking at the hazard rate for old age and retirement pensioners, at the age of 55 the hazard rate is about 20 per cent, 30 per cent at age 60 and back to 20 per cent at age 65: all the peaks are well below the highest level of the correspondent male hazard rate. The hazard rate prior to the standard age of retirement at 55 is lower than 5 per cent. These results show that although women could retire earlier from the labour market, they tend to postpone retirement. The hazard rate for the alternative exit route is dominated by the peak at age 65: this result can be driven by the nature of the benefits paid to these pensioners (in particular the social security benefits). Prior to the age of 65 the hazard rate is lower than 5 per cent

6. Parametric estimates (Appendix 3m and 3f)

46. Firstly, results for the Cox proportional hazard model are presented where the two exits are considered, with a specification that does not include the characteristics of the last job. The results basically support the findings of the multinomial logit with a relevant exception: here the cohort dummies show that given all the other characteristics (and in particular, the number of years of contribution to the pension system), younger cohorts tend to leave the labour market earlier.

47. When concentrating on old age and retirement exits it is possible to exploit the information on the last jobs. The results of the previous estimates are confirmed and it also becomes clear that the self-employed retire later. Given all the other characteristics, public servants do not seem to retire earlier than other workers, while workers employed in the manufacturing sectors seem to be those exploiting the retirement pensions the most. The first results might seem to be in contrast with the common belief that public servants retire earlier, but it has to be taken into account that:

1. The exit time is given by the calendar age, not by the years of contribution to the pension system
2. Public servants who retired very early (before the age of 45 for women and 50 for men) are not included in the sample (i.e. "*baby pensioners*" are excluded from the sample).

48. In general, when evaluating on average whether workers of a given sector retire earlier than others, one should be take into account that the characteristics of the workers across industries are not homogeneous. Furthermore, as can be seen from Table 7, in our sample, public sector pensioners have more years of contribution to the pension system (3 years more than the average for men, 6 for women)

while the age at retirement is exactly in line with the overall average. The opposite is true for the primary sector workers; they retired slightly later than other workers, but with a noticeably shorter contribution history.

7. Effects of replacement ratio on hazard rates

49. Although the SIWH is not a survey designed to study retirement behaviour, it contains some useful information to analyse the effects of policy reforms on retirement. In particular, all retired people and old age pensioners were asked to assess the ratio between the first pension benefit received and their last earnings. This ratio, the so-called replacement rate, is a key variable of any defined benefit pension scheme and it is one of the most commonly used policy variables (together with the eligibility terms). In this section the distribution of observed replacement rate is first described; then the replacement rate for people currently working is predicted, and finally the effect of a reduction of 10 points percentage of the replacement rate on the hazard rate is evaluated, i.e. on the probability to retire at given age. At this stage focus was placed on male retirement and the old age hazard rate because no replacement rate is available for people leaving the labour force for other reasons and because the implemented procedure does not guarantee reliable results for women.

50. Replacement rates are mainly determined by years of contribution to the scheme and the sector of employment. This explains why the average female replacement rate is lower than the male replacement rate (see Table 8). Public sector employees enjoy higher replacement rates than other workers, but, as discussed above, they contribute longer to the scheme (see Table 7). As shown in Table 9, the replacement rate increases with educational attainment and decreases with age (i.e. more recently retired workers have higher pensions with respect to their last earnings).

51. To simulate the effects of a reform affecting the replacement rate it was necessary to make some assumptions on the replacement rates of currently active workers. In principle they could be computed on the basis of the full labour history record, but this information is not available in the SIWH. The strategy adopted was to predict the replacement rates of workers on the basis of information on pensioners, i.e. to regress replacement rates on pensioner characteristics observable both for workers and pensioners and then predict the replacement rates for workers. In order to identify the system it is necessary to assume that some of the characteristics determining the replacement do not affect the hazard rate (once controlled for the replacement rate). Here it was assumed that the age at which the respondents began their working life and the combination of occupation and sectors was relevant for the replacement rate, but not for the hazard rate. It should be noted that the use of years of contribution in replacement rate equations is not advisable, because this variable has to be considered endogenous in this framework¹².

52. With the predicted replacement rate in hand, a Cox proportional hazard model was used to determine the effect of a reduction of benefits on retirement probability. Results are reported in Appendix 4: a reduction of 10 per cent of the replacement rate reduces the hazard rate of 4.7 per cent, *ceteris paribus*. In terms of expected retirement age, a 10 per cent reduction shifts the expected age at retirement, on average, from 58.49 to 58.67 years (+2.16 months), and a 20 per cent reduction to 58.85 (+4.3 months). The effects of such reductions are not independent from the starting level of replacement

13. We adopted a LAD regression method, i.e. the predicted replacement rates could be seen as the median replacement rate computed with subgroups defined by the combination of class of age at the beginning of working life, occupation, sector and birth cohort. Estimation results are not reported for sake of brevity and are available upon request.

rates: workers with 80-90 per cent replacement rates would react to a 20 per cent reduction by increasing the expected retirement age from 58.14 to 58.37 years (+2.76 months), while respondents with 90-100 per cent replacement rates would shift from 60.83 to 61.28 (+5.84 months).

8. Conclusions

53. In this paper we use the Bank of Italy Survey on Income and Wealth of Italian Households to study the retirement behaviour of Italian workers. Despite the relevance of the issue for the ongoing reform of the pension system, there is little evidence on this topic produced on the basis of individual microeconomic data. Our results need to be taken with caution given that the used data set is not specifically designed to study retirement behaviour, but they are nevertheless useful to analyse how different groups of workers behave and how they can react differently to policy changes.

54. Estimation of duration models shows that all other things being equal, and in particular years of contribution to the pension scheme, younger generations retire earlier, which implies that the fraction of life spent out of the labour force is increasing both for the increasing length of life and for the decreasing retirement age.

55. A steeper earnings-age profile and a delayed entry into the labour market can be at the origin of the later retirement of the better educated workers, a result that is confirmed by the duration models even after controlling for the occupational and industry variables. It is important to notice how the recent changes of the formula for computing the pension benefit, which in fact reduce the replacement rate in particular for these workers, can hit this group of workers more than others, and how this group of workers is becoming more and more relevant in the work force.

56. Lower replacement rates and higher retirement age characterise the behaviour of self-employed workers, whose entitlement rules and contributions to the pension scheme are one of the issues of the current reform.

57. Women retirement behaviour is particularly difficult to study, given data limitations, but our preliminary results show that although their hazard rate peaks at the retirement age (55) they tend to postpone their exit from the labour force.

58. Not all our results are in line with what it is often considered as common knowledge. In particular there is no evidence that workers in the public sector retire earlier, although their replacement rates are the highest on average¹³. Furthermore, we cannot reject the hypothesis that invalidity or social security benefit have the same relevance in the North as in the South in determining the exit from the labour force.

59. Recent reforms have modified the benefit computation rule, reducing the replacement rates of future pensioners. A tentative evaluation based on the results of the last section would suggest that such reforms might be capable of reducing the financial burden of an increasing number of pensions, but are not likely to be powerful enough to extend labour force participation. More effectively, with regard to this policy goal, would probably be any action affecting the eligibility terms, as a minimum number of years of contribution and/or minimum age at retirement. From this point of view the policy mix adopted by

14. This result is robust to the specification adopted. In particular, even estimating a Cox proportional hazard model on public sector employees and pensioners only the baseline hazard has spikes as those presented in the appendices for all the sample.

Italian governments seems to be appropriate: benefits have been made more closely related to contributions, as well as reduced mainly for those still far from retirement, in a framework capable of producing sensible reductions; eligibility terms are changing for all, and directly affect the retirement age.

60. Further research on retirement behaviour is necessary to better understand how eligibility rules and replacement rates affect retirement age, but due to the nature of these rules a complete working history of each respondent is needed to know his/her pension right exactly. This information could be available only through a specifically designed survey, something which is not currently available. The Bank of Italy survey could be exploited further, relying on some approximation, to study how changes in the combination of the minimum years of contribution to the scheme and the minimum age at retirement can affect the expected retirement age of different groups of workers, something which is already on our research agenda.

Table 1. Men aged 50-70, women aged 45-65 in 1995

	Men		Women		Total	
	%	% with benefit	%	% with benefit	%	% with benefit
Blue collar	11.76	5.67	7.57	7.72	9.53	6.54
White collar	14.54	2.66	12.01	4.10	13.19	3.35
Self-employed	15.73	23.66	7.36	10.04	11.27	18.92
Unemployed	3.55	3.96	1.20	0.00	2.30	2.85
Labour pensioners	49.93	99.65	19.09	99.83	33.50	99.70
Other pensioners	4.49	99.21	9.54	100	7.19	99.77
Housewives	0.00	0.00	43.23	1.42	23.03	1.42
Total	100	59.12	100	31.03	100	44.26

Source: SIWH.

Table 2. Pensioners receiving more than a benefit (% of all pensioners)

	Men	Women	Total
Retirement or old age pensioners	8.88	22.44	14.35
Other pensioners	4.79	13.55	12.16
Total	8.58	19.03	13.85

Source: SIWH.

Table 3. Recipients of retirement or old age pension with other benefits (% of total)

	Men	Women	Total
Invalidity benefit	3.75	2.09	3.07
Widow benefit	1.51	19.44	8.87
Social security benefit	0.09	0.21	0.14
Other benefit	2.92	1.39	2.29

Source: SIWH.

Table 4. **Recipients of invalidity pension with other benefits (% of total recipients)**

	Men	Women	Total
Retirement or old age pension	33.48	10.06	20.26
Widow benefit	0.00	21.47	12.12
Social security benefit	0.43	0.67	0.56
Other benefit	4.78	1.01	2.65

Source: SIWH.

Table 5. **Descriptive statistics: Men**

	Working	Retired	Other	Total
%	37.27	60.17	2.56	2887
Duration (years)	6.51	8.37	6.70	7.64
years of contribution (years)	30.51	32.56	21.98	31.52
Married (at the time of the interview, %)	93.40	88.54	79.73	90.13
family size (at the time of the interview)	3.55	2.68	2.59	3.00
working spouse (spouse alive at the time of the interview %)	29.55	33.85	44.59	32.52
home owner (%)	77.60	64.88	59.45	69.48
lower secondary school (%)	24.25	22.22	16.21	22.82
upper secondary school (%)	25.55	13.64	2.70	17.80
university degree (%)	10.31	4.37	2.70	6.54
born before 1920 (%)	0.37	8.00	10.81	5.23
born in 1920-1924 (%)	1.58	19.06	9.46	12.30
born in 1925-1929 (%)	3.07	26.89	22.97	17.91
born in 1930-1934 (%)	12.17	25.04	27.03	20.30
born in 1935-1939 (%)	32.99	15.26	21.62	22.03
born in 1940-1944 (%)	49.81	5.76	8.11	22.24
North West (%)	19.89	25.85	12.16	23.28
North East (%)	20.72	23.32	18.92	22.24
Centre (%)	21.47	21.13	20.27	21.23
South (%)	28.53	21.19	39.19	24.39
Islands (%)	9.39	8.52	9.46	8.87
white collar (%)	38.47	32.00	--	--
self-employed (%)	34.20	13.18	--	--
agriculture (%)	8.29	11.05	--	10.00
energy, mining and quarrying, manufacturing (%)	22.72	35.23	--	30.45
construction (%)	10.24	10.36	--	10.32
trade (%)	17.41	7.66	--	11.38
transport and communication (%)	4.93	5.64	--	5.37
financial sector (%)	3.91	2.13	--	2.81
other services (%)	6.52	2.59	--	4.09
P.A. (%)	25.98	25.33	--	25.58
Benefit defining the exit time				
Old age or retirement pension		96.66	6.76	
Invalidity benefit		0.17	79.73	
Widower benefit		0.00	0.00	
Social security benefit		0.00	10.81	
Other benefit		3.17	2.70	

Source: SIWH.

Table 6. Descriptive statistics: Women

	Working	Retired	Other	Total
%	37.66	53.31	9.03	2371
Duration (years)	8.51	11.28	11.13	10.23
acontrib (years)	22.54	23.04	10.29	21.70
married (at the time of the interview, %)	74.69	59.17	44.39	63.68
family size (at the time of the interview)	3.08	2.12	1.93	2.47
working spouse (spouse alive at the time of the interview %)	50.16	30.61	22.42	37.24
home owner (%)	73.90	56.72	47.66	62.37
lower secondary school (%)	20.94	12.5	10.74	15.52
upper secondary school (%)	26.42	12.34	5.60	17.04
university degree (%)	11.08	2.93	0.00	5.73
At least upper secondary	37.51	15.26	5.60	22.77
Born before 1910 (%)	0.90	1.82	1.40	1.43
born in 1910-1914 (%)	1.47	7.67	5.61	5.19
born in 1915-1919 (%)	1.90	6.49	8.41	4.93
born in 1920-1924 (%)	3.58	18.83	25.70	13.71
born in 1925-1929 (%)	3.02	22.31	17.76	14.64
born in 1930-1934 (%)	2.69	21.52	16.36	13.96
born in 1935-1939 (%)	14.56	16.69	19.63	16.15
born in 1940-1944 (%)	30.46	3.72	4.21	13.83
born in 1945-1949 (%)	41.32	0.95	0.93	16.15
North West (%)	23.63	28.96	28.70	26.66
North East (%)	22.51	26.82	26.64	25.18
Centre (%)	22.28	20.73	23.36	21.55
South (%)	22.40	17.96	16.36	19.49
Islands (%)	9.18	5.54	7.94	7.13
white collar (%)	40.31	22.54	--	--
self-employed (%)	26.20	18.75	--	--
Agriculture (%)	9.36	23.66	--	17.85
energy, mining and quarrying, manufacturing, construction (%)	16.99	30.93	--	25.27
trade (%)	21.39	12.66	--	16.20
transport and communication (%)	1.04	0.63	--	0.80
financial sector (%)	1.73	0.87	--	1.22
other services (%)	11.56	11.63	--	11.60
P.A. (%)	37.92	19.62	--	27.05
Benefit defining the exit time				
Old age pension		97.86	7.01	
Invalidity pension		0.24	40.19	
Widow benefit		0.08	30.84	
Social security benefit		0.00	19.16	
Other benefit		1.82	2.80	

Source: SIWH

Table 7. Age at retirement and years of contribution by sector

	Men		Women	
	Age at retirement	Years of contribution	Age at retirement	Years of contribution
Agriculture	59.37	26.39	56.75	20.73
Manufacturing	57.14	33.82	55.32	22.62
Construction	58.99	29.51		
Trade	60.05	30.09	57.23	22.60
Transp. and comm.	58.97	33.65	58.00	29.37
Financial sector	59.32	36.05	57.81	28.00
Other services	59.02	29.22	56.75	18.21
Public Sector	58.62	35.29	56.23	29.20
Total	58.37	32.56	56.28	23.04

Source: SIWH.

Table 8. **Replacement rate by years of contribution**

	Men		Women	
	%	Replacement rate	%	Replacement rate
Less than 20	5.96	56.29	32.56	62.73
20-24	6.72	65.84	17.44	64.83
25-29	11.04	68.17	15.20	69.48
30-34	23.45	71.95	16.98	70.61
35-39	38.78	76.42	13.75	75.11
40 or more	14.05	79.13	4.07	74.60
Total	100	74.42	100	68.79

Source: SIWH.

Table 9. Replacement rates %

	Men	Women	Total
Occupation:			
Blue collar	72.76	66.03	70.55
White collar	81.22	74.24	78.92
Self-employed	62.24	66.05	63.49
Education:			
At most primary	71.87	66.07	68.82
Lower secondary	76.25	68.57	74.76
Upper secondary	78.18	75.20	77.07
Tertiary	81.28	77.65	80.16
Industry:			
Primary	63.88	67.35	65.61
Manufacturing	74.56	64.64	71.77
Construction	68.27	74.16	68.52
Trade	63.22	63.45	63.32
Transport	74.98	77.20	75.11
Finance	74.87	80.40	76.01
Other services	66.15	69.30	68.40
Public sector	81.78	74.45	79.27
Birth cohort:			
Before 1915	68.74	67.11	68.07
1915-1919	72.33	68.86	70.90
1920-1924	73.06	67.58	71.29
1925-1929	72.71	69.21	71.70
1930-1934	76.18	68.52	74.01
1935-1939	78.04	67.71	74.28
1940-1944	74.91	77.30	75.60
After 1944	-	69.68	69.68
Total	74.42	68.79	72.50

Source: SIWH.

Appendix

List of variables

ncomp : current family size
married : 1 if currently married
medi : 1 if lower secondary
super : 1 if upper secondary
univ : 1 if university degree
ss : 1 if super or univ
Iarea5_1: North West
Iarea5_2: North East
Iarea5_3: Centre
Iarea5_4: South
Iarea5_5: Islands
Icc_20 : 1 if born before 1920
Icc_25 : 1 if born in 1921-1925
Icc_30 : 1 if born in 1926-1930
Icc_35 : 1 if born in 1931-1935
Icc_40 : 1 if born in 1936-1940
Icc_45 : 1 if born in 1941-1945
Icc_50 : 1 if born in 1946-1950
home : 1 if home owner at the time of the retirement
w12 : 1 if the spouse was working at the time of respondent's retirement.
acontrib : years of contributions paid to the public pension system
white : 1 if white collar in the last job
self: : 1 if self-employed in the last job
Isett_1 : primary
Isett_2 : energy, mining and quarrying, manufacturing
Isett_3 : construction
Isett_4 : trade
Isett_5 : transport and communication
Isett_6 : financial sector
Isett_7 : other services
Isett_8 : P.A.
Quota1 : predicted replacement rate
Icassi_2 : 1 if respondent experienced temporary layoff with benefit for at least one year continuously in his working life (*Cassa integrazione guadagni*)
Idisoc_2: 1 if the respondent experienced at least one unemployment spell lasting 6 or more months during his working life

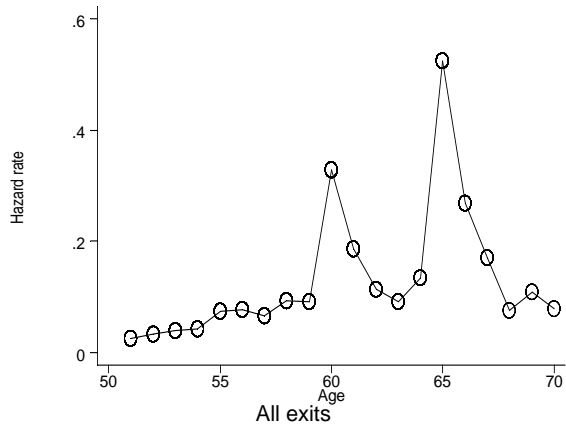
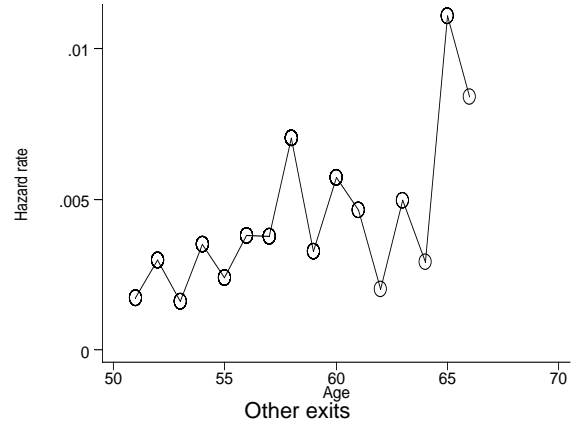
Appendix 1m
Multinomial regression
MEN

	Retired			Other		
	Coef.	Std. Err.		Coef.	Std. Err.	
acontrib	0.003	0.023		0.078	0.040	*
acontri2	0.001	0.000	*	-0.003	0.001	***
married	-0.021	0.209		-0.759	0.416	*
ncomp	-0.220	0.049	***	-0.273	0.126	**
w12	0.331	0.120	***	1.108	0.290	***
home	-0.568	0.123	***	-0.478	0.275	*
medie	-0.194	0.134		-0.405	0.349	
super	-0.782	0.145	***	-2.165	0.736	***
univ	-1.486	0.231	***	-1.888	0.750	**
Icc_25	-0.610	0.574		-1.196	0.775	
Icc_30	-0.876	0.548		-0.738	0.701	
Icc_35	-2.285	0.530	***	-1.629	0.687	**
Icc_40	-3.791	0.529	***	-2.485	0.705	***
Icc_45	-5.052	0.536	***	-3.966	0.779	***
Iarea5_2	-0.373	0.160	**	0.108	0.462	
Iarea5_3	-0.502	0.161	***	-0.073	0.459	
Iarea5_4	-0.766	0.163	***	-0.081	0.426	
Iarea5_5	-0.455	0.215	**	0.087	0.552	
_cons	4.176	0.596	***	2.083	0.839	**
Log Likelihood	=	-1393.01				
Number of obs	=	2887				
chi2(36)	=	1645.18				
Pseudo R2	=	0.3713				

Appendix 1f
 Multinomial regression
 WOMEN

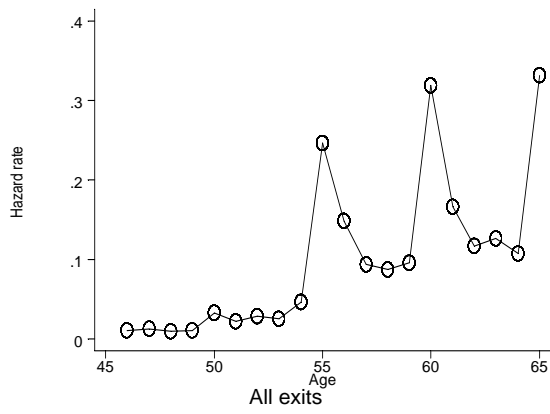
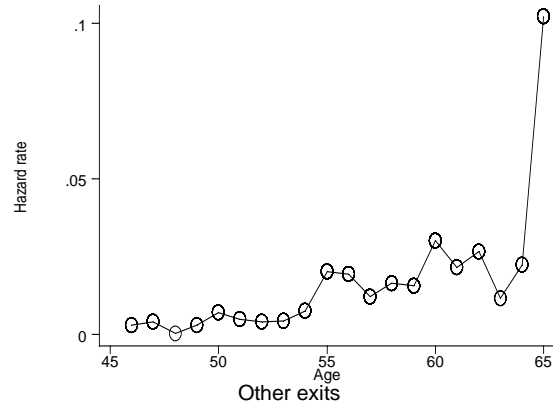
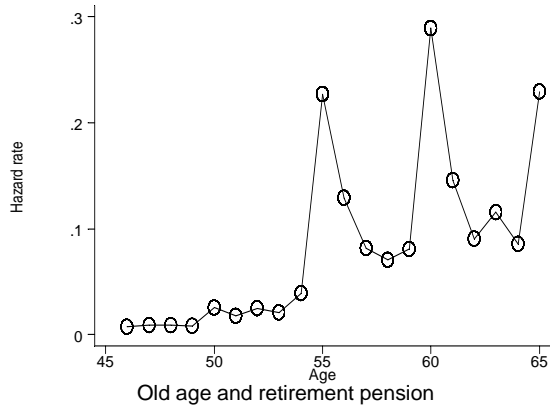
	Retired			Other		
	Coef.	Std. Err.		Coef.	Std. Err.	
acontrib	0.039	0.01	***	-0.075	0.010	***
married	0.432	0.19	**	-0.323	0.270	
ncomp	-0.190	0.07	***	-0.203	0.107	*
w12	0.318	0.17	*	0.398	0.263	
home	-0.185	0.15		-0.276	0.206	
medie	-0.626	0.188	***	-0.804	0.285	***
ss	-0.717	0.174	***	-1.218	0.350	***
Icc_15	0.913	0.520	*	0.956	0.812	
Icc_20	0.534	0.510		1.433	0.790	*
Icc_25	0.854	0.474	*	2.143	0.746	***
Icc_30	1.271	0.484	***	2.275	0.760	***
Icc_35	1.312	0.495	***	2.544	0.773	***
Icc_40	-0.687	0.468		1.371	0.755	*
Icc_45	-2.976	0.489	***	-0.616	0.814	
Icc_50	-4.540	0.551	***	-2.390	1.029	**
Iarea5_2	-0.295	0.191		-0.142	0.268	
Iarea5_3	-0.492	0.195	**	-0.252	0.274	
Iarea5_4	-0.828	0.202	***	-0.805	0.295	***
Iarea5_5	-1.001	0.271	***	-0.436	0.375	
_cons	1.144	0.465	**	0.336	0.738	
Log Likelihood	=	-1283.71				
Number of obs	=	2371				
chi2(38)	=	1796.14				
Pseudo R2	=	0.4116				

Appendix 2m



Italian men hazard rate by exit route

Appendix 2f



Italian women hazard rate by exit route

Appendix 3m. Cox proportional hazard model: males

Multiple destination							Invalidity pensioners and others dropped		
Old age & retirement				Invalidity and other			Old age & retirement		
	Coef.	Std.Err.		Coef.	Std.Err.		Coef.	Std.Err.	
acontrib	0.027	0.009	***	0.074	0.032	**	0.012	0.008	
Acontri2	0.000	0.000		-0.003	0.001	***	0.000	0.000	
Married	0.047	0.074		-0.702	0.381	*	0.048	0.076	
Ncomp	-0.106	0.024	***	-0.155	0.117		-0.113	0.024	***
W12	0.288	0.050	***	0.997	0.274	***	0.329	0.052	***
Home	-0.254	0.050	***	-0.100	0.255		-0.178	0.051	***
Medie	-0.003	0.063		-0.255	0.329		0.003	0.069	
Super	-0.376	0.072	***	-1.815	0.749	**	-0.478	0.091	***
Univ	-0.763	0.098	***	-1.226	0.699	*	-0.936	0.119	***
Icc_25	0.055	0.081		-0.553	0.538		0.046	0.088	
Icc_30	0.149	0.078	*	0.185	0.455		0.192	0.084	**
Icc_35	0.217	0.082	***	0.572	0.476		0.256	0.088	***
Icc_40	0.484	0.101	***	1.155	0.529	**	0.570	0.107	***
Icc_45	0.802	0.181	***	1.172	0.626	*	0.965	0.168	***
Iarea5_2	-0.293	0.069	***	0.254	0.451		-0.174	0.069	**
Iarea5_3	-0.281	0.071	***	0.199	0.439		-0.212	0.071	***
Iarea5_4	-0.498	0.066	***	0.287	0.382		-0.472	0.069	***
Iarea5_5	-0.347	0.091	***	0.284	0.528		-0.256	0.096	***
White							0.107	0.082	
Self							-0.878	0.080	***
Isett_2							0.155	0.081	*
Isett_3							-0.198	0.093	**
Isett_4							-0.452	0.115	***
Isett_5							-0.141	0.114	
Isett_6							-0.084	0.146	
Isett_7							-0.491	0.158	***
Isett_8							-0.212	0.090	**
LnL				-12495.7					-11826.5
# obs.				2887					2811

Appendix 3f. **Cox proportional hazard model: females**

Multiple destination							Invalidity pensioners and others dropped		
Old age & retirement				Invalidity and other			Old age & retirement		
	Coef.	Std.Err.		Coef.	Std.Err.		Coef.	Std.Err.	
acontrib	0.021	0.002	***	-0.076	0.007	***	0.008	0.003	***
Married	0.073	0.072		-0.503	0.203	**	-0.093	0.072	
Ncomp	-0.041	0.033		-0.062	0.082		-0.029	0.034	
W12	0.433	0.067	***	0.506	0.203	**	0.463	0.065	***
Home	-0.165	0.056	***	-0.163	0.149		-0.125	0.054	**
Medie	-0.247	0.077	***	-0.504	0.225	**	-0.124	0.082	
Super	-0.366	0.085	***				-0.232	0.115	**
Univ	-0.499	0.181	***				-0.408	0.212	*
Ss				-0.918	0.302	***			
Icc_15	0.181	0.210		0.453	0.654		0.338	0.236	
Icc_20	0.036	0.215		0.911	0.638		0.336	0.238	
Icc_25	0.184	0.197		1.466	0.603	**	0.420	0.223	*
Icc_30	0.360	0.197	*	1.306	0.607	**	0.520	0.224	**
Icc_35	0.401	0.98	**	1.720	0.609	***	0.620	0.224	***
Icc_40	0.468	0.205	**	2.320	0.612	***	0.692	0.231	***
Icc_45	-0.180	0.264		1.632	0.708	**	-0.105	0.298	
Icc_50	-1.056	0.396	***	0.408	0.927		-1.268	0.420	***
Iarea5_2	-0.187	0.071	***	0.014	0.194		-0.038	0.070	
Iarea5_3	-0.292	0.072	***	-0.035	0.200		-0.239	0.076	***
Iarea5_4	-0.437	0.078	***	-0.344	0.219		-0.363	0.080	***
Iarea5_5	-0.456	0.128	***	0.082	0.292		-0.371	0.133	***
White							-0.018	0.109	
Self							-0.641	0.072	***
Isett_2							0.099	0.074	
Isett_4							-0.289	0.092	***
Isett_5							-0.409	0.256	
Isett_6							-0.208	0.209	
Isett_7							-0.264	0.094	***
Isett_8							-0.381	0.110	***
LnL				-9893.1			-8320.7		
# obs.				2371			2129		

Appendix 4

Cox proportional hazard model:
model with replacement rate

	All exits		
	Coef.	Std. Err.	
married	0.103	0.077	
ncomp	-0.122	0.024	***
Icassi_2	-0.052	0.126	
Idisoc_2	0.157	0.080	*
quota1	0.005	0.003	*
w12	0.307	0.053	***
home	-0.167	0.052	***
medie	0.048	0.071	
super	-0.441	0.093	***
univ	-0.839	0.120	***
white	0.104	0.084	
self	-0.787	0.089	***
Isett_2	0.137	0.090	
Isett_3	-0.213	0.097	**
Isett_4	-0.522	0.122	***
Isett_5	-0.191	0.125	
Isett_6	-0.167	0.159	
Isett_7	-0.526	0.162	***
Isett_8	-0.257	0.102	**
Icc_25	0.046	0.092	
Icc_30	0.231	0.088	***
Icc_35	0.278	0.092	***
Icc_40	0.605	0.110	***
Icc_45	1.122	0.174	***
Iarea5_2	-0.146	0.069	**
Iarea5_3	-0.207	0.072	***
Iarea5_4	-0.462	0.071	***
Iarea5_5	-0.249	0.097	**
Log Likelihood =	-11286.425		

Note: Replacement rate = quota 1.

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