Very preliminary

Pension Reforms and Women at Work[1]

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Abstract

We analyse the effects of pension reforms on labour supply decisions of women by exploiting within country variation in pension wealth across cohorts of women in Italy after the Amato and Dini reforms of the early 1990s. We focus on the retirement decision. We investigate how the response in terms of expected retirement age changes for men and women. Binding constraints relating to eligibility to pensions seem to reduce the responsiveness of women to changes in pension rules. This explains why, contrary to a priori expectations, men are often found to be more reactive than women to changes in pension rules.

Keywords: Pensions, Social Security Wealth and Accrual, gaps in careers.

JEL Classification Codes: J14, J16, J26.

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Introduction

The determinants of female labour force participation decisions have been rather thoroughly investigated both in theory and in empirical work. Surprisingly enough, this rich literature has overlooked the interactions between generosity of pension systems and labour supply. This is quite unfortunate as women' labour supply is often found to exhibit different responsiveness then observed for men to changes in relative prices. The income and wage elasticities of labour supply are generally found to be higher for women than for men and women have longer life expectancies, hence are more likely to experience large variations in incomes when there are changes in rules concerning their own pensions, widower pensions and retirement provisions for their husbands.

Important differences in the working-lives of men and women and on the role of women within the family are likely to impact on women's pension rights and on the related labour supply response. In many studies gender differences are stressed in analyzing responses to reforms or simulated reforms: these range from benefits which are specific of a given group of the population such as mandated maternity benefits (Gruber, 1994) to pension reforms (see for example Gruber and Wise 2004). An obvious point made in the literature is that women usually end up (in all countries) with less retirement income than men. A promising strand of research has started looking at the risk-return implications of gender differences in the age profile of labour income and its implications for resources in retirement (Baxter, 2001): a preliminary conclusion is that women should adopt a different strategy from men in accumulating resources for retirement. A crucial role in determining expected social security benefits is played by the stochastic features of the earnings profile, particularly by gaps in the working life of women. Interruptions in working life has been studied extensively in the literature (Mincer and Ofek, 1980; Mincer and Polachek, 1974; van der Klaauw, 1996), but this literature stresses the causes and the direct costs of interruptions rather that the long term consequences. We argue that on top of these "traditional" costs there are important costs related to future pension provisions: interruptions imply that in some cases women, after a given age, cannot even "catch up" when it comes to pensions as they do not have enough paid working years (Clare 2004). Thus, although unconstrained choices of women would involve a stronger responsiveness to the incentives embedded in pension systems, their choices are actually constrained by career gaps and minimum contribution requirements.

The purpose of this paper is to shed some light on the labour supply response of women to changes in pension rights by exploiting within country variation in pension wealth across cohorts of women in Italy after the Amato and Dini reforms of the early 1990s. The latter reform introduced a "Notionally Defined Contribution" (NDC) method for calculating pension benefits, tightly (and transparently) linking pension claims to the accrued contributions of the worker. The NDC system mimics a capitalized pension scheme, with a significantly lower tax component than the previous Defined-Benefits (DB) system (see table A1). Thus, looking at participation decisions for women around the time of these reforms and across the age (and seniority contribution) thresholds can offer valuable insights as to the effects of pension rules on women labour supply.

Ideally one would like to follow not only the retirement decisions, but also the decision as to the timing of entry (or re-entry) in the labour market. In order to capture cohort differences in education levels, participation and career profiles -- which are particularly relevant in the case of women -- we rely on micro-level data. Unfortunately, there is not a unique dataset capturing all

the dimensions we are interested in. The only data set available in Italy which contains detailed information on different dimensions of the life cycle of households is the Bank of Italy survey (Survey on Household Income and Wealth, SHIW).

The plan of the paper is as follows.

Section one provides a simple framework for empirical analysis of retirement decisions of women under different pension rules.

Section two documents the variability in attachment to the labour market at older ages for Italian men and women showing that women typically exit the labour market earlier than men. Obviously health conditions and household arrangements may also affect the timing of retirement, but previous work (Gruber and Wise, 1999; Brugiavini and Peracchi, 2004) suggests that eligibility rules and economic incentives embedded in social security systems are indeed a main determinant of the timing of exit from the labour force in Italy.

Section three dwells on retirement decisions. It shows that workers are affected in their retirement choice by their expectations about future social security arrangements and by the accrued value of their social security (pension) benefits. Because women have typically shorter working lives (gaps in career), their labour supply behaviour at older ages appears to be particularly sensitive to measures of interruptions.

1. An empirical framework

Retirement decisions are the result of a complex lifetime decision model.. In this paper we focus on the decision to retire and abstract from private saving decisions or other dynamic choices. While we could argue that marital status decisions and fertility decisions, which are obviously relevant for the labor supply of women (see for example van der Klaaw, 1996) have already taken place when planning about retirement, abstracting from private saving and insurance decisions is a more heroic assumption. Indeed important work has been carried out on the interaction of the retirement decision with consumption-saving decisions and with other insurance decisions, such as medical insurance (see Gustman and Steinmeier, 1994, Gruber, 1998, Rust and Phelan 1997; Attanasio, Low, and Sanchez-Marcos, 2004). However this approach would require a fully detailed dynamic programming model and a very rich data set following individuals and households for a sufficiently long time. Furthermore, for Italian workers we can safely assume that other insurances are in place which do not require to fully investigate the interaction with health risks etc.. Hence, for the time being, we will focus the attention on the determinants of the retirement decision.

Our empirical framework relies on the "option value" model introduced by Stock and Wise (1990). The key feature of the model is that, when deciding on whether or not to retire, a worker compares the expected value of retiring immediately with the expected value of continuing to work.

The crucial variable in this setup is the social security wealth (SSW). For a worker of age a, , in case of retirement at age $h \geq a$, this is defined as the expected present value of future pension benefits (see Appendix 3 for details)

$$SSW_h = \sum_{s=h+1}^{S} \rho_s B_s(h)$$

Here *S* is the age of certain death, $\rho_s = \beta^{s-a}\pi_s$, with β denoting the pure time discount factor and π_s the conditional survival probability at age *s* for an individual alive at age *a*, and $B_s(h)$ the pension expected at age $s \geq h+1$ in case of retirement at age *h*.
Social security wealth is a static stock measure, a "sufficient statistic" for the entire social security benefit stream, including eligibility rules and benefit computation rules. The decision to retire is intrinsically dynamic, as clearly explained by the "option value" model. In this case the individual takes into account the value of future human capital (for given wage) and the social security rules in place. In two contributions Gruber and Wise (1999 and 2004) have suggested a framework to implement a tractable version of the option value model. This is focused on the role of incentives at the individual level and it requires micro data for workers observed at different ages. It should be mentioned that in this paper we draw heavily on Gruber and Wise (2004) as well as Brugiavini and Peracchi (2004).

For a worker of age ***a***, who decides to work until age ***r*** > ***a***, expects to earn ***Ws*** in each year ***s*** until retirement and then to receive a pension equal to $\boldsymbol{B_r(s)}$ until the age of death ***S***. The pension benefit depends on the retirement age ***r***, past work history and the pension rules. To simplify algebra (without unduly forcing reality) it is assumed that hours of work before retirement are fixed, after retirement the individual does not work at all and when deciding on whether or not to retire at age ***r***, the worker evaluates the indirect utility of the stream of future income as follows

(1) $$V_a(r) = \sum_{s=a}^{r-1} \beta^{s-a} U_1(W_s) + \sum_{s=r}^{S} \beta^{s-a} U_2(B_s(r))$$

where β is the discount factor, $U_1(W)$ is the indirect utility of future earnings and $U_2(B)$ is the indirect utility of future pension benefits. Evaluated at age ***a***, the gain of postponing retirement until age ***r*** > ***a*** is given by

(2) $$\boldsymbol{G_a(r) = E_a[V_a(r)] - E_a[V_a(a)]}$$

where $\boldsymbol{E_a}$ denotes the expectation operator based on the information available up to age ***a***. .

The probability that a worker retires at age ***a*** is

(3) $$\boldsymbol{P(a) = \Pr\{G_a(r^*) \leq 0\}}$$

Wher $\boldsymbol{r^* = argmax_r\ G_a(r)}$ subject to $T_m \geq r \geq \alpha$ is the age at which the gain of postponing retirement is highest As retirement is irreversible and there is uncertainty about future earnings and pension benefits, there is an option value of waiting given by

(4) $$E_a[V_a(r^*)] - E_a[V_a(a)]$$

However most implementations of this model do not need to fully work out the option value. A valid proxy for this measure is an incentive variable, like the *social security accrual* (SSA). The SSA is defined as the difference in SSW between retirement at age $a+1$
and retirement at age a:

$$\mathrm{SSA}_a = \mathrm{SSW}_{a+1} - \mathrm{SSW}_a = \sum_{s=a+2}^{S} \rho_s [B_s(a+1) - B_s(a)] - \rho_{a+1} B_{a+1}(a).$$

The SSA is positive if the expected present value of the increment in the flow of pension benefits is

greater than the expected present value of the pension benefit foregone by postponing retirement. If the increments $B_s(a+1) - B_s(a)$ are small, as it is usually the case, then the SSA is negative.

1.2. Effects of pension wealth on the retirement decisions

Social Security plays essentially a twofold role in the decision as to whether to retire this year or continue working. The first is through its traditional *wealth and substitution effects*: higher social security wealth (SSW) induces individuals to consume more of all goods, including leisure, and to retire earlier. The second is more intrinsically dynamic and is captured by its *accrual effect*: the individual's decision to continue to work is a function of the increase in retirement consumption resulting from additional work. Following this discussion, a typical retirement model would use both Social Security Wealth (SSW) and an incentive variable (SSA described above) in a regressions of the planned (or actual) retirement.

In particular, SSW is the expected PDV of SS benefits that is available to the person if she retires that year (t); SSA is the incentive measures noted above (accrual). A vector of control variables that may importantly influence the retirement decision but do not enter directly into the calculation of SSW (education, region of residence, industry dummies, occupation dummies, marital status) are normally included. When the dependent variable is dichotomous, the model is normally estimated as a probit.

In this paper we also address differently the decision of the worker, namely we model changes in expected retirement age (see also Jappelli, Padula and Bottazzi, 2003). This requires that the worker forms expectations on her future social security wealth and decides her retirement age both on the basis of knowledge of eligibility rules and on the basis of the maximum option value of retirement. Hence what is relevant to us is not just the change in social security wealth between today and tomorrow, based on the idea that the worker who is "at risk" of retirement evaluates today whether to work en extra year, but rather the expected change between social security wealth at the first eligibility age and the expected retirement age, both discounted at the current age.
As individuals change their expected retirement ages (say they plan to work more and plan to post-pone retirement) their future path of social security benefits should also be changed. We refer to the PDV of future social security wealth corresponding to a future age, which is also chosen as a retirement age, as the "subjective peak value" for the worker. Note that this might not always correspond to the actual *ex post* maximum social security wealth ("objective peak value") for the entire age profile of the individual[2].

As it will become clear in the actual application, we exploit the panel nature of the data only as a rotating panel and in this sense it is reasonable to assume that the future optimal retirement age is a "moving target" and not a once-for-all decision. This is also the intuition behind the option-value model of retirement which, in its reduced form adopted in this paper, allows for re-planning at each age.

We make use of this particular incentive variable (SSP=SSW-Peak Value) both in an Order Probit Regression and in a standard linear regression analysis. The nature of this incentive variable is similar to the one of SSA.
Normally one would expect a positive impact of Social Security wealth and a negative effect of the incentive variable on retirement (because of the accrual effect). In other words an increase in SSW between two adjacent years would induce workers to continue work, while a reduction (a negative

[2] See Gruber and Wise 1999 for a formal definition of "peak value". The peak value is a global maximum, while we take local maxima, each corresponding to a future retirement age.

accrual) would induce the worker to retire. Because changes to SSW are usually quite small and take place gradually, one can hardly obtain sensitivity of actual choices to the accrual variable SSA. However, thanks to the recent pension reforms in Italy, we are in a position to include in our estimates relevant changes in SSW. More to the point this changes have been particularly relevant from some groups in the population (see Attanasio and Brugiavini, 2003), especially those "middle age" workers who had been treated generously before 1995.

It is well known that women in Italy (particularly in the public sector) had an advantage over men workers as they could retire very early with no actuarial penalty. The 1995 reform levels out these differences and the differential impact on groups of workers should allow us to better capture empirically the response in terms of labour supply. Both the reduction in the level of SSW and the fact that there is a need to complete one's career (a steeper SSA), should induce women to postpone retirement more than men, on average.

2. Assessing Social Security Wealth under different Pension Regimes

In this Section we document how changes in pension regimes have affected social security wealth of men and women. The effects depend crucially on the earnings profiles of individuals and on the following three elements:

(a) cohort differences
(b) variability in educational levels
(c) variability in the length of working careers (and gaps in careers).

As we wish to capture as much as possible elements of variability, we cannot rely on mean or median earnings profiles. The SHIW sample has several advantages in this respect: it is a cross-sectional sample of large sample size and covers several years (1978 to 2002), though it has been run every two years. It records current occupation and past occupation: a large fraction of workers in Italy, particularly women, is either employed in the public sector or is engaged in self-employment activities and it is important to take account of sectoral variability in pension arrangements because workers in different sectors have been treated differently under the different pensions regimes. Finally SHIW has a small panel component (rotating panel) that can be used to study actual transitions from work to retirement.

Table 1
Composition of the SHIW sample

	1991	**1995**	**1998**	**2000**	**2002**
Men					
Worker	47%	44%	44%	45%	44%
Retired	17%	20%	19%	22%	25%
Women					
Worker	24%	25%	26%	26%	27%
retired	12%	14%	12%	13%	16%

Table 1 provides a brief description of the SHIW data available for workers and retired individuals (we neglected other conditions such as disability or the fact of being housewives). Table 2 clearly shows that a larger percentage of individuals who are currently active or have been active in the past are men. This result is largely dominated by the labour market behaviour of older cohorts as there is a non negligible decline over time in the percentage of working men and an increase in the percentage of working women.

2.1. Working life and pension claims

A crucial feature of many pension systems is the design of pension benefits: in most European countries this is of the defined benefit (DB) variety and it is related to some average of lifetime earnings. An extreme version of this is a final salary computation method: this was basically adopted in Italy until the 1992 pension reform as well as during the transitional phase which Italy is going through. In particular in until 1992 the pension benefit was based on the average of the last five years earnings, during the transitional phase these became the last 10 years earnings (see Table A1 for details). The 1995 Pension reform changes radically this system as benefit should be computed according to a Notionally Defined Contribution (NDC) method. In the latter case pension benefits are automatically linked to the an average of lifetime earnings, adjusted by some actuarial coefficients (see Table A1).

While this reform is normally regarded as a move towards a more actuarially fair system, it is still debated who might gain or lose from such a change. In particular it is not clear how workers with gaps in their careers would fare under the new regime as very little is known on the length of working life and how recent trends of shorter working careers are impacting on pension provisions (see also Brugiavini and Peracchi 2004). In order to provide some preliminary evidence in this respect, we investigated the SHIW sample for the 2002 wave, and whenever appropriate for previous waves (see Appendix for description of the SHIW data).

2.2. Working women and Gaps in Working Life

In our data set we have access to both a cross-sectional sample of approximately 8000-12000 households per year and a smaller rotating panel (approximately 3000 households per year). However the information relevant to us is not available in each year of the sample[3] and much of the relevant information is retrospective, such as the age at which a worker entered the labour market or the age at which a retiree left the labour market. Despite these caveats the SHIW data seem rich enough to reveal some important behavioural pattern.

We first characterize the number of "gap-years" in the working careers of individuals in our sample. This is done through a simple "imputation" method, by distinguishing retirees from workers. In fact, for the former group we make use of retrospective information on three items:

- the age that the respondent reported as age entering the labour market
- the self-reported age of retirement
- the self-reported number of years of contributions

From this information we can compute the difference between years in which the retiree was potentially active and years when he was out of the labour force. This is a very noisy measure both because the Respondent can have a vague recollection (especially if far in the past) of the events and because the number of years of contributions may not coincide with the "gap-years". However, to us it is not relevant to look at the actual number of gap-years, but rather to make a comparison between men and women of different age groups.

We distinguish also education levels (low education is no education or elementary, medium is lower secondary and upper secondary, high is college and above). Obviously the bulk of the distribution for these people is for the ages 55 to 85.

[3] In particular years of contributions are recorded only starting in 1993.

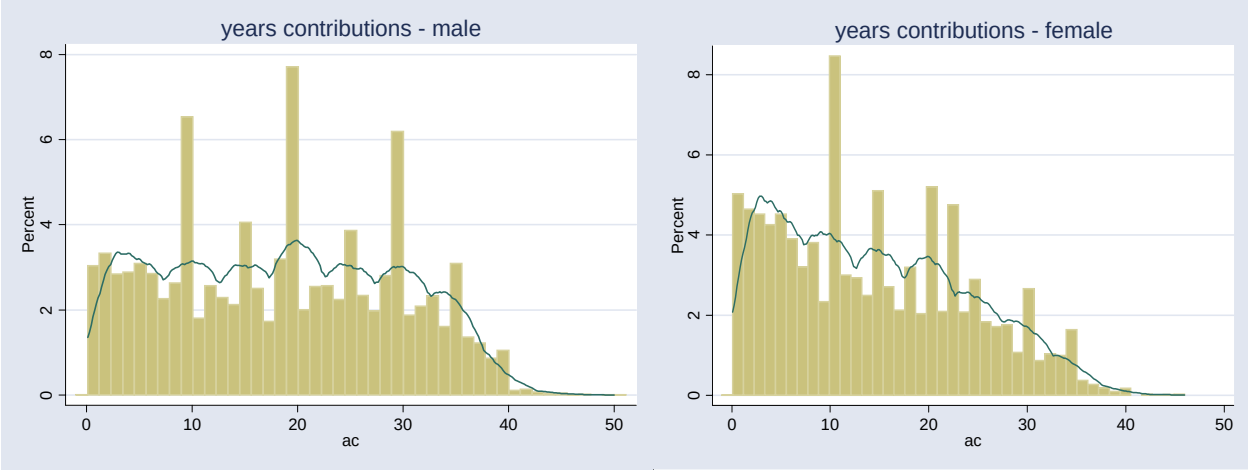
Table 2 shows the average number of "gap-years" for retired individuals distinguishing also educational levels: for retired individuals, women have a systematically higher number of interruptions[4]. However for low educational levels the difference between men and women is not so sharp.

Table 2
Average number of gap years per retired individual by educational attainment

	Male			Female		
education	*low*	*Medium*	*High*	*low*	*medium*	*High*
Age						
<50	1.35	0.38	0	1.87	1.43	1.36
50-55	2.61	1.34	0	3.38	2.02	0.89
56-60	3.87	2.01	0.6	10.8	5.44	0.79
61-65	7.72	3.16	1.51	13.19	8.11	0.79
66-70	9.79	5.74	1.34	13.57	7.25	2.36
71-75	11.05	5.56	1.95	13.31	7.11	3.33
>75	11.67	6.21	2.07	14.55	7.47	2.25

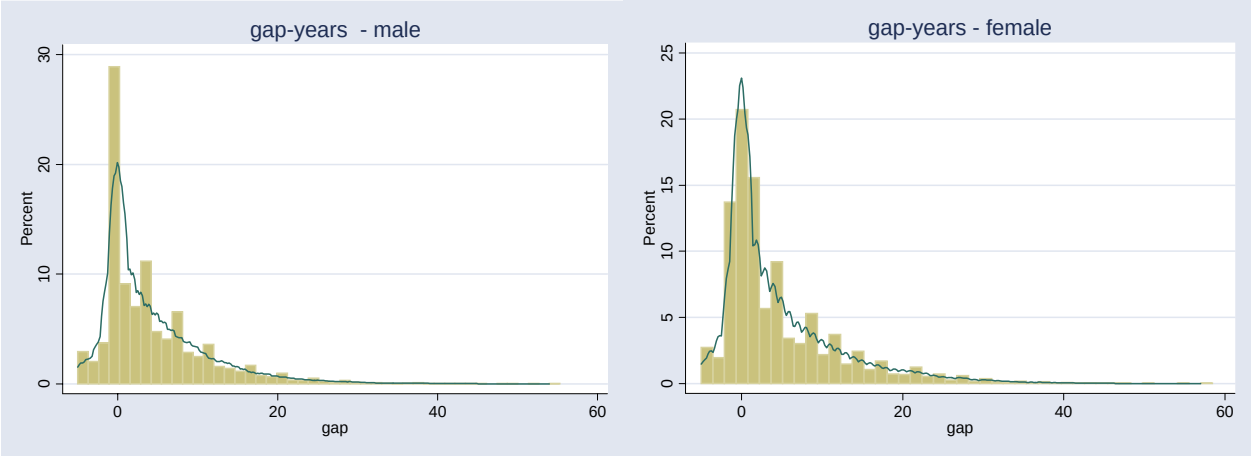
To complete the analysis we show the same calculation for people who are still working, hence accruing pension rights. These observations are right-censored as far as potential labour market experience and years of contributions are concerned.

Figure 1



[4] We do not know precisely when these gaps too place, they could be at the beginning of the working life, because although the woman worked she did not pay contributions or actual interruptions.

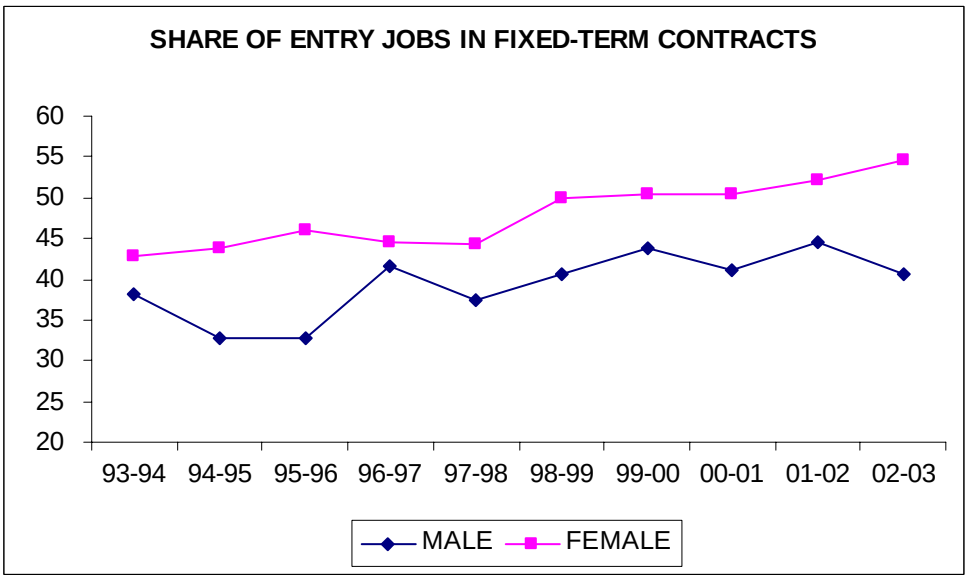
Figure 2



Figures 1 and 2 show the percentage distribution (with a kernel density) of contributions and gap-years: for female contributions are more concentrated at the lower end and also the percentage of gap-years is more concentrated on the positive values. The breakdown of gap years by cohort and sector confirms that gap-years are higher for female workers, and years of contributions are lower on average for women than for men. Gap-years are also higher for the self-employed than for the employees, however this pattern does not seem to be affected by gender-composition.

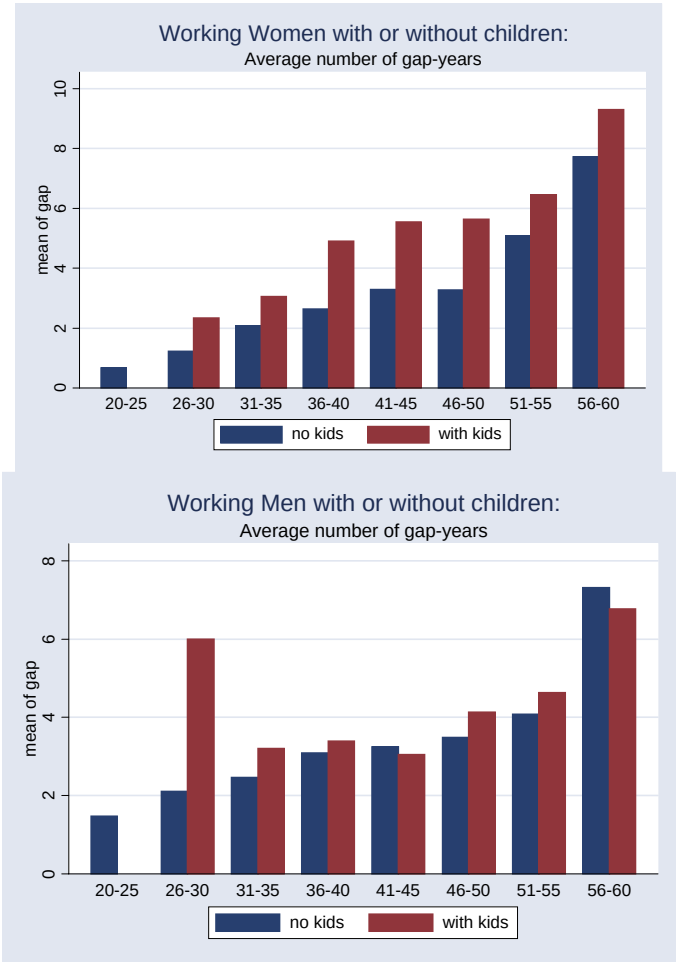
It should be stressed that breaks in career are becoming even more frequent, notably for women, after the labour market reforms of the 1990s. As shown by Figure 3, which is based on April-to-April labour market transitions as estimated on the basis of the Italian Labour Force Survey, fixed-term contracts became recently the main port of entry into the labour market for women, much more than in the case of men.

Figure 3



This evidence does not provide direct insight into what caused these gaps in the working lives of individuals. One possibility is that working women report mandated (or voluntary) maternity interruptions as lack of contributions. This is not totally correct in terms of the legislation concerning the protection of maternity leave, as in Italy mandated maternity interruption are fully counted as actual contributions since the year 1971: they are accounted for both in terms of benefit calculation and in terms of eligibility conditions. However for the purpose of this paper this evidence is quite useful because these gaps clearly give rise to forgone returns to experience (Olivetti, 2005; Attanasio et. al 2004). To investigate this further we look at correlation of the labour market variables with the presence and the number of children[5]

Figure 4



[5] It should be stressed that at the moment we can only record the number of children leaving in the household and therefore there could be an important bias for older workers.

Figure 5

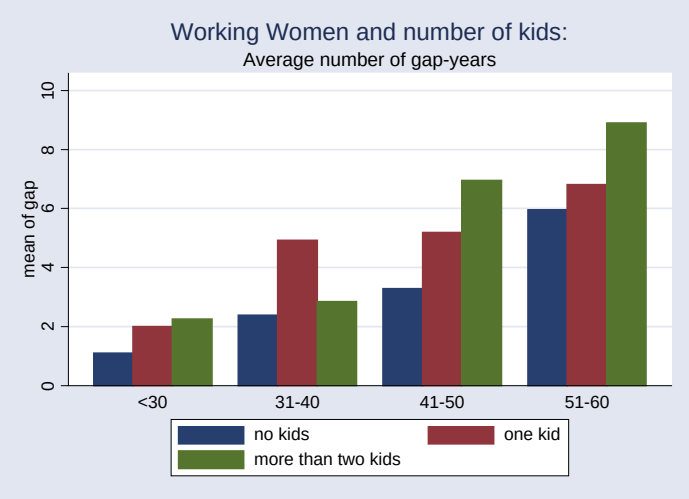
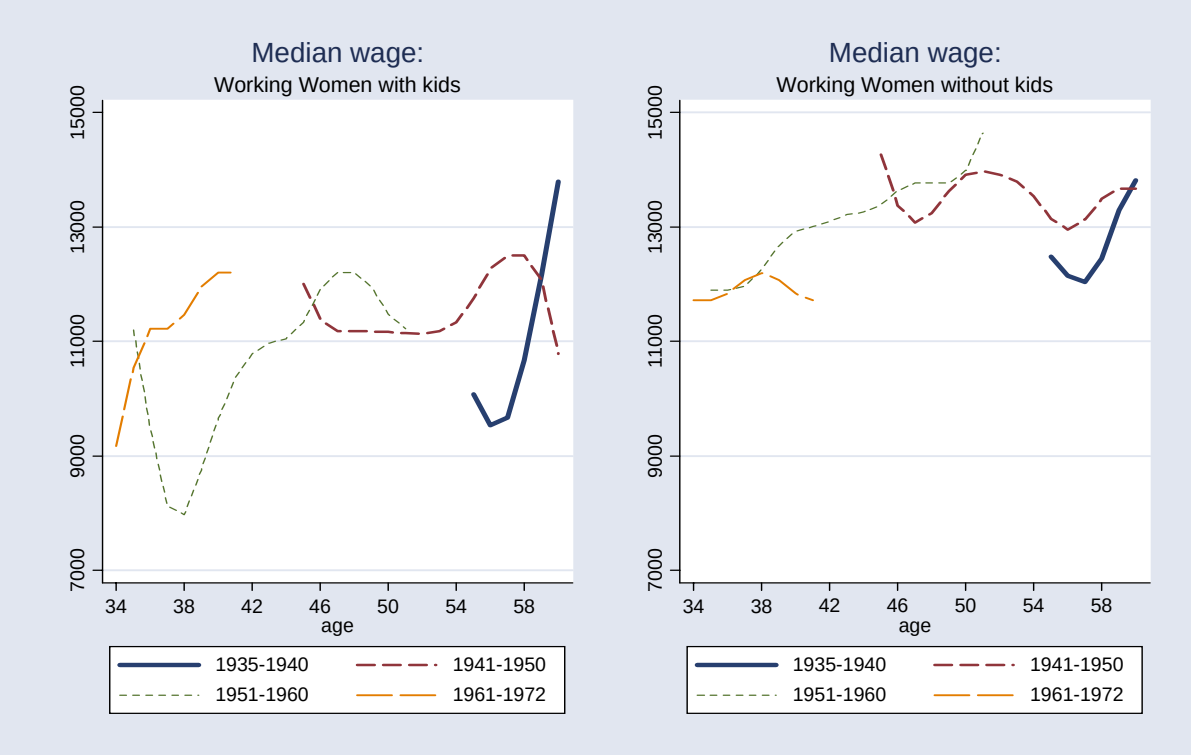


Figure 4 shows that women with children report a systematically higher number of gaps than women without children (and it seems as the difference is not so marked for men). Also, an higher number of children is related, at any age, with a higher number of interruptions in career (Figure 5).

Figure 6



Wages are typically higher for women without children (also controlling for age and cohort) than for women with children, while for men the patterns are quite similar (Figures 6 and 7). Finally women with children have a very unstable pattern in working hours over the life cycle (Figure 8).

Figure 7

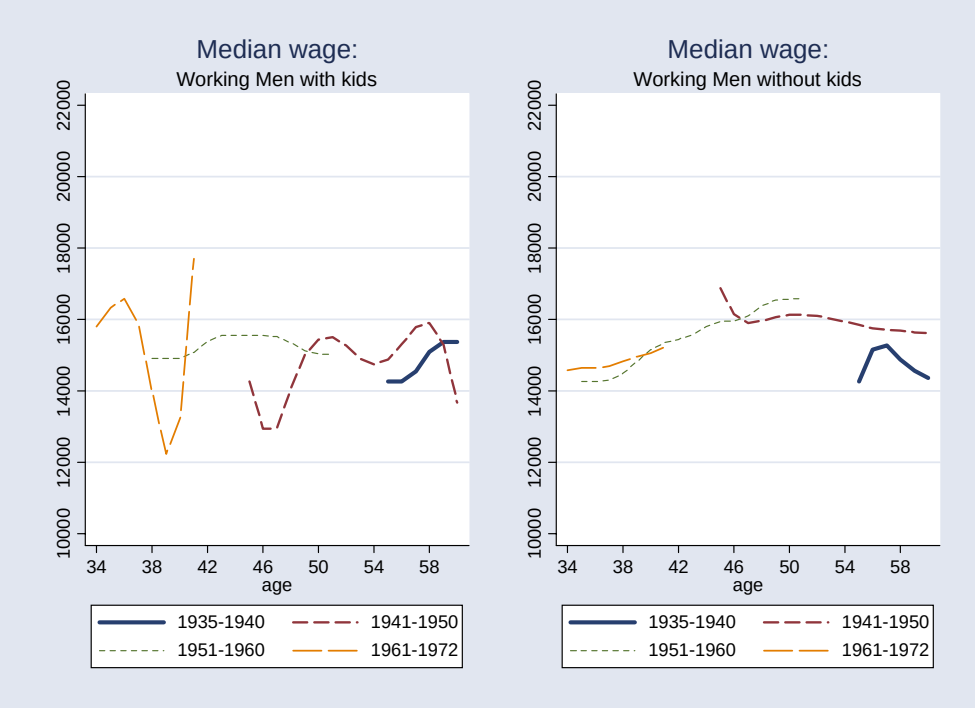
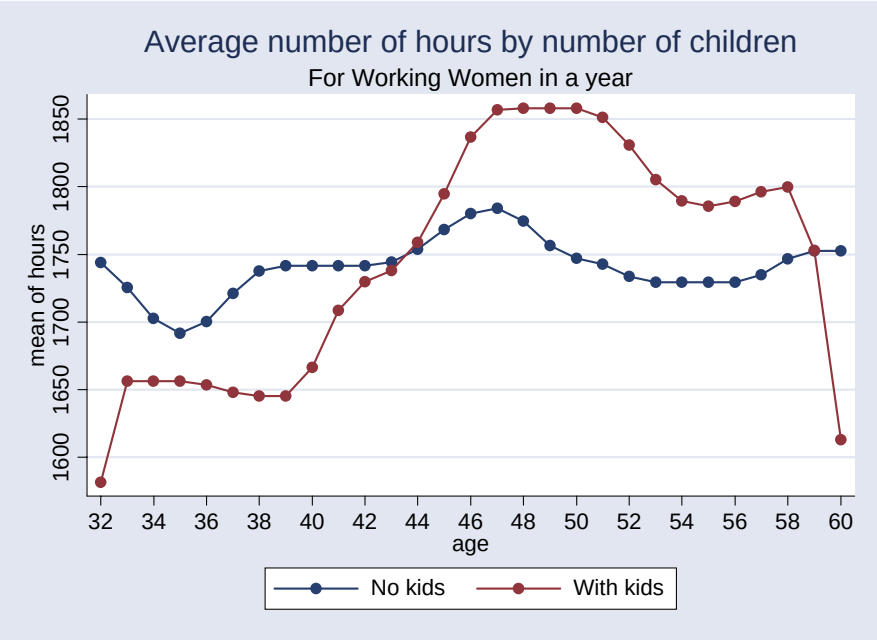


Figure 8



By and large the SHIW data suggest that, although Italian women might have preserved contributions and pension rights thanks to the generous maternity-leave legislation, important differences in earnings and labour market behaviour emerge which point to the importance of reduced returns to experience due to gaps in career.

3. Effects on Retirement Decisions

The evidence presented in Section 2 suggests that it is worth investigating the different labour supply decision of women comparatively with the behaviour of men. As we argued in this paper we do not try to provide an explanation for these differences in labour market behaviour, such as the "time cost of children" (Hotz and Miller, 1988; van der Klaaw, 1996; Attanasio et al. 2004), rather we look at the likely effects on retirement decisions and the potential rigidities resulting from the retirement legislation.
As documented above, women have a significantly larger number of "gap years" than men. Before resorting to imputed social security wealth and accrual rates we want to investigate the role of self-reported contribution years in a simple descriptive framework. In order to take this into account in our econometric analyses, we computed the ratio between self-reported years of contributions and potential labour market experience or the completed contributions (**CC).**. For retirees the denominator is the working life obtained as the difference between retirement age and the age of entry into the labour market, i.e., the complement to the "gaps in career". For workers this is given by the difference between current age and age at entry. The gender gap in the mean values of this index is self-evident in the case of retirees: 0,76 for women compared with 0,85 for men. Gender differences in CC among working (right-censored) individuals are much less marked (0,85 for women compared with 0,86 for men).

A simple probit analysis of the probability of being retired (1) or working (0) shows the effect of this index along with other socio-economic variables: in particular gender and education (Table 3).

Table 3 Probit analysis for actual retirement

	Coef.	Std. Err.	z
age	.219306	.0049885	43.96
female	1.828979	.2394776	7.64
married	.2836008	.0695878	4.08
medu	-.4062847	.0574843	-7.07
hedu	-1.259138	.1037002	-12.14
priv	.0071146	.0620402	0.11
self	-.8973826	.0772006	-11.62
CC	**3.045338**	**.2183789**	**13.95**
CC*woman	**-1.72607**	**.2712938**	**-6.36**
const	-15.26231	.4156669	-36.72

Pseudo R2	=	0.7837
Number of obs	=	11550

The probit results suggest that the probability of being retired increases, as one would expect, with age. Women and people with low or no education are also more likely to be retired. Turning to the variables of interest: the higher the number completed contributions years (CC) the higher the probability of being retired, controlling for age, and this is more important for women than for men (CC interacted with gender). This may be because for many women additional years of contribution do not yield the seniority required for retirement. It should be stressed that current female workers are even more likely to be negatively affected by gaps in career due to the introduction of the Notionally Defined Contribution system.

However this evidence is affected by a number of problems: it is entirely based on current and retrospective information (hence it does not exploit the forward-looking information contained in

SHIW) and it does not fully take account of the recent reforms, which have affected mostly younger workers (who clearly are not currently at risk of retirement).

In order to capture the effects of the 1995 reform it is important to focus on younger cohorts, who are to a larger extent affected by the new rules[6]. The SHIW sample contains (not for all years) questions on expectations concerning retirement. Workers are asked what is the expected retirement age and what is the expected replacement rate. Table 4 below displays mean values of these expectations for the waves reporting this information. We distinguish three relevant groups according to seniority: this is relevant to assess the extent to which a worker is "under the new regime" or not (see appendix).
1) *senior*: workers with more than 18 years contributions in 1995, hence fully exempted from the Dini reform;
2) *mid-seniority*: workers with less than 18 years contributions in 1995, who already worked in 1995, who moved only pro-quota to the new regime;
3) *junior*: people starting to work after1996, hence entirely under the new regime.

Table 4

**AVERAGE EXPECTED RETIREMENT AGE,
BY YEAR, SEX, SECTOR OF ACTIVITY AND SENIORITY**

Men								
		1989	*1991*	*1993*	*1995*	*1998*	*2000*	*2002*
private employees	*Senior*	**60.12**	**59.97**	**58.72**	**58.7**	**60.06**	**60.61**	**60.95**
	mid	**60.06**	**60.86**	**60.52**	**61.44**	**62.04**	**62.41**	**62.87**
	junior	**-**	**-**	**-**	**-**	**62.69**	**63.2**	**63.32**
public employees	*senior*	**60.34**	**60.59**	**59.61**	**59.54**	**60.43**	**61.15**	**61.09**
	mid	**60.37**	**60.92**	**61.07**	**61.48**	**62.33**	**62.37**	**62.85**
	junior	**-**	**-**	**-**	**-**	**63.09**	**63.93**	**63.96**
self-employed	*senior*	**62.2**	**62.46**	**62.13**	**60.58**	**63.62**	**63.61**	**63.72**
	mid	**61.15**	**61.64**	**62.05**	**62.7**	**63.65**	**64.2**	**64.11**
	junior	**-**	**-**	**-**	**-**	**64.28**	**64.51**	**64.78**

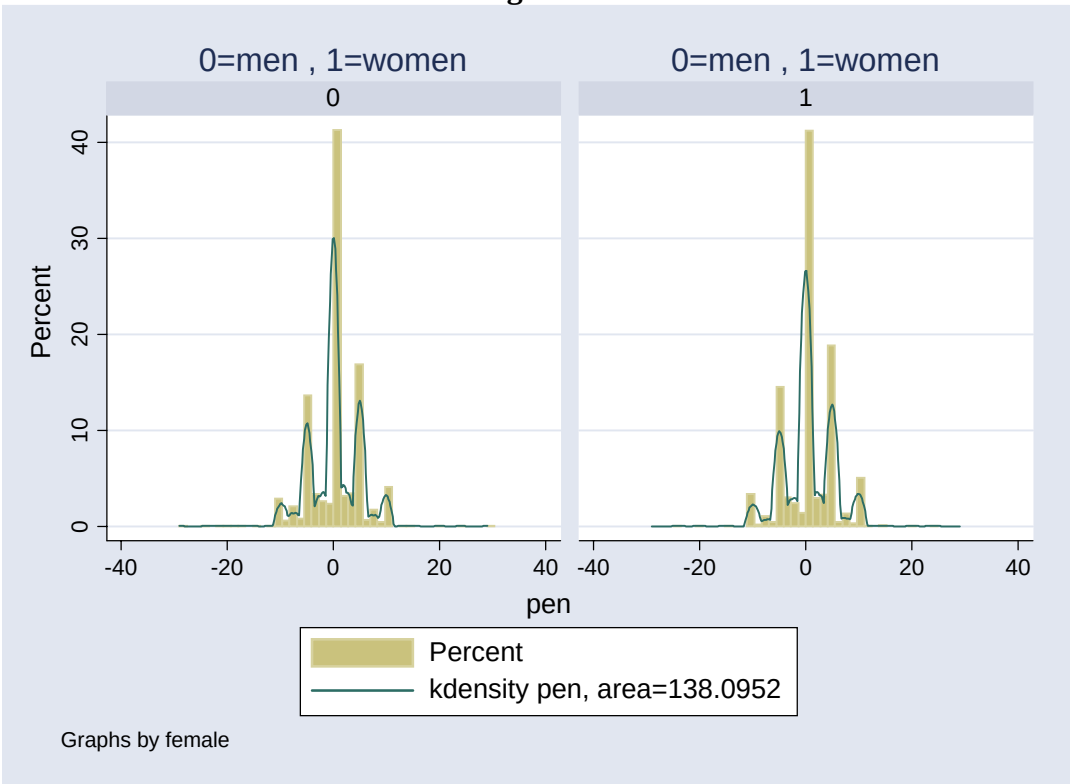
Women								
		1989	*1991*	*1993*	*1995*	*1998*	*2000*	*2002*
private employees	*senior*	**56.82**	**56.88**	**56.53**	**57.37**	**58.83**	**59.36**	**59.36**
	mid	**56.84**	**57.83**	**57.35**	**58.84**	**59.52**	**60.11**	**60.51**
	junior	**-**	**-**	**-**	**-**	**60.33**	**61.02**	**61.21**
public employees	*senior*	**57.62**	**57.78**	**58.27**	**58.5**	**59.55**	**59.95**	**59.92**
	mid	**57.06**	**58.25**	**58.35**	**59.74**	**60.83**	**60.83**	**60.88**
	junior	**-**	**-**	**-**	**-**	**62.03**	**61.38**	**61.75**
self-employed	*senior*	**59.47**	**59.53**	**58.83**	**58.65**	**61.08**	**61.11**	**61.36**
	mid	**58.08**	**59.56**	**59.25**	**60.16**	**60.55**	**61.8**	**61.38**
	junior	**-**	**-**	**-**	**-**	**62.68**	**62.64**	**61.6**

[6] The Italian social security system is currently going through the transitional period and the rules of the 1995 reform for benefit calculation are being applied "pro rata" according to the cohort of birth. The cohorts entering the labour market after 1996 will be completely under the new regime.

There is a trend to report an increase in the retirement age and to expect lower replacement rates: an indication that workers are learning about the reform process (see also Jappelli, Padula and Bottazzi, 2003)[7]. Expected retirement age is higher for the self-employed. Junior workers have higher expected retirement ages as a direct effect of the reform (they have to fully incorporate the changes in their future plans).

We use these variables to test whether the 1995 reform has significantly affected the plans of individuals in our sample and particularly how relevant is the contribution history of women in changes of these expectations. To this end we make use of the rotating panel available in SHIW (the same household is interviewed in 2 consecutive waves, see Appendix 2), which also displays the average expected retirement ages for this sample. Figure 9 shows the "trimmed" distribution for this variable, the modal case is to report no change in the expected retirement age, however a large percentage of the sample reports an increase or even a reduction in the expected retirement age[8]. The unconditional distributions look remarkably similar between men and women and fairly symmetric: as far as the actual econometric specification is concerned we have no clear indication to opt for non linear regression techniques, however we do experiment with different methodologies.

Figure 9



[7] Expected replacement rates are not shown for brevity. They are available upon requests from the authors

[8] There are clear heaps occurring at round numbers such as "five", this is because the legislation did in fact produce a change of 5 years in the normal retirement age, taking place gradually. It should be noted that as documented in Brugiavini and Peracchi 2004 there is wide variability in actual retirement ages both for men and women.

The following regressions are run for the sample of workers, they relate the observed change in expected retirement age to a number of explanatory variables. These include cohort dummies (cohort 1 is the oldest, individuals born before 1930), gender, education, occupation, seniority and to the "gap years". Furthermore we include our estimate of social security wealth (SSW) and the difference (DSSP) between the peak value and the expected social security wealth to which the individual is currently entitled to (given current eligibility rules)[9]. We run separate regressions for men and women, preserving an identical specification in order to make comparisons. Finally, because we make use of both information on years of contributions and expected retirement age the only years where these are available in SHIW are 1995, 1998, 2000 and 2002, hence the sample size is rather small. Tables 8 and 9 make use of changes, between two consecutive years of the survey, in the expected retirement age as dependent variable[10]. In this first set of regressions we define an index which takes value 1 if expected retirement age increases, -1 if it decreases and 0 otherwise.

Results indicate that for men both the "incentive variable" and the gap-years (the index as defined before) variable are relevant in explaining any increase in the retirement age. In particular the incentive variable has a positive correlation so that the higher the difference between the peak value and the SSW one is entitled to, the higher the probability of postponing retirement. For women the model seems badly specified and only the gap-years variables has a significant positive effect.

Dummies for senior and mid-seniority workers have a negative effect on the change because, with respect to junior workers, they where not strongly affected by the Dini reform. Gap years have a significant positive effect because for workers with discontinuities it is relevant to complete their careers by postponing retirement. What is relevant to our study is that *for female workers this variable is important substantially more than for men*, other things being equal. This suggest that a female-worker with the same gap-years as a male-worker in her working life, has lost more in terms of pension rights and she has to make up by working for more years.

[9] Details of the estimation of social security wealth in our sample are given in the Appendix

[10] It should be noted that while all changes are based on 2-years intervals, between 1995 and 1998 we have a 3 years interval. We have not yet dealt with this problem, but our intuition is that this should not affect the results dramatically as there should be no "heaping" or piling up in the expectation variable if taken over three years. On the other hand the Dini reform takes place exactly within that period.

Table 8: Ordered Probit Analysis
Explaining the change in expected retirement age- Men.
Dependent variable: index for a change in expected retirement age

	Coef.	Std. Err
age	-0.064*	0.0058
co1	2.164*	0.2483
co2	1.732*	0.2163
co3	1.425*	0.1867
co4	1.193*	0.1623
co5	0.879*	0.1384
co6	0.657*	0.1196
co7	0.417*	0.0999
co8	0.134*	0.0884
married	-0.006	0.0436
medium-edu	-0.113*	0.0496
high-edu	-0.104	0.0727
private sector	-0.044	0.0391
self-employed	-0.039	0.0464
senior	-0.237*	0.0452
mid	-0.056	0.0385
north	0.016	0.0384
south	0.003	0.0404
Gap-years	0.005*	0.0028
DSSP	0.984*	0.0521
SSW	0.004	0.0031
Number of observations	6259	
Pseudo R2	0.0235	

SSW is social security wealth while DSSP is the difference between peak value and current SSW.

Table 9: Ordered Probit Analysis
Explaining the change in expected retirement age- Women.
Dependent variable: index for a change in expected retirement age

	Coef.	Std. Err
age	-0.078*	0.008
co1	2.878*	0.358
co2	2.189*	0.312
co3	1.744*	0.269
co4	1.574*	0.229
co5	1.169*	0.197
co6	0.964*	0.167
co7	0.601*	0.141
co8	0.211	0.121
married	0.002	0.046
medium-edu	-0.194*	0.077
high-edu	-0.229*	0.088
private sector	-0.043	0.046
self-employed	-0.036	0.063
senior	-0.195*	0.064
mid	-0.162*	0.049
north	0.005	0.046
south	-0.055	0.055
Gap-years	0.006*	0.002
DSSP	0.590*	0.185
SSW	0.005	0.003
Number of observations	3948	
Pseudo R2	0.0265	

SSW is social security wealth while DSSP is the difference between peak value and current SSW.

However, one might argue that, overall, these results are not very informative. First the relevant dependent variable is the difference between expected retirement age recorded in two consecutive years. Furthermore social security wealth and peak values are the results of estimates and are bound to both being endogenous variables (to the extent that one can control retirement age) and measured with error, hence instrumental variables procedures would be advisable.

4. Results and Comments

In tables 10, 11 and 12 we present results of IV regressions for the change in expected retirement age where SSW and DSSP have been instrumented by using, amongst others, the group dummies based on seniority, on job-sector and gender (if applicable)[11]. We cannot make use of an identification strategy based on a "difference-in-difference" argument as we do not use years before 1995. In Table 8 we run the IV regression jointly for men and women under the assumption that all the differences between the two groups are picked up by the "female" dummy. In tables 9 and 10 we distinguish the two sub-samples.

The results of Table 10 suggest that, once instrumented, the incentive variable plays an important role and is positive, as expected, while the level of social security wealth is not so relevant. We have relegated differences between men and women to just one "woman" dummy, which is marginally significant. In Tables 11 and 12 the same specification is estimated in the two sub-samples. It emerges that, once again, the incentive variable is highly significant for men, but not for women, while the level of social security wealth is less relevant in both cases.

The important gender-difference is that for women the only relevant variable is the gap-years in the work-profile. This is largely consistent with previous work by Brugiavini and Peracchi (particularly Brugiavini and Peracchi, 2004), where for a sample of female workers drawn from the Italian social security archive, the role of incentive variables is much less precise than for men (though of the correct sign).

Overall our evidence suggests that women face a sort of "constraint" in their retirement decision, measured by the missing contributions years, such that filling these gaps for acquiring future pension rights weighs much more than the standard incentive variables.

[11] We avoid using the number of children as explanatory variable because, as we argued, this is measured with error. In the few attempts which we carried out this variable was not significant.

Table 10: IV Regression
Explaining the change in expected retirement age.
Dependent variable: change in expected retirement age

	Coef.	Std. Err	Student-t
age	-0.078	0.022	-3.54
co1	2.467	0.954	2.58
co2	1.251	0.832	1.50
co3	0.823	0.720	1.15
co4	0.947	0.626	1.51
co5	0.637	0.540	1.18
co6	0.480	0.471	1.02
co7	0.163	0.406	0.40
co8	-0.233	0.365	-0.64
woman	0.213	0.123	1.72
married	-0.088	0.156	-0.57
medium-edu	-0.166	0.203	-0.82
high-edu	-0.273	0.264	-1.03
private sector	-0.242	0.145	-1.67
self-employed	-0.167	0.182	-0.92
senior	-0.078	0.178	-0.44
mid	0.028	0.150	0.19
north	0.106	0.144	0.74
south	-0.012	0.159	-0.08
number of kids	-0-068	0.955	-0.71
gap-years	0.029	0.011	2.67
DSSP	0.848	0.172	4.92
SSW	0.011	0.011	1.01
constant	2.823	0.664	4.25
Number of observations		7499	
R-squared		0.020	

SSW is social security wealth while DSSP is the difrence between peak value and current SSW.

Table 11: IV Regression
Explaining the change in expected retirement age – Men.
Dependent variable: change in expected retirement age

	Coef.	Std. Err	Student-t
Age	-0.0701	0.0282	-2.480
co1	2.1509	1.2055	1.780
co2	1.1092	1.0509	1.060
co3	0.6714	0.9141	0.730
co4	0.8488	0.7972	1.060
co5	0.4067	0.6830	0.600
co6	0.2947	0.5948	0.500
co7	0.0158	0.5054	0.030
co8	-0.4539	0.4578	-0.990
married	-0.1956	0.2174	-0.900
medu	-0.2004	0.2430	-0.820
hedu	-0.2009	0.3592	-0.560
private sector	-0.3432	0.1915	-1.790
self-employed	-0.2522	0.2293	-1.100
senior	-0.0401	0.2190	-0.180
mid	0.1827	0.1925	0.950
north	0.1320	0.1884	0.700
south	-0.0355	0.1991	-0.180
gap-years	0.0219	0.0140	1.560
DSSP	0.0017	0.0003	6.770
SSW	0.0052	0.0140	0.372
constant	4.3498	0.8675	5.010
Number of observations	4609		
R-squared	0.0168		

SSW is social security wealth while DSSP is the difference between peak value and current SSW.

Table 12: IV Regression
Explaining the change in expected retirement age - Women.
Dependent variable: change in expected retirement age

	Coef.	Std. Err	Student-t
age	-0.0887	.0355	-2.500
co1	3.8123	1.5744	2.420
co2	2.0271	1.3543	1.500
co3	1.4092	1.1683	1.210
co4	1.3537	1.0214	1.330
co5	1.2262	0.8933	1.370
co6	0.9170	0.7793	1.180
co7	0.5431	0.6877	0.790
co8	0.2318	0.6124	0.380
married	0.0987	0.2286	0.430
medu	-0.0766	0.3736	-0.200
hedu	-0.2526	0.4311	-0.590
private sector	-0.1072	0.2249	-0.480
self-employed	-0.2349	0.3128	-0.750
senior	-0.1058	0.3070	-0.340
mid	-0.3135	0.2420	-1.300
north	0.1633	0.2280	0.720
south	0.0283	0.2714	0.100
gap-years	0.0394	0.0195	2.020
DSSP	0.1136	0.2362	0.480
SSW	0.0216	0.0175	1.230
constant	3.2270	1.1443	2.820
Number of observations	2890		
R-squared	0.009		

SSW is social security wealth while DSSP is the difference between peak value and current SSW.

5. Effects of pension reforms on (re)-entry decisions

In this paper we do not fully model the re-entry decision. However we briefly looked at this evidence as well and we are planning to do further research on this point, by relying on the rotating panel component of the SHIW. We carried out our preliminary analysis following two alternative strategies. First, we analysed difference-in-differences estimators of the probability of being employed, by taking as the difference the fact of being assigned to the NDC relative to the DB system and, as second difference, the fact of deciding to enter the labour market after the 1996 Dini reform relative to the 1993-5 period where the old rules were still applied[12]. Next, we run probit regressions of the probability of being employed at the end of the two-years interval at which the survey is carried out, conditional on not being employed in the initial year, against a number of explanatory variables including a dummy discriminating among different pension rule and a variable capturing the pension accrual rate in case of taking up a job corresponding to the

[12] We are aware of the problems existing with DiD methodologies for non linear models, as clearly pointed out also by Athey and Imbens. For the time being we just look at probit estimates but we are planning to turn to suitable models.

individual's characteristics. Before proceeding it is however instructive to document to which extent did the pension reforms altered social security wealth and social security accrual rates relevant for labour market entry decisions.

5.1. How relevant were the Pension Reforms of the 1990s for entrants?

We argued above that the pension reforms carried out in Italy in the 1990s substantially altered the generosity of pension systems. Table 13 documents how peak values in social security wealth and accrual rates have changed as a result of these reforms. In particular, the variables SSA (the yearly variation in social security wealth subsequent to the take-up of a job corresponding to her/his qualifications) and SSP (the peak value) are computed for individuals who – because of their seniority – were left to the old DB system or were assigned to the NDC system. Clearly, comparisons of these variables are more meaningful conditioning on personal characteristics, such as age, educational attainments, industry, etc.. However, due to the small sample size, we prefer at this stage to confine on unconditional mean values of these variables. Standard deviations are tabulated within brackets.

Table 13: SSA and SSP by gender and across pension regimes

	Male		***Female***	
	senior (more than 18 years contributions)	*junior*	*senior (more than 18 years contributions)*	*junior*
SSA	3,132 (9,180)	2,143 (2,499)	1,859 (3,688)	1,123 (2,215)
SSP	76,676 (103,852)	32,459 (30,534)	47,985 (62,172)	18,916 (28,705)

Note:data in Euros 2002, standard deviations in brackets

Two things stand out as important. First, the reforms significantly reduced the average objective peak values in social security wealth. Second, average social security accrual rates decreased after the reforms relative to the pre-reform period, but less than the peak value denoting a steeper convergence to the highest attainable social security wealth with the new rules. Importantly the difference in peak values is larger for women than for men, whilst the opposite happens in the case of SSA. Overall these results are encouraging as to our empirical strategy in that they denote that changes have not been of a second order of magnitude.

5.2. Re-entry probabilities

Figure 5 below reports the probability of moving from non-employment to employment in the periods 1991-5 and 1998-2002 periods for the junior and senior cohorts. Our sample inclusion/exclusion restrictions are as follows: we consider only individuals who were not employed in the initial years (1993 and 1998 respectively), but i) had some previous work experience and ii) had more than 25 and less than 55 years of age. This is because we do not want to include individuals who are still undergoing formal education or who retired.

As suggested by Figure 5, re-entry probabilities are unsurprisingly larger for the junior-generations than for the senior ones. This is simply because junior workers are generally younger than senior workers. Also unsurprisingly re-entry probabilities are often increasing over time. The labour market reforms carried out in Italy in the 1990s have indeed eased the entry margin. More importantly, the increase in the re-entry probability is generally larger for the junior generations than for the senior workers. This may indicate that the reforms increased labour supply incentives, although we cannot rule out explanations based on the demand side[13].

As argued above, re-employment probabilities depend on a variety of factors, in addition to pension rules. Table 14 displays probit estimates of the probability of being employed at the end of each two-years period as a function of a number of personal and family characteristics, cohort and regional dummies as well as pension rules. The key variables of interest are in bold characters. Dini_ref identifies those individuals who, because of their contribution records, were subject since 1996 to the new NDC rules while dinigen is the control group, that is, individuals with the same characteristics of the Dini generations throughout the entire period (even before the 1996 reform). Finally the incentive variable (SSA/SSP) combines the two variables displayed in Table 13 in providing a measure of the speed of convergence to the highest possible level of secial security wealth.

Two fact stand out. First, the convergence variable is always significant pointing to important incentives played by less generous pension rules also on entry margins. Second, this effect is robust to introducing other controls for the Dini and non-Dini generations (available only for a sub-sample). Importantly the variable capturing the fact of being in the Dini-generation after the reform (Dini_ref) is statistically significant in the case of women, but not of men, pointing to stronger effects of the reform on participation decision of women then men.

[13] Unreported probit regressions controlling for age, birth cohorts, educational attainments, marital status confirm this result. The interpreteation of difference-in-differences estimators in probit regressions is however problematic.

Table 14
Re-entry probabilities under different pension rules

	Female	*Male*	*Female*	*Male*
age	-0.022	0.003	-0.024	-0.002
	(5.53)***	(0.71)	(9.09)***	(0.52)
married	-0.168	0.106	-0.161	0.164
	(4.83)***	(2.24)**	(4.87)***	(3.61)***
medu	0.049	0.007	0.040	0.023
	(1.80)*	(0.18)	(1.50)	(0.58)
highedu	0.370	0.235	0.327	0.245
	(6.51)***	(3.60)***	(6.13)***	(3.87)***
co1	0.533	-0.415	0.784	-0.076
	(3.54)***	(2.29)**	(7.73)***	(0.55)
co2	0.318	-0.486	0.512	-0.179
	(2.42)**	(2.92)***	(5.74)***	(1.40)
co3	0.161	-0.550	0.356	-0.305
	(1.42)	(4.07)***	(4.60)***	(2.85)***
co4	0.106	-0.446	0.266	-0.241
	(1.13)	(3.87)***	(4.11)***	(2.63)***
co5	0.089	-0.255	0.189	-0.072
	(1.20)	(2.73)***	(3.53)***	(0.90)
co6	0.099	-0.185	0.144	-0.057
	(1.69)*	(2.62)***	(3.16)***	(0.99)
co7	0.039	-0.101	0.108	0.004
	(0.89)	(2.21)**	(2.86)***	(0.12)
north	-0.052	0.103	-0.051	0.106
	(2.08)**	(2.68)***	(2.09)**	(2.77)***
south	0.038	0.076	0.036	0.043
	(1.40)	(2.04)**	(1.40)	(1.21)
children	0.001	0.016	-0.012	0.019
	(0.06)	(1.13)	(0.89)	(1.53)
mother	0.056		0.066	
	(1.57)		(1.91)*	
dini_ref	**0.052**	**-0.025**		
	(1.65)*	**(0.67)**		
dinigen	**-0.336**	**-0.099**		
	(9.84)***	**(1.69)***		
SSA/SSP	**0.803**	**0.913**	**0.813**	**0.983**
	(2.90)***	**(2.50)****	**(3.05)*****	**(2.62)*****
Constant	1.399	0.651	1.094	0.527
	(14.89)***	(5.62)***	(14.78)***	(5.68)***
Observations	1938	1207	2253	1462
R-squared	0.26	0.09	0.19	0.06

Notes: Absolute value of t statistics in brackets; parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

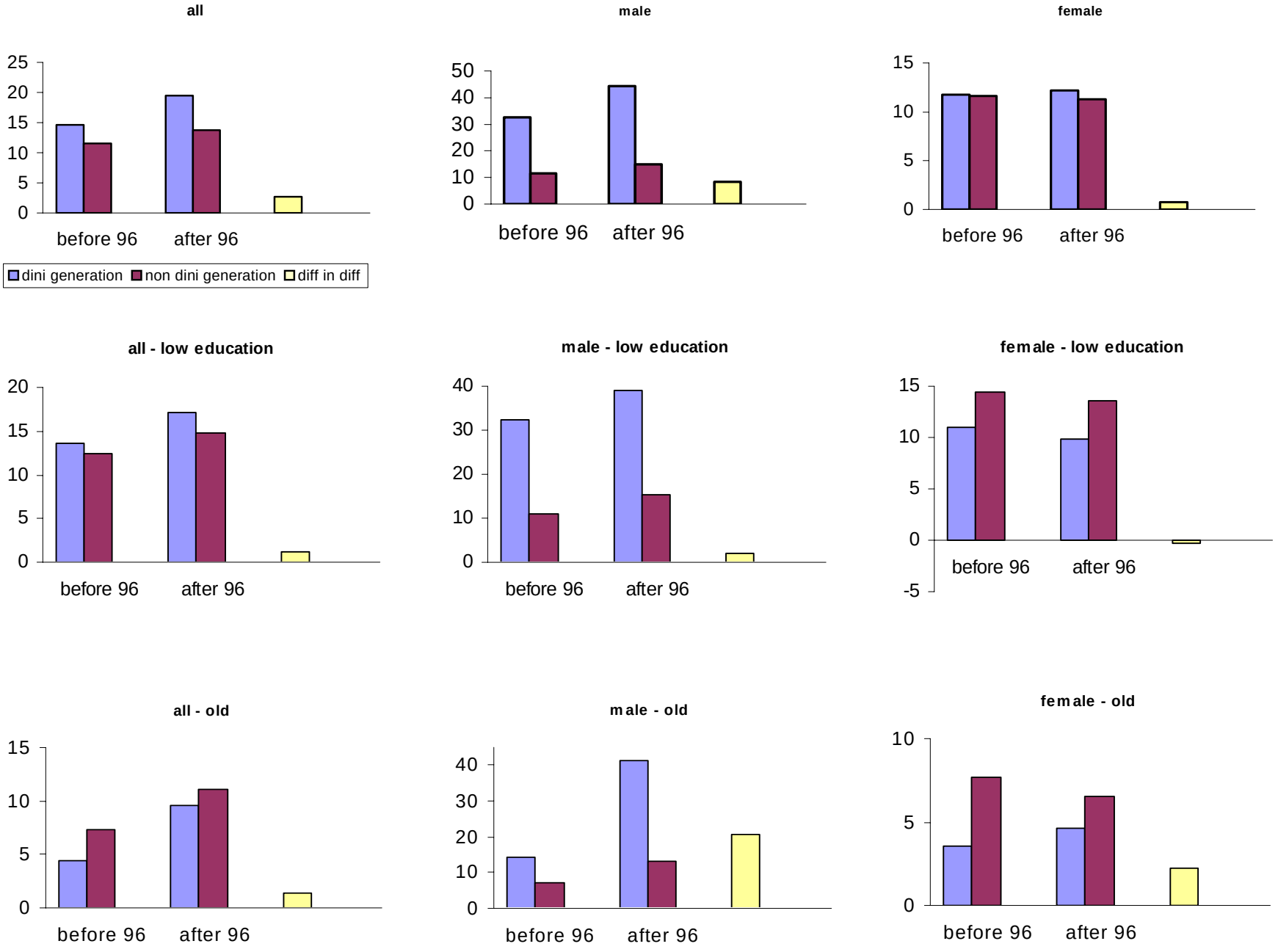

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Figure 3

6. Final Remarks

The main purpose of this paper was to analyse how pension reforms altered labour supply decisions of women and men by exploiting the pension reforms carried out in Italy in the 1990s. We considered not only retirement decisions, which have already been rather thoroughly investigated, but also the decision as to the (re)entry in the labour market, which has been to date quite systematically neglected by the theoretical and empirical literature on pensions.

Our results suggest that effects may not be second order and are broadly in line with what one could expect from economic theory. In particular, the reduced generosity of pension systems would seem to postpone retirement decisions. Contrary to a priori expectations, men are more reactive than women to changes in pension rules. However, this may be due to the fact that women have to fill their gap years whatever the pension rules. In other words, it may be the presence of binding constraints related to eligibility which reduces the responsiveness of women to changes in pensions rules.

The evidence collected in this paper on entry margins, suggest instead that women may be more responsive than men to changes in social security wealth when control is made for personal and family characteristics.

All this seems to reconcile evidence of a stronger labour supply elasticity of women than men with the fact that women appear less responsive than men to retirement incentives. It is just a matter of looking at the different margins (entry or retirement) and taking into account of the additional constraints imposed on retirement decisions of women by gaps in career.

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Appendix 1

The rules in place for the social security system

Table A1: Key Features of the Pension Regimes in Italy

	Pre-1993 regime	1992 reform	1995 reform
Normal retirement age	60 (men) 55(women)	65 (men) 60(women)	Any age after 56 (for both men and women)
Transitional period		Until about 2032	Until about 2035
Pensionable earnings	Average of last 5 years real earnings (converted to real values through price index)	Career average earnings (converted to real values through price index + 1%)	Career contributions (capitalized using a 5-year moving average of GDP growth rate)
Pension benefit	2%*(pensionable earnings)*(t), where t is years of tax payments (at most 40)	2%*(pensionable earnings)*(t), where t is years of tax payments (at most 40)	Proportional to capitalized value of career contributions, the proportionality factor increasing with age at retirement (from .04720 at age 57 to .06136 at age 65)
Pension indexation	Cost of living plus real earnings growth	Cost of living	Cost of living
Pension to survivor	60% to spouse 20% to each child 40% to each child (if no spouse)	Same	Same
Years of contributions for eligibility	15	20	5
Early retirement provision	Any age if contributed to SS for 35 years or more, no actuarial adjustment	Any age if contributed to SS for 35 years or more, no actuarial adjustment	No early retirement provision
Total Payroll tax	24.5% of gross earnings	27.17% of gross earnings	32.7% of gross earnings

Appendix 2

The SHIW data

The Survey of Household Income and Wealth - SHIW is conducted, since 1978, every other year and has been widely used by several researchers to analyze the saving behaviour of Italian households. [14] For a detailed analysis of the features of the sample see Brandolini and Cannari (1995).
The survey contains detailed information on household income, consumption and wealth, as well as a number of demographic and economic variables. The data are generally of excellent quality and have been used for a variety of different studies.[15] Since 1989, the survey also contains a (relatively small) longitudinal component.

The main advantage of the Survey for our study is the fact that it was conducted immediately before and immediately after the reforms of the pension system.
In this paper we focus in waves from 1989 to 2002:

- contribution years are recorded only from 1995 to 2002;
- replacement rates are recorded in 1989 in 1991 in 2000 and 2002;
- year of entry into labour market and expected retirement age are in all relevant waves;

The sample size of workers and retirees only is as follows:

Male:

Activity	year 1991	1995	1998	2000	2002	Total
worker	5,748	5,169	4,555	4,952	4,532	24,956
retired	2,127	2,283	1,960	2,386	2,537	11,293
Total	7,875	7,452	6,515	7,338	7,069	36,249

Female:

Activity	1991	1995	1998	2000	2002	Total
worker	3,050	3,056	2,800	2,989	2,927	14,822
retired	1,540	1,672	1,251	1,498	1,754	7,715
Total	4,590	4,728	4,051	4,487	4,681	22,537

Workers distinguished by sector of activity.

Male:

Sector of activity	year 1991	1995	1998	2000	2002	Total
private employees	2,982	2,610	2,361	2,698	2,494	13,145
public employees	1,507	1,148	979	959	884	5,477
self-employed	1,259	1,411	1,215	1,295	1,154	6,334
Total	5,748	5,169	4,555	4,952	4,532	24,956

Female:

[14] See, for instance, the volume edited by Ando, Guiso and Visco (1995) and the studies cited therein. As explained below in this Appendix, we also make use of the Bank of Italy Surveys for the years 1978, 1979, 1980, 1981, 1982, 1983, 1984 and 1986. These samples have a slightly different format from the surveys available in subsequent years, however they contain enough information to estimate age-earnings profiles.
[15] Of particular interest, because of their originality, are the modules on households expectations and on cash balances. In what follows we use the data on expected retirement age.

Sector of activity	1991	1995	1998	2000	2002	Total
private employees	1,073	1,325	1,246	1,471	1,479	6,594
public employees	1,440	1,093	1,043	1,019	960	5,555
self-employed	537	638	511	499	488	2,673
Total	3,050	3,056	2,800	2,989	2,927	14,822

Finally the rotating panel is as follows

Years	sample size
1993-1995	3268
1995-1998	2275
1998-2000	3269
2000-2002	3008

Appendix 3

Estimating Social Security

Estimation of social security wealth at micro level requires essentially two ingredients: the age-earnings profile and the rules for benefit computation and eligibility. Both are especially important in Italy, as the process of social security reform involves moving from a "final salary" type of benefit formula (pre-1993 system) to a lifetime earnings formula (1992 reform) and to a formula based on the value of lifetime contributions (1995 reform).
The information available in order to model age-earnings profiles in the SHIW sample consists of age, gender, education, occupation, sector of employment and region of working activity. However we only make use of gender, age and occupation in order to model these profiles, given the reduced sample size (see also Attanasio and Brugiavini, 2003).

Given the period in which the individual is observed (this ranges from a minimum of one wave to a maximum of 5 waves in our data) the estimation of the age earnings profile is used for both backward projections and forward projections in earnings.
As in Brugiavini and Peracchi (2004), individual real age-earnings profiles are assumed to be completely flat after the last year of observed earnings, if this occurs above age 50. This corresponds to the assumption that, at the individual level, the real earnings process is a random walk with no drift. The "jump-off" point for the earnings projections is taken to be the last year of observed earnings. This jump-off point pins down the level of the age-earnings profile for each individual, while age effects are assumed essentially constant within gender groups. Note that this might underestimate future earnings growth, particularly for younger cohorts, but we have no alternative.

The actual calculation of SSW is "a rolling" present discounted value of a stream of future benefits, taking account of mortality. For each additional year of work SSW has to be re-computed. We assume a real discount factor of 1.5 percent. Benefits are defined in real terms and the indexation rules prevailing under each legislation are implemented (e.g. before the 1995 reform, for senior workers, we apply the defined benefit system). We also assume that real earnings growth after 2002 the last year of the SHIW sample), is constant at 1.5%. We carry out calculations as follows.

Estimate SSW for men and women separately.
We assume that workers are single, though we know marital status. In the Italian legislation, the only major difference between a single worker and a married worker is eligibility to survivors'

pension and we assume that this does not substantially alter the SSW profile. We assume variation in mortality only by sex and age.
We apply the prevailing legislation to impute eligibility rules, and benefits become available only when eligibility requirements are met. For workers in the "mixed system" eligibility is based on the pre-1995 regime. Eligibility for "minimum benefits" are also applied.

Table 7

Average Expected Retirement Age in the Rotating Panel

Male						
		1993	*1995*	*1998*	*2000*	*2002*
private employees	*senior*	**58.47**	**58.85**	**58.88**	**60.04**	**60.00**
	mid	**60.36**	**61.48**	**61.47**	**62.43**	**62.53**
	junior	**-**	**-**	**62.29**	**63.33**	**63.05**
public employees	*senior*	**59.79**	**59.53**	**60.32**	**60.88**	**60.53**
	mid	**60.99**	**61.67**	**62.13**	**62.35**	**62.76**
	junior	**-**	**-**	**62.88**	**62.86**	**63.42**
self-employed	*senior*	**61.89**	**60.80**	**62.87**	**63.22**	**63.10**
	mid	**62.10**	**62.82**	**63.39**	**64.67**	**64.31**
	junior	**-**	**-**	**64.93**	**64.64**	**64.65**

Female						
		1993	*1995*	*1998*	*2000*	*2002*
private employees	*senior*	**56.65**	**57.37**	**58.09**	**58.61**	**58.64**
	mid	**57.30**	**58.76**	**58.88**	**59.99**	**59.88**
	junior	**-**	**-**	**58.50**	**61.72**	**60.91**
public employees	*senior*	**58.54**	**58.73**	**59.30**	**59.66**	**59.68**
	mid	**58.78**	**59.92**	**60.29**	**61.02**	**60.86**
	junior	**-**	**-**	**60.92**	**61.59**	**61.22**
self-employed	*senior*	**59.94**	**58.70**	**61.62**	**60.52**	**60.83**
	mid	**59.59**	**61.02**	**59.66**	**61.08**	**61.04**
	junior	**-**	**-**	**62.50**	**60.88**	**61.74**