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ABSTRACT

The Side Effect of Pension Reforms on Training: Evidence from Italy*

Due to pension reforms, minimum retirement age increased substantially in Italy between the second part of the 1990s and the early 2000s. We compare the training participation of pre- and post - reform cohorts of private sector employees and estimate that adding one year to minimum retirement age increases training incidence by 6.9 to 10.7 percent, depending on the empirical specification. We find that policies that increase the residual working horizon are effective in increasing training participation by senior workers, and that traditional training policies that aim at reducing training costs by providing subsidies are ineffective.

JEL Classification: J24, J26

Keywords: pension reforms, training, Italy

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Introduction

Population ageing is a key challenge facing OECD economies. Over the next 50 years, all OECD countries will experience an important increase in the share of elderly persons in the population and a significant decline in the share of the population of prime working age (OECD, 2006). Since many individuals aged above 50 are out of the labour market, especially in Southern Europe, policies that increase the activity rates of senior workers can reduce the pressure of ageing on public finances, and at the same time ensure living standards.

Many OECD Governments have embraced training as one possible means of keeping older workers in employment or bringing them out of unemployment or inactivity and into employment (see Mahyew and Rjkers, 2004).[1] Training policies are often advocated because of the evidence showing that skilled older workers remain in the labour market longer than their unskilled peers. There is also evidence that a positive correlation exists in European countries between the incidence of training among older workers - relative to younger cohorts - and the average effective age of retirement (see OECD, 2006, and Bassanini *et al.*, 2007).

In spite of their popularity in policy circles, training policies that provide monetary subsidies to workers and firms have been criticized by economists, because of the substantial deadweight losses involved and the small expected returns (see Heckman, 2000, Falch and Oosterbeek, 2012 and Abramovsky et al, 2011). A recognized problem is that senior workers and their employers have only a short time to recoup their investment in skills before retirement occurs. This problem raises the question whether pension policies that increase minimum retirement age and therefore force affected senior workers to stay longer in the labour market can contribute to stimulate training investment.

Empirical evidence documenting the effects of changes in minimum retirement age on training is limited. Montizaan, Cörvers and De Grip (2010) review this small literature. Using a natural experiment in the Dutch public sector, they report that a shock to pension rights which postpones retirement has a positive but small impact on the training participation of senior public sector employees. In this paper, we add to the existing literature by providing evidence on the effects of exogenous changes in minimum retirement age on training participation by senior private sector employees in Italy. Italy is an interesting case for the topic at hand. According to the OECD, it shares with Spain and Greece a very low labour force participation rate in the age group 50 to 64, limited training of senior workers and a

[1] The European Commission has strongly encouraged member countries to promote lifelong learning and training of older workers, by promoting equal opportunity in the workplace and by providing training incentives with the European Social Fund. According to the Bruges Communiquè (European Commission (2011)) "...the future European labour market will be simultaneously confronted with an ageing population and shrinking cohorts of young people. As a result, adults - and in particular, older workers - will increasingly be called upon to update and broaden their skills and competences through continuing VET..." (p.2). US training policies targeted at older workers are reviewed by Eyster, Johnson and Toder (2008).

high predicted old age dependency ratio. During the 1990s, the country has experienced a sequence of pension reforms, that first introduced and then progressively increased minimum retirement age from 50 to 57 years (see Angelini et al, 2009).

We estimate the effects of the exogenous variation generated by these reforms on the residual working horizon and the training participation of private sector employees aged 40 to 56, who entered their fifties during the 1990s and early 2000s, when these reforms occurred. We compare cohorts born between 1940 and 1944, who are never affected by pension reforms, and cohorts born between 1945 and 1950, who are affected as they age.

We find that the observed increase in minimum retirement age has contributed both to extend the residual working horizon and to foster the training participation of older workers. In particular, we estimate that adding one year to minimum retirement age has increased training incidence by 6.95 to 10.71 percent in our sample, depending on the selected specification. This effect is more than twice as large as the one estimated by Montizaan, Cörvers and De Grip, 2010, in their study of Dutch public sector employees. Since their sample consists of workers older than ours, our results might suggest that the effect of pension reforms on training are larger when they occur at a lower age, as in the Italian case. If this speculation is correct, then additional reforms further raising minimum retirement age in Italy will have lower effects on training than currently estimated.

Using data on regional training subsidies paid to workers and firms, we also confirm that these subsidies have not significantly affected the training of older workers. These combined findings suggest that increases in minimum retirement age, typically motivated by the need to reduce the pressure of ageing on public finances, may be a more effective tool to promote the training of older workers than traditional training policies, which subsidize workers and firms.

The remainder of this paper is organized as follows. Section 1 provides some background on institutional details and describes the Italian reforms of minimum retirement age. The data and the empirical approach are introduced in Sections 2 and 3 respectively. Results are discussed in Section 4, which precedes our conclusions.

1. Changes in minimum retirement age. Italy from 1996 to 2004

In this section we review pension arrangements in Italy, and how the various reforms that were implemented during the 1990s impacted on retirement age. The Italian retirement system comprises both *old age* and *seniority* pensions. We only consider male employees in the private sector. Until 1992, these employees qualified for old age pensions at age 60 and for seniority pensions at any age, provided

that they had accumulated at least 35 years of social security contributions.[2] Empirical evidence suggests that eligibility for seniority pensions was acquired, in the large majority of cases, way before that for old age pensions. As a result, until 1995 male employees in the Italian private sector with a continuous working career from age 15 could retire as early as age 50 (i.e. after 35 years of contributions).

Starting from 1995, eligibility conditions for seniority pensions were progressively tightened by a sequence of reforms, aimed at containing public expenditure. In the new system, access to seniority pensions required not only at least 35 years of contributions, but also a minimum age. For male private sector employees, this age was initially set to 52 in 1996, and then progressively increased to 57 by 2002. The age condition for old age pensions also changed, increasing progressively from 60 to 65. We document these changes in Table 1 and provide further details on pension reforms in the Appendix.

The variation in eligibility conditions over time is most simply put across by considering Figure 1, where we report the number of years required to qualify for "seniority" and "old age" pensions for an hypothetical private sector employee aged 50 and with 35 years of contributions. The figure sets out the comparison of consecutive cohorts of individuals, who share the same number of years of contributions and are indexed by the year in which they reach age 50. The empirical relevance of seniority vis-à-vis old age pensions is clear-cut, as the former guarantees less stringent requirements for eligibility. It also emerges that relatively close cohorts of individuals face sharp differences in their eligibility rules.

2. Data

We use individual data from *ILFI* (*Longitudinal Survey of Italian Households*), a representative household survey comprising about 4,000 Italian households (10,000 individuals). Despite its richness, this is still a relatively under-utilized source of data for empirical economic analysis. We choose *ILFI* because of the quality of training data. Compared to the much larger Labour Force Survey, that only collects information on training during the month before the interview, ILFI registers all training episodes and their duration since labour market entry, by combining survey and retrospective information.

The ILFI panel consists of five waves, conducted every two years, starting in 1997 and ending in 2005. It collects detailed information on retirement decisions, number and duration of training episodes and number and duration of occupational spells throughout the entire life, and several household and individual level demographics, including education and geographic mobility. The first interview was carried out using a detailed face-to face life-course event history calendar instrument, and collected data on the key episodes since birth for all household members older than 18. The information we have access to therefore combines retrospective (until 1996) and survey data (from 1997) for all individuals

[2] See, for instance, Angelini et al (2009). In Italy, social security contributions are paid by the employer and the employee.

in the sample, yielding aggregate figures that are in line with those from other surveys conducted by the Italian National Statistical Office.[3]

Training in these data refers to any programme organized by firms, local authorities and industrial associations that takes place after completion of upper secondary education and is not included in vocational tertiary education. We allocate to each year all training episodes that started in that year and use information on the year and the month when each training spell started and ended to retrieve the annual number and duration of training episodes. We use two measures of training, training incidence – defined as the probability of experiencing a training episode - and the duration of training (in months).

Turning to pension eligibility rules, we follow Battistin et al, 2009, and construct a variable that measures the time to/from pension eligibility. The detailed information contained in the ILFI data allows us to compute the number of accrued years of contributions at all ages and for all individuals. To this end, we use the retrospective information on labour market histories, including the spells of inactivity and unemployment, and information on labour market status at the end of each year.[4] We then calculate the individual's *potential* retirement age by combining the information on the years of accrued social security contributions with the minimum retirement age imposed by the Law across the various phases of the pension reforms described in Section 1. Finally, we compute distance to eligibility *WH* - or the residual working horizon - as the difference in months between the individual's *potential* retirement age and current age. This variable is positive if eligibility is not yet attained, and measures the number of months required to become eligible given the accumulated social security contributions and the pension regime in place at all ages. The computed difference is negative or zero when eligibility has been attained.

Our sample includes both active and retired individuals.[5] We use the available retrospective information on labour market histories to construct a longitudinal dataset of individuals observed at the end of each year, that spans the period between 1980 and 2004. We select those born between 1942 and 1950 who have turned 50 – the estimated minimum retirement age before the reforms – either a

[3] For example, considering a sample of Italian males aged 45 to 55 in year 2000, ILFI data show that 84.2 percent of them are employed, 3.65 percent are unemployed and 12.17 percent are either retired or inactive. In a similar sample drawn from European Labour Force Survey, these percentages are 84.9, 3.1 and 12 respectively.

[4] In Italy, contributions are usually earnings-related and payable by both employees and employers. In some exceptions, it is the government that pays contributions, i.e. during the periods covered by unemployment insurance, maternity leave, sickness leave and compulsory military service. Until 1996, the government used to pay social security contributions also to individuals eligible to receive benefits associated to temporary layoffs (*Cassa Integrazione Guadagni*). When calculating the social security contributions accrued by individuals, all exceptions are taken into account.

[5] We identify the latter on the basis of the self-declared labour market status at the end of each year, which we further refine as follows. In each year, all individuals who were not employed were asked whether they classified themselves as unemployed, retired or out of the labour force (which includes housewives, students, serving army, disabled, dismissed workers, or on leave). We distinguish individuals retired from those out of the labour force by using the available information on individual eligibility status and the fact that retirement is an absorbing state. Therefore, we consider an individual as temporarily out of the labour force rather than as retired if the following two conditions are met: a) the worker does not satisfy the eligibility conditions for retirement; b) the individual experiences at least an additional employment episode after the inactivity spell.

few years before of a few years after 1996. To derive the final sample used in the regressions, we drop all individuals with no labour spell, those living in the two tiny regions, Valle d'Aosta and Molise, those living abroad, those with at least one spell of inability, and those who started working before age 10. Our final sample consists of 347 employees, whom we follow from age 40 to aged 56, and of 4,550 "individual x year" observations. Summary statistics based on this sample are presented in Table 2. The percentage of employees who became eligible for retirement or have retired during the selected window of observation is respectively 20.2 and 6.1 percent; training incidence is as low as 2.02 percent, and training duration is equal to 0.055; average age is about 47 years and average minimum retirement age is 51.5 years. Finally, the age when the first job was started is 17.9 years.

Table 2 also shows summary statistics separately for those born between 1942 and 1944, who were not treated by the reforms, and those born between 1945 and 1950, who were affected by the reforms. Average age in the two samples is very similar (47.4 versus 46.9), as well as age when the first job started (17.78 versus 17.89) and the share of low educated workers (0.392 versus 0.364). Minimum retirement age *M* is 1.8 years higher in the younger group, who has been exposed to reforms, than in the older group. Because of the reforms, the percentage eligible for retirement is significantly lower and the residual working horizon significantly higher in the former group. Both training incidence and training duration are more than twice as big among those affected by pension reforms. This group has also been exposed both to slightly higher regional unemployment rates and to a substantially higher stock of regional training incentives.

3. The Empirical Approach

Let T_a, WH_a, D_a, Z_a, X_a, where *a* is for age, denote respectively training, the residual working horizon, a dummy for retirement eligibility, equal to 1 if the individual is eligible and to 0 otherwise, the (exogenous) mandated *rules* for minimum early retirement age and eligibility for seniority pensions, and a vector of regressors, which are *predetermined* with respect to the decisions that we consider. We estimate the reduced form effects of changes in *Z* on *WH* and *T*.

To illustrate the impact of pension reforms on eligibility *D*, we consider the individuals in our sample born in 1942 and 1944, who belong to pre-reform cohorts, and in 1948 and 1950 (post-reform cohorts) and compare in Figure 2 the percentage eligible as age varies from 46 to 56. The pre-reform cohorts comprise individuals who are at least as old as the minimum retirement age prescribed by law, and therefore not bound by it. The post-reform cohorts consist instead of individuals who are younger than prescribed minimum retirement age, and thus bound by it. As expected, the percentage eligible for retirement is lower among treated cohorts.

In Figure 3, we compare the retirement behaviour of the same pre and post-reform cohorts, and show that the probability of retirement is always lower among individuals belonging to post-reform cohorts. We plot training incidence by age and cohort in Figure 4. Incidence is very low (around 1%) among workers born between 1942 and 1944, and substantially higher among younger workers. Even for this group, however, the percentage of individuals experiencing a training episode in a given year is never above 5%.

We construct the policy variable Z_a as follows. First, we set the minimum age requirement *M* in the private sector until 1995 at 50, by taking as benchmark an individual who entered the labour market at age 15 and has had no unemployment spells ever since.[6] Second, we follow Table 1 and set *M* as equal to 52 between 1996 and 1997, to 54 in 1998, to 55 between 1999 and 2000, to 56 in 2001 and to 57 from 2002 onwards. Since *M* is only binding those individuals who are younger than *M*, we define the dummy *B* as equal to 1 if age<*M* and to zero otherwise, and set $Z_a = (M_a - 50) * B_a$. To illustrate, a private sector employee aged 51 in 1994 has $Z_a = 0$, because he is older than the minimum requirement, while an individual aged 51 in 1996 has $Z_a = 1$, because minimum retirement age is 52 and he is younger than that age.

The variable Z_a measures how stringent the eligibility conditions have become after each pension reform, using age 50 as the benchmark (i.e. the age when private sector employees could retire in the pre-reform period). By exploiting the variability across cohorts, we estimate the effects of changes in Z_a on the outcome of interest when individuals are aged *a*. Since the correlation between *M* and *Z* is close to 0.9, these estimates are also informative of the effects of changes in minimum age on the some outcome.

We consider the following regression for training incidence or duration:

$$T_{it} = \beta_0 + \beta_1 Z_{it} + \beta_2 a_{it} + \beta_5 X_{it} + \gamma_c + \gamma_r + \varepsilon_{it} \qquad (1)$$

where the subscripts *i* and *t* are for the individual and time, γ_c, γ_r are fixed effects for the cohort of birth and the region of residence, and ε is an error term. The vector of covariates *X* includes age at entry in the labour market, a dummy equal to 1 if completed years of schooling are less than 8 (lower secondary education) and five industrial dummies in the private sector.[7] We also add the unemployment rate in the region of residence to capture business cycle effects.

[6] This minimum age requirement for entering the labour market was introduced only in 1967 (Law n° 977, 17th October 1967). This implies that the older cohorts could in principle retire before age 50. For instance, if they had entered the labour market at age 12, they could retire at age 12+35 = 47. Because of this, the notion of "minimum retirement age" that we use here holds for most but not for all individuals in the sample.

[7] These dummies refer to the industry of employment in 1993. Conditional on cohort and age effects, time effects cannot be identified.

We use a probit specification for training incidence and a negative binomial for training duration, to account for the fact that the dependent variable has a large number of zeros.[8] In all regressions, the error term includes a time invariant individual effect. We cluster standard errors accordingly. As shown in Table 3, older cohorts in our data are never affected by pension reforms. Younger cohorts are instead affected, to a different extent, as they age. Since the rules are set to become more stringent, the younger the cohort the higher the value of Z_a in terms of deviations from the minimum retirement age 50. Consider the cohort of those born in 1946. Individuals are followed over time, and any age before 1996 is a pre-reform age. The "treatment status" at each age, with respect to *Z*, is "as good as randomly assigned" to individuals, depending on their cohort of birth. We can therefore use the variability in the exposure to treatment across cohorts to identify causal effects.[9]

4. Results

Table 4 reports the estimates of the effects of *Z* on the residual working horizon *WH* for our sample of individuals aged 40 to 56 and born between 1942 and 1950. We find that adding one year to *Z* reduces eligibility by 19.44 percent [0.194/(0.202*4.939)]. There is also evidence that *WH* is lower among older and less educated workers, and higher among those who have started working at a later age. The estimated effects of pension reforms affecting Z on training incidence are shown in Table 5. We find that adding one year to *Z* raises incidence by 11.9 percent (see Column (1)). There is also evidence that training is lower among the less educated.

A potential concern with the estimates in the first column of Table 5 is that, when other policies affecting training are in place, failure to control for these policies may incorrectly attribute their effects to pension reforms. In the case of training, investments depend on training costs, which are affected by government incentives to firms and employees. During the period under study, two main training policies were in place: a) temporary national tax deductions for employers providing training during 2001 and 2002 (the so called Tremonti law); b) training incentives during the period 1994 to 2004. In Italy, these incentives have been managed by regional authorities and funded by the European Social Fund and the national government with a compulsory levy of 0.3 percent on national payroll (see Brunello, Comi and Sonedda, 2012, for details). We estimate that, during the period 1994-2004, about 3.37 billion euro at constant prices have been tendered by regions to support continuous vocational training (CVT), of which 2.7 billion euro funded by the EC. Before 1994, there were no incentives for CVT.

[8] Our qualitative results hold when we use linear probability models. They are also robust to the use of methods handling rare events. See the discusson in Tomz, King and Zeng, 2001.

[9] We are grateful to Erich Battistin for suggesting this identification strategy.

We aggregate funds from different sources and obtain gross training incentives per year, which we divide by the regional population. We then cumulate these flows over time with the perpetual inventory method, using a 3% discount rate and obtain the variable *Q*, which varies by region and time. By so doing, we allow both current and lagged incentives to affect current training, albeit with a declining weight. To ensure that this variable is predetermined with respect to annual training flows, and to take into account the lag between allocation of funds and actual expenditure, we use the first lag of *Q* as an additional covariate in (1). We also control for national training policies by adding to (1) a dummy for the years 2001 and 2002, when national tax deductions for training were in place. The second column of Table 5 shows the probit estimates (marginal effects) when we control for training policies. In the table, we present the p-value of the test that national and regional training policies are not jointly statistically significant. Since we cannot reject the null hypothesis, we conclude that these policies have been ineffective in stimulating the training investment of senior private sector employees.[10]

The marginal effect of varying minimum retirement age *M* on training *T* is equal to $\frac{\partial T}{\partial M} = \frac{\partial T}{\partial Z}\frac{\partial Z}{\partial M}$, where we estimate that $\frac{\partial Z}{\partial M} = 0.9$. When evaluated at the sample mean value of training incidence, the estimates in columns (1) and (2) of Table 5 suggest that adding one year to *M* increases training incidence for private sector employees by 6.93 to 10.71 percent, depending on the selected specification.[11] Given that minimum retirement age increased from 50 to 57 in the period under study, our results suggest that the impact of reforms on training incidence has been sizeable.

We ask whether the effect of *M* on *T* varies with respect to age and education by adding to specification (1) either the interaction of *Z* with a dummy equal to 1 if the individual is aged 50 to 56 (column (3) of the table) or the interaction with a dummy equal to 1 if the individual has low education (column (4)). We find that the interaction of *Z* with the age dummy attracts a negative coefficient, and that adding one year to *M* increases training by 12.8 percent in the age group 40 to 49, and by 10.6 percent in the older group. The estimated difference, however, is not statistically significant. We also estimate that adding one year to minimum retirement age *M* increases training by about 12 percent among those with 8 or more years of schooling and by 9.6 percent among those with less education. Again, the difference is not statistically significant.

Table 6 presents our estimates when the dependent variable is training duration. Results are qualitatively similar to those shown in Table 5. In particular, we estimate that adding one year to minimum retirement age *M* increases duration in months by 7.8 percent (8.7 x 0.9). Let training

[10] Brunello, Comi and Sonedda, 2012, find that training subsidies have had a statistically significant effect on training in a broader sample which includes individuals aged 20 or older. This suggests that subsidies have been effective in influencing training only in the sub-population of relatively young workers.

[11] The standard errors in the second column of Table 5 are clustered by region and year to take into account the higher level of aggregation of Q.

incidence and training duration - conditional on positive incidence - be equal to $\Pr ob(T=1)$ and $E[TD \mid T=1]$ respectively. Then training duration *TD* is given by $TD = \Pr ob(T=1)E[TD \mid T=1]$, and the following condition holds

$$\frac{\partial \Pr ob(T=1)}{\partial Z} E[TD \mid T=1] + \Pr ob(T=1) \frac{\partial E[TD \mid T=1]}{\partial Z} = \frac{\partial TD}{\partial Z} \qquad (2)$$

Using our results and evaluating effects at mean sample values, we estimate that $\frac{\partial E[TD \mid T=1]}{\partial Z} \frac{1}{E[TD \mid T=1]} = -0.027$, a negative effect. This suggests that higher minimum retirement age has increased the percentage of senior workers receiving training. However, the average duration of training episodes has slightly declined.[12]

Since our estimates are based on a small sample of 347 individuals, a source of concern is whether they hold in a larger sample of the Italian population. To address this concern, we use data from the Italian Labour Force Survey. The advantage of having a much larger dataset comes at the price that these data only cover training events in the four weeks before the interview. We compute training incidence as a dummy equal to 1 if a training event has occurred in the reference period and to 0 otherwise, and regress this measure on Z, age, a dummy for low education, the regional unemployment rate, a linear trend and cohort and region dummies, using a linear probability model.[13] The estimates – reported in the first column of Table 7 – confirm that increasing Z has a positive and statistically significant effect on training. In particular, we estimate that a unit change in minimum retirement age *M* increases training incidence by 4.5 percent, about half as much as in the *ILFI* sample. The smaller effect is not surprising, given that many training episodes are not counted in the Labour Force data.

Policies that alter the minimum required pension age can also affect the probability of unemployment. On the one hand, stricter retirement requirements can induce firms to terminate older workers before their retirement age, and older workers to increase their consumption of leisure by switching from career to temporary bridge jobs, experiencing unemployment spells in the transition process.[14] If these effects prevail, unemployment risks are likely to increase with *Z*. On the other hand, unemployment status could also be affected by training decisions, because additional training stimulates employment and labour market attachment, and therefore reduces unemployment risks. We investigate

[12] Let $\frac{\partial T/T}{\partial WH} = \frac{\partial T/T}{\partial Z} / \frac{\partial WH}{\partial Z}$, where $T = \{TI, TD\}$, be the percent increase in training induced by a one – year increase in the working horizon. Using the estimates reported in Tables 4-6, we evaluate this effect at 45.1 percent in the case of training duration and at 61.6 percent in the case of training incidence. These are substantial effects, that apply to very low levels of incidence and duration.

[13] Since these data are repeated cross sections, age and time do not coincide.

[14] Compared to the US, the percentage of older workers who are in bridge jobs in much lower in Europe and Italy. See Brunello and Langella, 2013.

the effect of changes minimum retirement age on unemployment by using the Italian Labor Force Survey and by regressing unemployment status – a discrete variable - on *Z* and the covariates in Eq. (1), and report our estimates in the second column of Table 7. These estimates indicate that adding one year to minimum retirement age reduces the probability of unemployment by 5.5 percent (0.9*6.1) Therefore, increasing minimum retirement not only raises training incidence but also reduces unemployment.

Conclusions

The economic meaning of increasing retirement age is clear. On the one hand, more stringent rules exogenously manipulate retirement eligibility status and have the potential of reducing the probability of retirement. On the other hand, by lengthening the residual working horizon, an increase in minimum retirement age can increase the take-up of training. Using Italian data, we have studied the effects of repeated increases in minimum retirement age on the training decisions of older workers and their employers. On the one hand, we have shown that these increases have contributed substantially to lifting training incidence above the very low levels experienced by pre-treatment cohorts. On the other hand, we have found no evidence in our data that more traditional training policies - based on the provision of training subsidies – have affected incidence.

Many policy commentators have identified training as a key mechanism to promote labour market attachment and delay early retirement. Yet the pressing question is how can we design policies that stimulate older workers and firms to invest in further training. We share the view held by other economists that training subsidies are unlikely to be an effective policy tool, especially when fiscal retrenchment is spreading across developed economies. The Italian experience suggests that policies that have increased minimum retirement age, which were originally aimed at reducing pension expenditures, have paid off also in terms of higher training for older workers, possibly because they have contributed to extend relatively short working horizons and to increase the perceived benefits from additional training.

We hasten to stress that the retirement policies considered in this paper have increased minimum retirement age from 50 to 57 years, and have therefore affected workers in their fifties. Whether similar effects would apply when retirement age is raised to either 65 or 70 years is an open question that we leave to future research.

Figures and Tables

Figure 1. Number of years required to qualify for "seniority" and "old age" pensions for an hypothetical private sector employee aged 50 and with 35 years of contributions

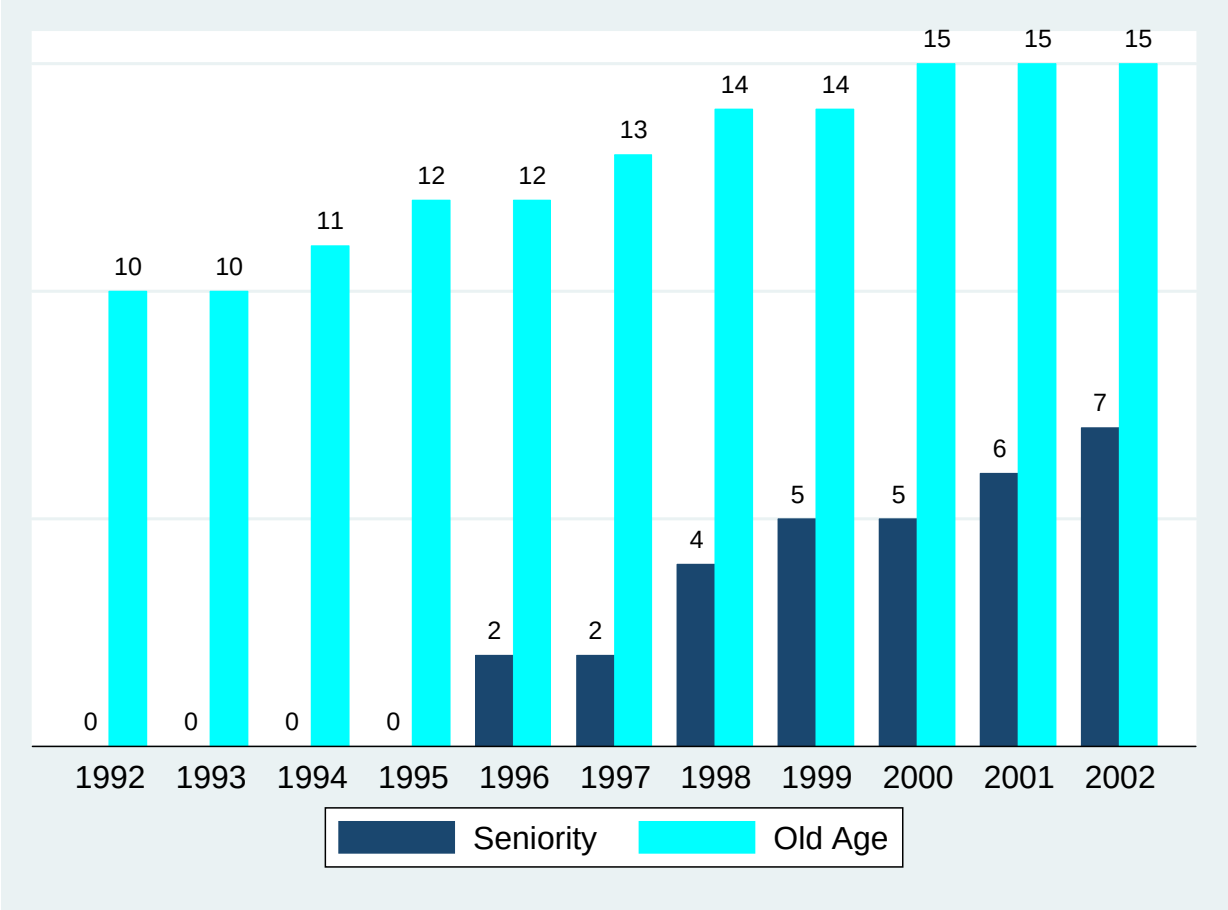

Figure 2. Percentage eligible to seniority pensions by age. Cohorts born between 1942 and 1944 (pre-reform) and between 1948 and 1950 (post-reform).

Figure 3. Age profile of the Retirement Probability. Cohorts born between 1942 and 1944 (pre-reform) and between 1948 and 1950 (post-reform).

Figure 4. Age Profiles for training incidence. By age. Cohorts born between 1942 and 1944 (pre-reform) and between 1948 and 1950 (post-reform).

Table 1. Minimum retirement age for seniority pensions. Period 1995-2004

Year	Minimum retirement age of private sector employees
Until 1995	50
1996	52
1997	52
1998	54
1999	55
2000	55
2001	56
2002	57
2003	57
2004	57

Table 2. Summary statistics. Male workers born between 1942 and 1950.

	Full sample	Cohorts 1942-44	Cohorts 1945-50
Retired	0.060 (0.239)	0.082 (0.279)	0.052 (0.209)
Percentage eligible	0.202 (0.402)	0.252 (0.431)	0.183 (0.381)
Residual working horizon (in months)	4.939 (5.936)	4.295 (6.108)	5.186 (5.855)
Training incidence	0.020 (0.171)	0.009 (0.102)	0.025 (0.202)
Training duration in months (conditional on T=1)	3.315 (2.679)	3.181 (2.088)	3.338 (2.779)
Z	1.303 (2.296)	0 (-)	1.803 (2.611)
Minimum retirement age	51.517 (2.348)	50.565 (1.520)	51.882 (2.611)
Average age	47.051 (4.645)	47.432 (4.726)	46.905 (4.582)
Age when first job started	17.855 (4.427)	17.775 (4.253)	17.885 (4.529)
Low educated workers	0.372(0.482)	0.392(0.488)	0.364(0.481)
Regional training incentives	7.425 (16.657)	2.050 (7.976)	9.901 (19.535)
Regional unemployment rate	9.871 (5.565)	9.769 (5.612)	9.910 (5.527)

Note: standard deviations within parenthesis

Table 3. Value of *Z=(M-50)*B*, by age and cohort. Private sector employees

Age	Year of birth								
	1942	1943	1944	1945	1946	1947	1948	1949	1950
40	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0
50	0	0	0	0	2	2	4	4	5
51	0	0	0	2	2	5	5	5	6
52	0	0	0	0	4	4	5	5	6
53	0	0	0	4	5	5	6	7	7
54	0	0	0	5	5	6	7	7	7
55	0	0	0	0	6	7	7	7	
56	0	0	0	0	7	7	7		

Table 4. Effects of Z on distance to eligibility WH. Workers aged 40 to 56 and born between 1942 and 1950. Linear model.

Z	0.194***
	(0.024)
Age	-0.932***
	(0.012)
Less than secondary education	-0.545***
	(0.192)
Age when first job started	0.855***
	(0.035)
Regional unemployment rate	0.002
	(0.014)
# observations	4,550

Note: the regression includes region, cohort and industrial dummies (for 1993). One, two and three stars for statistical significant at the 10, 5 and 1 percent level of confidence. Clustered standard errors within parentheses.

Table 5. Effects of Z on training incidence. Workers aged 40 to 56 and born between 1942 and 1950. Dependent variable: training incidence. Probit marginal effects. With and without controls for regional and national training policies.

	Baseline	With controls for training policies	With interaction with age	With interaction with low education
	(1)	(2)	(3)	(4)
Z * 100	0.200***	0.129*	0.238*	0.225**
	(0.076)	(0.075)	(0.126)	(0.090)
Z*100 *($50 \leq age \leq 56$)			-0.040	
			(0.091)	
Z* Less than secondary education *100				-0.046
				(0.063)
Age * 100	0.023	0.019	0.023	0.024
	(0.042)	(0.039)	(0.042)	(0.042)
Less than secondary education *100	-0.670***	-0.680***	-0.673***	-0.635**
	(0.254)	(0.208)	(0.253)	(0.268)
Age when first job started *100	0.038	0.038	0.038	0.032
	(0.028)	(0.027)	(0.028)	(0.027)
Regional unemployment rate * 100	0.107	0.142**	0.094	0.107
	(0.067)	(0.062)	(0.068)	(0.068)
Dummy for years 2001 and 2002 *100	-	0.327		
		(0.256)		
Lagged regional training incentives *100	-	0.009		
		(0.006)		
P-value of test	-	0.199		
# observations	4,550	4,550	4,550	4,550
% change in T for a unit change in Z	0.119	0.077		
% change in T for a unit change in Z - $40 \leq age \leq 49$			0.142	
% change in T for a unit change in Z - $50 \leq age \leq 56$			0.118	
% change in T for a unit change in Z - less than ISCED 3				0.107
%change in T for a unit change in Z - ISCED 3 ore more				0.134

Note: each regression includes region, cohort dummies industrial dummies (for 1993). One, two and three stars for statistical significant at the 10, 5 and 1 percent level of confidence. Standard errors clustered by region and year within parentheses.

Table 6. Effects of Z on the training duration. Workers aged 40 to 56 and born between 1942 and 1950. Dependent variable: training duration. Negative binomial marginal effects. With and without controls for regional and national training policies.

	Main estimation (1)	With controls for training policies (2)	With interaction with age (3)	With interaction with low education (4)
Z * 100	0.481***	0.435**	0.972**	0.393**
	(0.176)	(0.217)	(0.427)	(0.175)
Z*100 *($50 \leq age \leq 56$)			-0.514	
			(0.359)	
Z* Less than secondary education *100				0.154
				(0.183)
Age * 100	0.064	0.054	0.060	0.061
	(0.079)	(0.093)	(0.078)	(0.076)
Less than secondary education *100	-1.210	-1.180	-1.290*	-1.270*
	(0.745)	(0.913)	(0.747)	(0.757)
Age when first job started *100	0.134*	0.139	0.143*	0.155*
	(0.077)	(0.098)	(0.079)	(0.083)
Regional unemployment rate * 100	0.304*	0.315*	0.207	0.313*
	(0.161)	(0.182)	(0.140)	(0.156)
Dummy for years 2001 and 2002 *100	-	-0.324		
		(1.070)		
Lagged regional training incentives *100	-	0.013		
		(0.024)		
P-value of test	-	0.833		
# observations	4,550	4,550	4,550	4,550
% change in T for a unit change in Z	0.087	0.079		
% change in T for a unit change in Z - $40 \leq age \leq 49$			0.176	
% change in T for a unit change in Z - $50 \leq age \leq 56$			0.082	
% change in T for a unit change in Z - less than ISCED 3				0.071
% change in T for a unit change in Z – ISCED 3 or more				0.091

Note: each regression includes region, cohort dummies industrial dummies (for 1993). One, two and three stars for statistical significant at the 10, 5 and 1 percent level of confidence. Standard errors clustered by region and year within parentheses.

Table 7. Effects of Z on the training incidence and the probability of unemployment. Workers aged 40 to 56 and born between 1942 and 1950. Linear probability models. Source: Labour Force Survey.

	Training Incidence (1)	Unemployment (2)
Z*100	0.055**	-0.233***
	(0.025)	(0.045)
Age *100	0.047**	-0.074**
	(0.018)	(0.034)
Less than secondary education	-0.012***	0.033***
	(0.0005)	(0.001)
Regional unemployment rate	0.065***	0.073
	(0.017)	(0.048)
# observations	105,980	105,980
Percent change in incidence for a unit change in *Z*	0.050	0.061

Note: each regression includes a linear trend, region and cohort dummies. One, two and three stars for statistical significant at the 10, 5 and 1 percent level of confidence. Robust standard errors within parentheses.

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Appendix: Pension Reforms in Italy

Since 1969 (Law n.153/69) Italy adopted a mandatory PAYG (Pay-As-You-Go) pension system which included both "old age" and "seniority" pensions.[15] The system was quite generous[16] and by the end of the 1980s required urgent reforms to guarantee its sustainability. A stark example of the generosity of the system were the so called "baby pensions", which allowed married females employed in the public sector to retire and draw generous benefits after having accumulated only 14 years, 6 month and one day of social security contributions.

The 1992 Amato reform (Law n. 503/92)[17] reduced the generosity of benefits by introducing the principle that benefits should be based on average earnings during the last 10 years of individual working life for workers with more than 15 years of contributions and on average earnings during the entire working life for all other workers, rather than the 5 years used until then. Eligibility to old age pensions was also tightened. The minimum age increased gradually for males from 60 (55 for females) in 1992 to 65 (60 for females) in 2001.The number of years of contribution was also increased from 15 in 1992 to 20 in 2001 These tighter rules did not apply to workers with at least 15 years of accumulated contributions by the end of 1992. This disparity of treatment between older and younger cohorts was maintained in the subsequent reforms, leaving the former relatively unaffected. Law n. 503/92 also stated the intention to abolish the so called "baby pensions" in the public sector. Law n. 335/95, the so called Dini pension reform, changed the system from defined benefits to defined contributions. This epochal reform, however, applied entirely to those hired after 1995 and did not apply to those workers who had at least 18 years of accumulated contributions by the end of 1995.

Most important for the purpose of this paper, the Dini reform also changed the minimum age required to access seniority pensions, which typically have an earlier eligibility age than old age pensions. Until 1995, workers were eligible for seniority pensions at any age, provided that they had accumulated at least 35 years of social security contributions. Starting from 1996 employees could retire with 35 years of accumulated contributions only if they satisfied also a minimum age requirement (52). This minimum was not binding only for those workers who had accumulated a higher number of years of social security contributions (36 in 1996). Table A1, corresponding to Table B of Law 335/95, describes in more details the new eligibility rules for access to seniority pensions.

At the end of 1997, Prime Minister Romano Prodi further tightened eligibility requirements. The rules in Table A1 were maintained for blue collar workers in the private sector and for individuals who had paid at least one year of social security contributions when aged 14 to 19. Tables A2 (corresponding to Table C, Law n.449/97) illustrates the new eligibility rules in the private sector after Law n.449/97 was enacted.

[15] Individuals older than 65 who are not covered by old age pensions receive social pensions.
[16] Angelini, Brugiavini and Weber, 2009, argue that the generosity of the system has been a key reason for the relatively low labour force participation of individuals aged 55 to 64.
[17] The main Italian pension reforms that occurred in 1992, 1995 and 1997 are known as Amato, Dini and Prodi reforms respectively.

Table A1: Eligibility Rules for Access to Seniority Pensions. Law n. 335/95. Both private and public sectors

Year	Minimum Age and Years of Contribution	Minimum Years of Contributions only
1996	52 and 35	36
1997	52 and 35	36
1998	53 and 35	36
1999	53 and 35	37
2000	54 and 35	37
2001	54 and 35	37
2002	55 and 35	37
2003	55 and 35	37
2004	56 and 35	38

Table A2: Eligibility requirements for the private sector. Law n. 449/1997

Year	Minimum Age and Years of Contributions	Minimum Years of Contributions only
1998	54 and 35	36
1999	55 and 35	37
2000	55 and 35	37
2001	56 and 35	37
2002	57 and 35	37
2003	57 and 35	37
2004	57 and 35	38