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Ageing and firm-sponsored training: the role of pension reforms in Italy

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Ageing and firm-sponsored training: the role of pension reforms in Italy[1]

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Abstract. This paper takes advantage of a recent pension reform to study the effect of ageing upon workplace training activities. While economic theory is inconclusive on the expected effect – inasmuch as training can be effective in reducing the productivity gap of old-age workers, but the payback period of training investments would in their case be very short – our empirical analysis clearly suggests that firms react to increased retirement age by increasing training, provided that the related costs are funded through external resources. Distinguishing by sector and firm size the results of the empirical analysis allow us detecting some specific and different patterns between small companies in the service sector on the one hand, and larger ones from manufacture on the other.

Keywords: Ageing, Workplace Training, Pension reforms, Fornero reform, Italy

JEL: J24, J26

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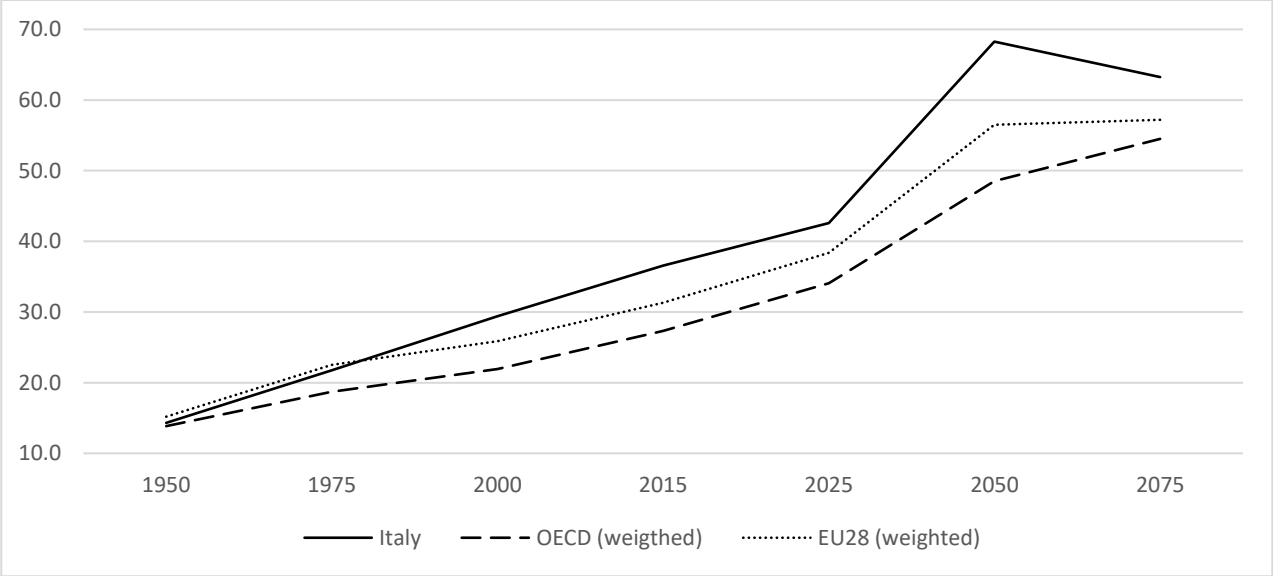
1. Introduction

Population ageing is one of the key challenges facing the world economy. In 2010, for the first time in the European Union, the share of individuals aged 55-64 surpassed the share of those aged 15 to 24 (Eurofound, 2012). In a few decades, the old-age dependency ratio – understood as the ratio of the number of people aged 65 or more to the number of those in the working-age population (i.e. aged 15-64: Figure 1) – is expected to threaten the sustainability of the public finance of most advanced economies (Disney, 2007). In order to alleviate this pressure on public finance, active ageing policies aimed at boosting older workers' employment are increasingly implemented all across advanced economies In particular, a generalized – although heterogeneous in terms of magnitude and timing – delay of minimum retirement age has been widely introduced (OECD, 2015). That is, aged workers employment and employability have been partly pursued by pushing age requirements to get a pension upwards. The existing empirical literature generally supports this strategy (Manoli and Weber, 2016; Mastrobuoni, 2009; Staubli and Zweimüller, 2013), although unintended substitution effects on alternative welfare schemes should be considered (Ardito, 2017).

Figure 1: Demographic old-age dependency ratios: historical and projected values, 1950-2075



Source: OECD (2015)

When combined with a strict employment protection legislation (EPL) and rigid compensation schemes, tightening retirement rules may nonetheless have detrimental effects upon generational turnover and skill formation at the company level. The intuition is that if, at old age, wages grow

faster than productivity – e.g. due to the existence of deferred compensation schemes – senior workers become progressively unprofitable to the firm. Within such context, strict EPL may induce firms to keep at work (aged) workers that would have let retire otherwise. The literature on the relationship between age and productivity provides mixed results. Older workers may suffer from skill obsolescence (De Grip and van Loo, 2002; Rosen, 1975) and from declining cognitive abilities (Verhaegen and Salthouse, 1997). The implications on productivity seem to be negative (Anderson et al., 2002; Crepon et al., 2002; Haltiwanger et al., 1999; Hægeland and Klette, 1999; Ilmakaunnas et al., 1999) although Warr (1994) suggests instead that age is a poor predictor of work performance. What is important to our analysis, however, is that a general evidence that wages grow faster than productivity exists (Crepon et al., 2002; Dostie, 2011; Dygalo and Abowd, 2005; Ilmakaunnas and Maliranta, 2005).[2]

If employers cannot react to changing retirement rules through lower wages or by firing older workers, the adjustment has to occur on other margins (Brandolini et al., 2016). Boeri et al. (2016) study the reaction of Italian firms to Italy's 2012 pension reform in terms of generational turnover finding that "a lock-in of five workers for one year reduces youth hiring of approximately one full-time equivalent worker". Training has emerged as another adjustment channel (Mahyew and Rjkers, 2004) to update and strengthen aged workers' competences, thus reducing the gap between individual productivity and remuneration. A large evidence, indeed, shows that skilled aged workers have a significantly higher probability of remaining in the labor market than their unskilled peers, and to retire later (Bassanini et al., 2007; Battistin et al., 2012; OECD, 2015). However, employers may have low incentives to invest in older workers' skill formation, as the payback period would be anyway rather short (Skirbekk, 2004).

The main aim of our paper is exactly to study *how ageing affects firms' training policies*. Although not totally new to empirical analysis, the evidence on this issue is rather scant. Montizaan et al. (2010) exploit a natural experiment situation using data on the Dutch public sector; their results show that a retirement age postponement has a positive but small impact on the training participation of senior public-sector employees. Focusing on a sample of Italian males aged between 45 to 56, Battistin et al. (2012) show in turn that one-year increase in minimum (early) retirement age increases training participation by 12%. The analysis performed by Brunello and Comi (2013) moves along analogous lines suggesting that training intensity is significantly spurred for workers affected by pension reforms as compared to cohorts escaping their effects.

Our analysis exploits a comparable identification strategy – i.e. a pension reform tightening age requirements to retire – but improves on the existing literature by exploiting a unique survey on

[2] Neither view remains however unchallenged: see Hellerstein et al. (1999).

firms repeatedly observed over time, with an extremely rich set of information on training decisions, dedicated questions on the pension reform used for identification, and representative at the national level. In particular, our paper, contrary to the literature briefly surveyed above, focuses on training *supplied* by firms rather than on training *demanded* by workers. Moreover, it spans over a number of training measures, including total and per-employee cost as well as the share of trained workers over total employment. Eventually, it allows identifying who ultimately pays for training, by distinguishing the source by which training was originally funded. Our results unambiguously suggest that ageing brings a positive effect on the share of workers undergoing workplace training. However, this does not imply that employers react to ageing by providing older workers with more training. Indeed, the total cost of training is not affected by the reform, and the source of financing shifts from internal resources to the so-called *bilateral* funds, i.e. to sources co-funded by unions.

The paper proceeds as follows: next section describes the institutional background and explains why our case-study – i.e. Italy – represents an ideal test-bed to our purposes. Section three introduces the data, discusses the sample selection issues and presents some descriptive statistics. In section four we present the estimation strategy. Section five describes both our main results and some robustness checks in terms of disaggregation by sector and firm size. Section six eventually discusses the potential sources for estimation bias and concludes.

2. Institutional background

In order to identify the effect of ageing on workplace training, we take advantage of a pension reform recently introduced in Italy as part of the austerity measures that followed from the sovereign debt crisis, i.e. the so-called "Fornero reform".[3] The Fornero reform was introduced in December 2011 with Decree 201/11, confirmed under Law 214/11 two weeks later, and eventually enforced starting from January 2012. It followed a long series of pension reforms that started in the early nineties and progressively tightened the age requirements to retire, while at the same time reducing the amount of benefits (Ardito, 2017). Its main changes with respect to former rules – as established under Law 247/07 and marginally reviewed by Laws 122/10 and 148/11 – have been:

(i) The introduction of stricter requirements and of monetary penalties for seniority retirement. Under Law 247/07, seniority retirement was possible provided that the sum of age and years of contribution reached a minimum threshold (called *quota*), that was set to grow to 97 for dependent

[3] After the name of the Labor Minister under the Monti Government.

workers by 2013. The Fornero reform substituted the *quota* system with a scheme of early retirement in which the access to seniority pensions is possible if a minimum of 42 years and 1 month of pension contributions have been paid.[4] Moreover, pensions are subject to a 1% (2%) cut if the retiree is younger than 62 (60) years old.

(ii) The introduction of stricter requirements to get an old-age pension. Under Law 247/07 the requirements for old-age retirement were 65 years old for men, depending instead on sector for women. With the Fornero reform the age requirement became 66 for everybody, set to grow at 67 by 2022.

Italy and the Fornero reform represent then an ideal test-bed to assess the impact of ageing upon workplace training polices for a number of reasons. First, Italy has among the oldest population among advanced economies, well above the OECD and the EU average (Figure 1). Second, although in Italy a legal minimum wage does not exist, the combination of minimum pays set by collective agreements at the sectoral level and extending also to non-unionized workers, with little margins to derogate at the firm level, result in an extremely limited individual wage drift (Devicienti et al., 2007). Third, in Italy a clear system of seniority wage schemes does exist (Brugiavini and Peracchi, 2010). Fourth, employment protection legislation for senior workers is typically high for historical reasons, as they mostly entered the labor market and completed their careers – what often involved working in a medium or large firm, where protection is higher – before the deregulation season started (this fact, for instance, has protected senior workers more than younger ones from the employment losses implied by the economic crisis: Eurofound, 2012). Fifth, the Fornero reform could by no mean be anticipated by the firms, as it was introduced only 20 days after the Monti government installed, and enforced another 25 days later, with no discussion with the social partners and under tight international pressure for budget recovery (Eurofound, 2012; Sacchi, 2015). Eventually, Italy displays one among the highest labor discrimination rates, and the main source of discrimination is exactly age (Rymkevitch and Villosio, 2008).

[4] The threshold was set at 41 years and 1 month for women.

3. Data and sample selection

The impact of the Fornero reform is analyzed exploiting a representative panel of Italian firms observed over the period 2010-2014 in the private non-primary sector. The dataset used for the analysis is a subsample of the *Rilevazione Imprese Lavoro* (RIL), developed by the National Institute for the Analysis of Public Policies (INAPP). This survey collects information – organized in waves taking place every three or four years: we use the 2011 and 2015 waves[5] – on firms' characteristics, activities and performance. The detailed information on training represents a specific strength of the RIL dataset. Unlike most of the alternative sources – which typically provide only yes/no pieces of information – RIL reports the exact number of workers that take part into training programs, the amount of monetary resources invested, and the source of financing, including the use of public subsidies. Combined with data with workforce characteristics, RIL allows us to build refined training intensity measures. With respect to the specific exercise proposed here, moreover, a dedicated question makes the use of RIL of pivotal importance. In the 2015 wave, firms are asked whether, as consequence of the unexpected retirement age postponement the followed from the Fornero reform, they were forced to step back from previously programmed recruitment plans. Thanks to this question, we are able to discriminate between firms whose recruitment plans were affected by the reform, and those that were not: this will be our treatment variable. As outcome variables we distinguish instead among five different measures of training at the company level: the share of employees undergoing training, (logarithm of) total training costs, (logarithm of) per-employee training costs and two dichotomous variables taking the value of one when firms make use of internal funds and/or of bilateral funds to finance training activities.

In order to focus our attention upon firms with at least a modicum of potential for recruitment and training policies, we restrict the sample to companies with ten employees or more. In other words, we assume that in micro firms there is little room for combining training policies with generational recruitment plans. After dropping the outliers – defined as firms belonging to the first or the last centile of one of the dependent variables' distributions – we remain with a panel of more than 3,000 companies observed for two consecutive wave of the survey. Table 1 presents a set of descriptive statistics: rather evidently, all training measures report a positive trend. More specifically, we find that the share of firms undergoing some workplace training activities grows from less than 44% to more than 58% (+ 33%). This mirrors into a growing share of trained workers – from 22.8% to 38.7%

[5] Information is collected through retrospective interviews that follow the reference period by one year (e.g., the 2015 wave has information on the situation in 2014)

- as well as into a larger per-company expenditure (from roughly €4,500 to more than €6,200). Evidence on per-trainee expenditure – the trend of which is also positive – suggests that total expenditure grew more than the number of trainees. Such costs have been funded both through internal resources, and with bilateral funds.

Table 1: descriptive statistics

	2010			***2014***		
	Obs.	*Mean*	*s.d.*	*Obs.*	*Mean*	*s.d.*
Training investment (y/n)	4,756	0.438	0.496	4,524	0.584	0.493
Use of internal funds (y/n)	4,746	0.306	0.461	4,524	0.401	0.490
Use of bilateral funds (y/n)	4,742	0.042	0.200	4,521	0.092	0.289
No. of trained workers	4,746	10.672	54.962	4,511	16.012	87.147
Share of trained workers	4,756	0.228	0.344	4,524	0.387	0.418
Total training cost (€)	4,423	4531.5	30903	3,759	6258.4	47308
Per-employee training cost (€)	4,431	98.5	452.7	3,760	123.3	556.4

Source: own computations on RIL data

4. Estimation strategy

Based on that the RIL database includes an extremely rich set of information – what leaves, in principle, little room for unobserved heterogeneity – we first perform a standard pooled OLS regression specified as follows:

$$TRAIN_{it} = \alpha_0 + \alpha_1 RET_{it} + \alpha_2 X_{it} + \tau_t + \varepsilon_{it} \qquad (1)$$

where $i = \{1, \dots, N\}$ and $t = \{2010; 2014\}$ are firm and wave identifiers respectively, $TRAIN$ stands for one of the five outcome variables described above and RET is a dummy taking the value of one if the firm had to change its recruitment plans as a consequence of the Fornero reform (our treatment variable). Moreover, X is a set of controls including managerial (employer's education and age and family ownership) and firm's (age, size, sector of activity, region, workers' turnover, presence in foreign markets, innovation and R&D activities) characteristics, as well as workforce composition in terms of gender, age, education, occupation and contract arrangement (i.e. temporary or permanent); τ is a dummy taking the value of one in 2014 and aimed at controlling for the presence of common trends, while ε is an idiosyncratic shock assumed to have $E[\varepsilon|RET, X, \tau] = 0 \; \forall \; t \in \{2010; \; 2014\}$.

In spite of the large set of observables, we cannot rule out the possibility that the assumptions on ε_{it} are not violated in our data. We hence take advantage of the panel structure of RIL data to estimate the following richer specification:

$$TRAIN_{it} = \alpha_0 + \alpha_1 RET_{it} + \alpha_2 X_{it} + \delta_i + \tau_t + \varepsilon_{it} \qquad (2)$$

where δ is a firm-specific time-invariant effect capturing observed and unobserved company-specific features. Eventually, following a stepwise estimation procedure, we accommodate for the possibility that treated and untreated units may have structurally different levels of training measures, and for the opportunity that the existence of some outlier firms may drive the results. In order to do this we estimate a difference-in-differences specification in which treated and control firms have been paired using a propensity score matching procedure, where the score has been estimated using controls in specification (1) as predictors.

5. Results

5.1 Whole sample

Estimation results are presented in Table 2, where the different training measures appear in the rows, and the three estimation strategies in the columns.

Our estimates unambiguously show that the exogenous ageing shift implied by the reform under scrutiny resulted in an increase of the share of trained workers (line one): our most conservative estimates suggest an effect of around five percentage points. Rather consistently, we also find that the total (per-company) as well as the average (per-trainee) cost of training increased, by almost 50% and by 22-25% respectively, but these estimates do not survive the fixed-effects approach (lines four and five). Combined with the result that the Fornero reform displaced youth employment (Boeri et al. 2017), we can conclude that at least part of the effects we have detected are related to old-age workers. In other words, firms reacted to ageing by investing more in old-age workers' training. While this is consistent with the idea that firms use training to enhance the productivity of unprofitable workers in a context of high employment protection and of downward wage rigidity, it appears more at odds with the fact the payback period for such a huge investment – 50% in terms of overall spending

growth – would be very short (a few years at most).[6] Results in lines two and three of Table 2 help us to solve the puzzle. All of our estimates suggest that training has been enhanced by using bilateral training funds, what left unaffected firms' own funds. Put it differently, firms have increased workplace training, but its funding has been at least partially externalized. On top of being consistent with the idea that firms are not willing to invest money when the payback period is too short, this is also coherent with the results we have obtained from a companion piece of research, in which we go deeper into the role that unions play in training and skill formation (Berton et al., 2017a). Interviews to key informants, indeed, indicate that unions play in general a rather passive role in designing workplace training policies, unless it becomes an issue of (re)training old-age workers at risk of being laid off.

Table 2: estimation results, full sample

	Pooled OLS	***Fixed Effects***	***DiD with PSM***
Share of trained workers	.050** (.023) 6596 - .121	.083** (.031) 6596 - .091	.051*** (.018) 6596
Use of internal funds (y/n)	-.018 (.03) 6589 - .041	-.062 (.043) 6589 - .016	-.024 (.023) 6589
Use of bilateral funds (y/n)	.052** (.025) 6585 - .190	.068** (.034) 6585 - .059	.065*** (.018) 6585
Per-employee training cost (log of)	.249* (.144) 6143 - .175	-.060 (.217) 6143 - .072	.215* (.130) 6143
Total training cost (log of)	.469** (.237) 6128 - .282	-.068 (.357) 6128 - .087	.429** (.234) 6128

Source: own computations on RIL data. **Notes:** robust (bootstrapped) standard errors in second lines; number of observations and adjusted R-squared in third lines; *** = 1% significant; ** = 5% significant; * = 10% significant. Control variables: managerial characteristics (employers' education, age, family ownership), workforce composition (gender, age, education, professions, fixed term contracts), gross workers turnover, vacancy, performance related pay, firms' characteristics (age, physical capital per capita, sector of activity, size, macro-region, foreign markets, product innovation, process innovation).

5.2 Robustness checks

Once separated by sector and firm size (Tables 3-6), the results reported in Table 2 show different patterns. The positive effect of ageing – as identified by the pension reform under scrutiny – upon the

[6] The reader should not be surprised by such a huge percentage growth of training costs, provided that the starting values are rather small: €98.5 in terms of per-trainee costs, and €4,500 in terms of overall (company-level) expenditure.

share of trained workers, the total cost of training and per-employee training expenditure, appears driven by small firms in the service sector (two largely overlapping dimensions: Tables 5 and 4 respectively), with no leakage on the use of bilateral funds. As neither internal funds look affected by the increased training activity – and the related costs – we must presume that small companies from the service sector rely upon alternative external funds, e.g. other regional or European programs.

Table 3: estimation results, manufacturing sector only

	Pooled OLS	***Fixed Effects***	***DiD with PSM***
Share of trained workers	.025 (.030) 3931 - .104	.066* (.040) 3931 - .111	.032 (.023) 3931
Use of internal funds (y/n)	-.044 (.037) 3927 - .038	-.074 (.054) 3927 - .026	-.033 (.030) 3927
Use of bilateral funds (y/n)	.080** (.032) 3923 - .204	.098** (.043) 3923 - .055	.078*** (.025) 3923
Per-employee training cost (log of)	.068 (.176) 3666 - .176	.125 (.265) 3666 - .107	.238 (.162) 3666
Total training cost (log of)	.231 (.293) 3662 - .282	.184 (.449) 3662 - .115	.391 (.303) 3662

Source: own computations on RIL data. **Notes:** robust (bootstrapped) standard errors in second lines; number of observations and adjusted R-squared in third lines; *** = 1% significant; ** = 5% significant; * = 10% significant. Control variables: managerial characteristics (employers' education, age, family ownership), workforce composition (gender, age, education, professions, fixed term contracts), gross workers turnover, vacancy, performance related pay, firms' characteristics (age, physical capital per capita, sector of activity, size, macro-region, foreign markets, product innovation, process innovation).

On the contrary, the use of bilateral funds emerges from larger firms and the manufacturing sectors, again two strongly related features, as manufacturing firms are larger on average. Rather surprisingly, however, no effect seems to suggest that these companies are reacting to an exogenous positive shock to their workers' age by increasing training activity.[7] This is consistent with the hypothesis that large firms from the manufacturing sector have reacted to the increased retirement age by shifting their training programs from young and mature-age workers to older employees, and

[7] A positive effect on total cost of training and on per-trainee expenditure emerges only when applying the fixed-effect model (2) to large companies (Table 6).

by taking advantage – to do this – of the availability of bilateral funds, which have probably substituted other external sources of financing.[8]

Table 4: estimation results, service sector only

	Pooled OLS	***Fixed Effects***	***DiD with PSM***
Share of trained workers	.093** (.038) 2665 - .161	.106** (.051) 2665 - .087	.036 (.030) 2665
Use of internal funds (y/n)	.039 (.051) 2662 - .052	.048 (.075) 2662 - .030	-.014 (.038) 2662
Use of bilateral funds (y/n)	.010 (.040) 2662 - .181	.014 (.054) 2662 - .085	.012 (.026) 2662
Per-employee training cost (log of)	.479* (.250) 2477 - .190	.329 (.361) 2477 - .068	.077 (.224) 2477
Total training cost (log of)	.783* (.401) 2466 - .296	.368 (.559) 2466 - .086	.409 (.380) 2466

Source: own computations on RIL data. **Notes:** robust (bootstrapped) standard errors in second lines; number of observations and adjusted R-squared in third lines; *** = 1% significant; ** = 5% significant; * = 10% significant. Control variables: managerial characteristics (employers' education, age, family ownership), workforce composition (gender, age, education, professions, fixed term contracts), gross workers turnover, vacancy, performance related pay, firms' characteristics (age, physical capital per capita, sector of activity, size, macro-region, foreign markets, product innovation, process innovation).

This interpretation is consistent with the well-established fact that large firms in the manufacturing sector are more unionized – and are therefore likely to benefit from a privileged access to bilateral funds – and with evidence from Berton et al. (2017a) suggesting that unions' involvement into training programs within the manufacturing sector – and with blue-collar workers in particular – becomes pivotal only in cases of (a risk of) firm closure, and when (re)training emerges as an employment protection device, a feature largely related to ageing workforce.

[8] The effect on the use of internal funds is indeed null or, if any, positive when using a fixed-effect model on large firms only (Table 6)

Table 5: estimation results, small firms (less than 50 employees) only

	Pooled OLS	***Fixed Effects***	***DiD with PSM***
Share of trained workers	.093** (.037) 4658 - .093	.105** (.048) 4658 - .092	.011 (.023) 4658
Use of internal funds (y/n)	.008 (.045) 4655 - .049	.031 (.061) 4655 - .031	.009 (.028) 4655
Use of bilateral funds (y/n)	.008 (.028) 4653 - .034	.026 (.038) 4653 - .042	.019 (.014) 4653
Per-employee training cost (log of)	.566** (.220) 4397 - .112	.585** (.292) 4397 - .088	.360** (.160) 4397
Total training cost (log of)	.878** (.342) 4396 - .124	.899** (.458) 4396 - .094	.656*** (.247) 4396

Source: own computations on RIL data. **Notes:** robust (bootstrapped) standard errors in second lines; number of observations and adjusted R-squared in third lines; *** = 1% significant; ** = 5% significant; * = 10% significant. Control variables: managerial characteristics (employers' education, age, family ownership), workforce composition (gender, age, education, professions, fixed term contracts), gross workers turnover, vacancy, performance related pay, firms' characteristics (age, physical capital per capita, sector of activity, size, macro-region, foreign markets, product innovation, process innovation).

Table 6: estimation results, large firms (50 employees or more) only

	Pooled OLS	***Fixed Effects***	***DiD with PSM***
Share of trained workers	.009 (.030) 1938 - .162	.070 (.043) 1938 - .133	.106*** (.034) 1938
Use of internal funds (y/n)	.011 (.040) 1934 - .041	.138** (.064) 1934 - .062	-.066 (.045) 1934
Use of bilateral funds (y/n)	.062 (.041) 1932 - .185	.088 (.061) 1932 - .110	.111** (.044) 1932
Per-employee training cost (log of)	.110 (.188) 1746 - .204	.825** (.329) 1746 - .076	.092 (.236) 1746
Total training cost (log of)	.101 (.345) 1732 - .282	1.392** (.593) 1732 - .095	.299 (.459) 1732

Source: own computations on RIL data. **Notes:** robust (bootstrapped) standard errors in second lines; number of observations and adjusted R-squared in third lines; *** = 1% significant; ** = 5% significant; * = 10% significant. Control variables: managerial characteristics (employers' education, age, family ownership), workforce composition (gender, age, education, professions, fixed term contracts), gross workers turnover, vacancy, performance related pay, firms' characteristics (age, physical capital per capita, sector of activity, size, macro-region, foreign markets, product innovation, process innovation).

5. Discussion and concluding remarks

In this paper, we exploit a pension reform recently introduced in Italy to assess the impact of ageing on workplace training policies. We find that an exogenous ageing shift of a few years results in a higher share of trained employees and in larger monetary investments in training. While this is consistent with the idea that training is a viable solution to increase productivity of unprofitable workers in a context of high employment protection and of downward wage rigidity, our results may appear more puzzling once one considers that the payback period for such training investments would be rather short. The puzzle is solved by observing that training investments are not funded out of companies' internal funds, but from sources co-funded by unions. More details emerge once results are distinguished by sector and firm size. Small companies from the service sector react to the exogenous shift in retirement age by expanding their training activity, and by funding it through external funds. Larger firms from the manufacturing sector seem instead to shift training from younger to older workers, and to fund this strategy through funds co-managed with the unions.

Our identification strategy may nonetheless be compromised by the introduction, during the same years, of two other major labor market reforms in Italy. A few months after the pension reform we are using here for identification, Minister Fornero, with Law 92/2012, also proceeded to a harsh reduction of employment protection legislation on open-ended contracts. We have discussed that training is an option that firms may decide to undergo in spite of the short payback period in a context of high EPL and downward wage rigidity; if the constraint on employment protection is reduced and the two reforms are correlated at the firm level – e.g. employers took advantage of the lower EPL and used layoffs as a functional substitute of training – our estimates on training measures may be biased downward. Indeed, there is evidence that Law 92/2012 resulted in increased layoffs of mature workers with low educational attainment (Berton et al., 2017b), i.e. those workers that are presumably more in need or (re)qualification. We have circumvented this limitation in two ways. First, as Law 92/2012 applies only to firms with more than fifteen employees, we have controlled for firm size. Second, we rely on that the question on pension reforms should unambiguously refer to changing recruitment strategies due *exclusively* to the pension reform, net of other reforms that may have been introduced in the same period.

The second confounding effect may arise from Law 148/2011. At its article 8, it introduces the option – for firm-level collective bargaining – to derogate *in peius* to national agreements, which in Italy apply to a whole sector. In principle, hence, companies may have reacted to the pension reform by lowering old-age workers' wages. This possibility is however rather implausible: plant- and local-level collective agreements have the possibility to derogate to national collective

agreements provided that they are signed by the most representative unions at the national or local level; this condition may give rise to a massive number of lawsuits from national union representative questioning the representativeness of local signers. For this reason, only a few companies took that way.[9] Moreover, Article 8 of Law 148/11 is dedicated a specific question in the RIL survey, that we use as control in our specifications. Eventually, and again, the question on the Fornero pension reform is very specific, and should be apt to prevent that interviewees may confound its effects with those due to other reforms.

[9] The labor market provisions of Law 148/2011 were indeed considered not sufficient by the European Commission, the European Central Bank and the International Monetary Fund, that withdrew their support to the Berlusconi government and led to the installment of a technical government headed by Mario Monti in November 2011 (Sacchi, 2015).

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