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ABSENTEEISM, PENSION REFORMS AND GRANDMOTHERS

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Absenteeism, Pension Reforms and Grandmothers[♥]

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Abstract

Both economic and epidemiological literature have shown that perceived high strain at work and lack of social infrastructures are good predictors of sick-leave. The latter is particularly relevant in (Mediterranean) countries where facilities for children and LTC services are relatively scarce and women are frequently asked to fill the gap. The Italian 2011 pension reform, approved under the threat of a financial crisis, significantly restricted age and seniority requirements for retirement, especially for women in private employment, who still enjoyed a much more favorable treatment than men and women in public service. We investigate whether (employed) older Italian women reacted to the postponement of retirement by increasing their recourse to sick-leave. The empirical analysis, based on a noteworthy administrative data set provided by the Italian Social Security Agency, offers unequivocal evidence that this has indeed been the case, in particular for grandmothers.

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Keywords: Pension reform, sick-leave, child-care

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1. Introduction

The paper investigates whether a hardening of age/seniority pre-requisites for retirement determines an increase in sick-leave spells taken by workers. It measures the intensity of the effect by analyzing the response of Italian women to the radical pension reform (law 214), which in 2011, under the threat of a financial crisis, significantly increased the effective retirement age. We focus on middle aged women employed in the private sector, i.e. the group who, due to an implicit ex-post compensation for discrimination in the labor market, still enjoyed more favorable retirement conditions and who experienced, because of a short transition to uniform rules, the sharpest restriction in the age/seniority requirements.

Our aim is to look for a possible "substitution effect" between (postponed) retirement and sick-leave. The exercise is complicated by the fact that recourse to sick-leave by Italian middle aged women has been influenced, in recent years, by a number of conflicting forces. On the one hand, as just said, unexpected restrictions to retirement may induce more sick-leave (the effect that we want to measure), for specific health reasons or as a pretext for attending family chores, like care for grandchildren and/or older family members.

On the other hand, Italy has gone through a deep and prolonged recession that has reduced households' incomes and increased the area of economic vulnerability. With a very sluggish labor market and high unemployment, layoffs are more likely and absence-prone workers are typically among the first to be dismissed. Job loss fear can be enough to reduce absences to the strictly indispensable minimum (Leigh 1985). Moreover, the Italian labour market reform (approved a few months after the pension reform, see Fornero 2014) reduced employment protection, and economic literature has extensively documented that there is a positive correlation between employment protection and absenteeism (Ichino and Riphahn 2005). Finally, sick-leave can have negative effects on individuals' working careers[1] with likely consequences also on pension benefits (in Italy still largely determined, for current and quasi-retirees, according to a defined benefit formula, based upon the average salary of the final 10 years).

Our aim is to isolate the "pure" effect of the Italian pension reform on absenteeism.

The literature on absenteeism is quite rich. Both economic and epidemiological research have highlighted that perceived high strain at work and low social support are good predictors of sick-leave (Andreassen and Kornstad 2010 and Moreau et al. 2004). It has also been shown that the cost of being absent significantly affects work absence behavior (see Johannson and Palme 1996 and 2002). Both sick-leave regulation and its implementation play a key role in determining individuals' absence choices. Concerning Italy, Scoppa (2010) and Scoppa and Vuri (2014) have already pointed out how sick-leave is relatively higher among workers with higher seniority and more stable contracts, employed in public sector or in big private firms and living in regions with low unemployment levels. These findings, which refer to the pre-reform situation, are explained by the authors as the result of workers' opportunistic behavior in a country with low controls and high employment protection.

The literature on the effects of pension reforms, on the other hand, has concentrated on the consequences of a change in retirement rules on wealth accumulation and savings (Attanasio and Rohwedder 2003); on work and retirement decisions of individuals and couples (Belloni and Alessie 2009, Colombino et al. 2011); on the adequacy of retirement resources and on income

[1] No estimate for Italy is available, but for Norway, Markussen (2012) estimated that a one percent increase in sick-leave rates leads to a drop in earnings of about 1.2 per cent in the following 2 years.

distribution (Fornero, Lusardi and Monticone 2010, Borella and Coda Moscarola 2006 and 2011); on long-term employment and growth (Buyse et al. 2013).

To the best of our knowledge, the effects of pension reforms on absenteeism have not yet been analyzed. We find evidence of higher sick-leave absences for women that were obliged to postpone retirement by the 2011 Italian reform and in 2011 (before the reform) already experienced a sick-leave spell, with a significant direct correlation between weeks of absence and years of retirement delay. Women that in 2011 did not already have a sick-leave spell react to the postponement of retirement only if they are grandmothers, probably as a last resort solution to cope with caregiving duties towards grandchildren.

The remainder of the paper is organized as follows. Section 2 describes the Italian normative framework. Section 3 describes the empirical model. Section 4 presents the data and the descriptive statistics. Estimates on the effect of pension reform and care duties on absenteeism are presented in Section 5. Section 6 concludes.

2. The Italian normative framework

Since our analysis is centered on how reforms shape individuals' behavior, we start with a brief overview of the Italian retirement and sick-leave regulation.

2.1 The pension system before and after the 2011 swift reform

The Monti-Fornero reform (law 214/2011) is the latest stage of a very long and slow restructuring of the Italian pension system that started (once again in a financial emergency) in 1992. The new reform was introduced at a time when it was imperative to act immediately in order to avoid a potentially devastating crisis not only for Italy but for the whole Eurozone. Unlike all previous reforms (and perhaps because of their excessive gradualism), there was a very short phasing in period and an almost immediate and quite radical restriction in eligibility conditions to early retirement (Fornero 2015).

One of the key features of the new reform was the immediate implementation, as of January 1st 2012, of the Defined Contribution (DC) formula, for all workers for future seniorities and irrespective of their distance to retirement. This was meant to give back credibility to the DC formula and to do away with the unsustainable differentiation in pension provisions that had been created by the excessively gradual phasing in of the 1992 reform, and later confirmed by all subsequent reforms[2], that had put almost all the weight of the reform on the shoulders of the younger generations. The reform also introduced more stringent age and seniority requirements to both early and normal retirement.

[2]The segmentation was a way to reduce the political and social opposition to pension restructuring. In particular, after the 1995 reform, it meant a division of workers into three different groups, depending on their seniority at 31st December 1995:

- Defined Benefit (DB) workers, i.e. workers with more than 18 years of seniority, entitled to maintain, also for future seniority, the rather generous DB formula;
- Pro-rata Defined Contribution (pro-rata DC) workers, i.e. workers with less than 18 years of seniority whose pension benefit would be calculated according to a pro-rata mechanism (DB for past seniority and DC for future seniority);
- DC workers, i.e. new entrants whose pension benefit would be entirely computed with the DC formula.

Pre-reform requirements for women in private employment that in 2012 were relatively near to retirement[3] were as follows:

- 40 years + 1 month of seniority (Pure seniority pension) and a minimum effective seniority of 35 years (that is by excluding notional contributions for sick-leave and unemployment spells) or
- 20 years of seniority and a minimum age of 60 (Old age pension) or
- a sum of age+seniority greater or equal to 96, with a minimum effective seniority of 35 years and minimum age of 60 (the so-called "quota" pension) or
- a minimum age of 57 years and an effective seniority of 35 years, in case the worker opt for a pension benefit calculated according to the DC formula (DC option, valid only for women and until end of 2015).

A further year (the so-called “pension window”) was actually added to the above requisites since, once the worker had reached the conditions for retirement, she had to wait a year before getting her first pension payment; it was thus normal to continue to work. Age/seniority requirements were supposed to gradually increase to align with the ones of men and, starting from 2013, would have been subject, on a three year basis, to indexation to life expectancy.

Post-reform requirements were as follows:

- a seniority requirement of 41 years + 1 month (Pure seniority pension) and a minimum effective seniority of 35 years[4] or

- a minimum age of 62 with 20 years of contribution (Old age pension) or

- a minimum age of 57 years and an effective seniority of 35 years. Under this modality, accessible only until 31 December 2015, the pension benefit will be fully calculated according to the DC formula (DC option).

Age/seniority requirements gradually increase to align with the ones of men. Indexation of age/seniority requirements to life-expectancy was confirmed and its implementation anticipated to 2013; since 2018 the time lapse will be two years instead of three.

Only a few exceptions to the new rules have been allowed: private employees that at 31st December 2012 accrued quota 96 (age 60 + effective seniority 36 or age 61 + effective seniority 35) and women aged 60+ with at least 20 years of seniority can retire at age 64.

For greater transparency, the reform also abolished (except for the DC pension option) the "pension window", which means that the pension benefit is paid the month after retirement.

Table A1 (in Appendix A) compares more extensively the pre and post-reform provisions.

2.2 Sick-leave regulation

The Italian sick-leave regulation is based on the principle of not penalizing the sick worker, and therefore to guarantee both the salary and the pension wealth. All illness-due absences lasting more than one week lead to notional payrolls periods, i.e. contributions that are financed by either health

[3] That is women pertaining to DB and pro-rata DC categories according to note 3.

[4] A penalization on the pension amount was introduced for individuals retiring before the age of 62, but was later frozen until December 2017.

payroll taxes or general taxation. Notional contribution periods are used for the computation of both eligibility requirements and the pension benefit. Accreditation is conditional on having contributed to the Social Security scheme for more than one week before the start of the illness and since 2009 it is subject to a maximum of 96 weeks in the whole working life (National Social Security Institute - INPS, Circolare n.11, 24-01-2013)[5].

3. The empirical model

3.1 Possible outcomes of an increase in age/seniority requirements

Workers affected by the restrictions of a pension reform can either continue to work or withdraw from the labor market, and live on savings and/or spouse income. In what follows, we only consider those who continue their working activity. Some of them go on working with no increase in their morbidity rate (or following the trend shown in previous years), while others resort to additional sick-leave. This group may consist of workers that effectively experience a worsening in their health status, or subjectively perceive a worsening of their wellbeing or simply react to the pension restrictions. Of course resorting to sick-leave requires a validation by the doctor, which should in principle only be given for the first case. However, apart from lack of controls[6], there is a "grey area" in which, in presence of subjective discomfort, it can be very difficult for doctors to deny certification (as in the case of psychological complaints or nervous break downs).

Whatever the reasons, our a-priori is that sick-leave could be the response by some workers to the pension reforms and that this is more likely in the case of individuals who had planned early retirement for circumstances that the reform could not accommodate. This does not mean we are assuming an opportunistic behavior on the part of workers; on the contrary, we would like to test whether the disruption of personal life plans caused by a pension reform result in longer/more frequent sick-leave.

Of course, if the health condition is serious and this status is validated by a doctor, the worker can also apply for a disability pension. In this paper we do not consider this possibility, as we do not have access to the archive of disability applications. In any case, since the early 80s, the achievement of disability pensions in Italy has become increasingly difficult and very few people attain them.

3.2 The econometric specification

In order to test our thesis, we adopt a First Differencing approach (FD) and we estimate the following equation on a balanced panel referred to the years 2011 and 2012:

$$\Delta Y_{it} = (Y_{i2012} - Y_{i2011}) = T \quad + (\boldsymbol{Z_{i2012}} - \boldsymbol{Z_{i2011}})\gamma + \alpha Dtreated_{i2012} + (u_{i2012} - u_{i2011})$$

[5] Individual must present a demand for notional payrolls accreditation, however the events declared in the monthly individual reports (denunce individuali mensili, EMens) to the INPS (and reported in the "Estratti Conto" archive) are automatically registered.

[6] After several decades of continuous increase, since early 90s the average number of weeks of sick-leave per person per year exhibits a decreasing (although discontinuous) trend that has accelerated and stabilized from 2006 on (source: our elaborations on Estratti Contro INPS). This is probably due to the tightening up of the controls. At the same time, the counter-action against the recourse to invalidity pensions (law 222/1984) started from the middle 80s significantly restricted the access to this typology of pensions (Ragioneria Generale dello Stato 2014).

Where Y_{it} is the number of weeks of sick-leave in the year t (with t equal to 2012 or 2011) for the individual i; T is the trend dummy that is equal to 1 in 2012 and 0 otherwise; $\mathbf{Z_{it}}$ is a set of individual time-varying explanatory variables measured at time t; and u_{it} is the individual specific error term in time t.

The reaction of individuals to the 2011 pension reform is measured by the estimated coefficient of the dummy variable *Dtreated*. *Dtreated* is equal to 1 if the individual has been obliged in year 2012 to postpone retirement because of the 2011 pension reform (i.e. belongs to the treated group) and zero otherwise (i.e. belongs to the control group). Treatment in year 2011 is zero for both the treated and the control groups[7]. If being affected by the pension reform has a positive impact on number of sick-leave weeks, the estimates of α is positive.

In the base model, the set of time-varying individual regressors ($\mathbf{Z_{it}}$) includes: the seniority, the interaction between the seniority and the age, the number of weeks of notional contribution in all the working life (all seniority variables are measured at the beginning of each year), the age squared, the logarithm of the weekly wage, the regional unemployment rate and a constant capturing the time-trend. As usual, in the FD setting, the effect of the time-invariant regressors cancels out and the influence of the variation in age cannot be disentangled from the time trend.

We further try different specifications including interactions between some time-invariant individual characteristics and the time trend and/or the treatment variable. Finally we repeat all the estimations using the variable *Delay*, indicating the number of years of delay in retirement imposed by the reform to each individual, in place of the dummy *Dtreated*. The variable *Delay* is positive when the dummy *Dtreated* is equal to one, and zero otherwise.

In order to test strict exogeneity, following Wooldridge (2002) we add $\mathbf{Z_{i2012}}$ (the complete set of time-variant regressors observed in year 2012) to the set of regressors in the First Difference specification and we run an F test of significance of $\mathbf{Z_{i2012}}$. Strict exogeneity implies that $\mathbf{Z_{i2012}}$ are not jointly statistically significant.

To check whether the timing of the retirement matters in explaining the sick-absence behavior, we further control for the expected year of retirement under the pre-reform rules. Results are reported in the appendix (see table 4B). The estimated coefficient for this variable does not appear to be significantly different from zero at any standard significance level.

4. Data and descriptive statistics

The analysis is based on data from an administrative data set provided by the Italian Social Security Institute (INPS), the so called "Estratti conto" archive[8]. This archive collects all the information related to the contribution spells of workers in the INPS pension schemes, namely beginning and end dates of any contribution period; the classification of all contributions (regular employed work, sick-leave, maternity leave, unemployment, etc..); and the gross earnings (used to compute payrolls and pension benefits). INPS provided a sample of registered individuals born the 1st and the 9th of each month of each year. The data are updated to 31st December 2012, that is the sample contains

[7] Given that we have two periods only, fixed effect and first differencing produce identical estimates and inference and both cope with the elimination of the possible time-invariant individual specific component of the error term. However in the paper we opt for the first differencing as it allows for easier heteroscedasticity robust inference.

[8] The "Estratti conto" archive is public available for research scopes since 2012 (http://www.cliclavoro.gov.it/Barometro-Del-Lavoro/Pagine/Microdati-per-la-ricerca.aspx).

all the working life information of the selected individuals from the date of their first contribution to one of the INPS schemes up to the end of 2012.

Despite being a very rich dataset in terms of individuals' working careers, the INPS archive reports only illness-due absences lasting more than one week and provides no information on seniorities built up by individuals in other pension schemes (i.e. as civil servants or as freelance professionals), which leads to the impossibility of getting the complete picture for workers with mixed careers. Moreover, it provides only very limited information on socio-demographic conditions of the individual and her household, namely: year of birth and death, gender, and region of residence. However, we can still identify mothers and women in charge of informal caregiving duties from observed maternity leave and caregiving leave spells[9].

We focus on the sub-sample of women registered in the main private employee scheme (FPLD scheme), born between 1947 and 1959 and not yet retired in 2012 (i.e. that did not already reach the requisites to access pension in 2011). The sample collects all the information on their spells of work and sick-leave from 1962 up to 31st December 2012[10]. We analyze the determinants of the variation in the length of their sick-leave spells between 2011 and 2012.

To define whether the individuals are obliged to delay retirement as a consequence of the reform (whether they belong to the "treated" group), we use a simulation procedure. Starting from the observed age and seniority in 2012, for each individual in the sample, we simulate the year in which pension requisites for seniority or old age pensions[11] can be reached under pre- and post-reform rules in the hypothesis of a continuous (future) career. Pension requirements evaluation refers to the 31 December of each year. In some cases, the evaluation of retirement requisites requires the month and the day of birth, information that is not provided in the dataset. We deal with this by randomly assigning a month of birth to the individuals in the sample. We further assume that they are all born the last day of the month[12].

According to our simulations, as a consequence of the 2011 pension reform, about 74 per cent of women in our sample experienced an increase in the minimum age requirements for retirement from 1 up to 6 years; these women represent our "treatment group". The other 26 per cent, instead, were unaffected and can be used as "control group" (see table 1). The average delay for women in the treatment group is about 3 years.

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[9] Maternity leave spells are coded as: esn_tipcr=320; esn_tipcr=321; esn_tipcr=322; esn_tipcr=329; esn_tipcr=301; esn_tipcr=382; esn_tipcr=384; esn_tipcr=386; informal caregiving as esn_tipcr=324.

[10] We start with a sample of 7,169,385 spells of contribution related to our sample women and referred to the period 1962-2012. We drop observations related to individuals who started to work before the age of 15, as they show up unusual working patterns. We exclude individuals that have taken leave to provide care-giving to relatives (they are less than 1 per cent of the sample) as they have special pension rules and individuals with more than 96 weeks of notional payrolls as after this threshold notional seniority is not accounted for in the computation of the pension requisites. We drop also: individuals who reached the requisites to have access to pension in 2011; individuals with no contribution in 2012; individuals with "outlier" wages in 2012 (lower than 1°percentile or greater than 99° percentile); women with more than 52 weeks of seniority in 2011 and 2012; and individuals aged 65+ with less than 15 years of contribution 2012 (as they are probably retiring with the non-contributory social allowance, *pensione sociale*). We excluded unemployed individuals (*mobilità, cassa integrazione e disoccupazione*) in 2012. We end up with a balanced panel of 44,685 women either blue- or white-collar observed working in 2011 and 2012 of whom we have summarized the working seniority, the total number of weeks of leave and unemployment and all the other lifetime information relevant for our analysis.

[11] We exclude the possibility to access retirement with the DC option as it implies a great reduction of the benefit and it has been effectively chosen by a very small number of workers.

[12] Sensitivity analysis to these assumptions is done in tables 1B and 2B in the Appendix.

Table 1 - Delay in retirement (years) imposed on women in private employment by the reform

Years of delay in retirement imposed by the reform	Number of workes affected	%
0	5,790	26%
1	5,054	23%
2	2,320	10%
3	2,808	13%
4	1,697	8%
5	2,941	13%
6	1,732	8%
Total	22,342	100%

Source: our simulations on INPS data.

The time profile (measured in 2012) of the delay is hump-shaped (see table 2). The average increase in the retirement age for individuals up to the age of 55 or from the age of 60 on is about 2 years. It increases to 3 years for women aged 56 and to more than 4 years for individuals aged 57-59. This is due to the joint effect of the new age/seniority requirements to access retirement and of the workers' heterogeneity in the age and seniority at the time the reform has been introduced. Women aged 62+ were unaffected[13].

[13] This is due to the safeguard conditions included in the reform and to the decision of excluding from our sample all the individuals aged 65+ with less than 15 years of seniority in 2012.

Table 2 - Age composition and number of control and treatment groups

Age	Control group	Treatment group	
		Frequencies	*Average n. of years of delay*
53	864	2,960	1.85
54	575	2,969	2.28
55	759	2,553	2.77
56	797	2,249	3.53
57	643	1,930	4.02
58	563	1,552	4.36
59	343	1,259	4.31
60	222	1,060	2.60
61	207	20	1.70
62	303		1.85
63	218		
64	180		
65	116		
Total	5,790	16,552	
Mean age	57.04	55.75	
Mean delay (years)			3.02

Source: Our elaborations on INPS data.

Table 3 reports the type of pension which (sample) women could have access to before and after the pension reform under the hypothesis that they retire as soon as they are eligible[14]. Within the control group, 46 per cent of women reached first the old age requirements and 54 per cent the pure seniority requirements; in the treatment group, the same numbers for the pre-reform provision were 64 and 36 (12 per cent "quota" pensions and 24 per cent pure seniority pensions).

Once the reform is introduced, the "quota" pensions are abolished. As a consequence, 52 per cent of women that fulfilled the quota requirements under the pre-reform regime can retire on pure seniority requirements, while 48 per cent have to wait the accrual of old age requirements.

Most of the women who in the pre-reform regime had access to old age and pure seniority pension still have the possibility to get the same typology of pension (but with the new higher age and seniority requirements).

[14] To account for the fact that only very few women have been observed to retire according to DC option, as the pension benefit can be sensibly reduced by the application of the DC rule, we did not simulate retirement according to the DC option.

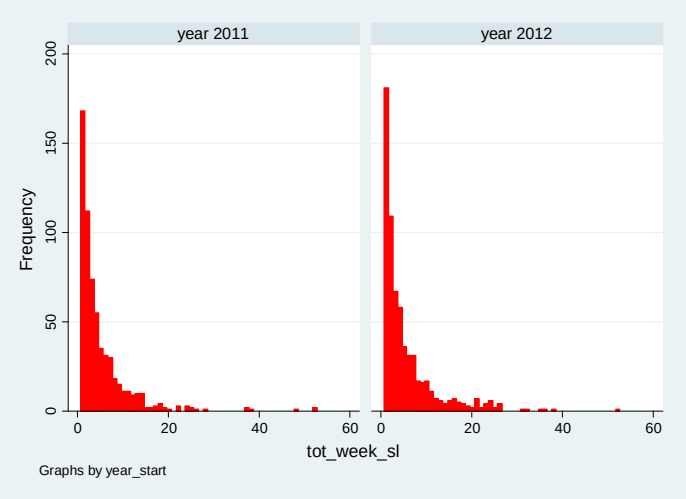
Table 3 - Types of pension accruable under pre and post-reform rules for treatment and control groups

			Typology of pension accruable under post-reform rules				
	Control group		*Treatment group*				
Typology of pension accruable under pre-reform rules	*n.*	*%*	*Pure seniority*	*Old age*	*Temporary*	*Total*	*Total %*
Pure seniority	3,139	54%	3,961	0	0	3,961	24%
Old age	2,651	46%	1,820	8,264	543	10,627	64%
Quotas			1,024	940	0	1,964	12%
Total	5,790	100%	6,805	9,204	543	16,552	100%
Total (%)			41%	56%	3%	100%	
Pure seniority			100%	0%	0%	100%	
Old age			17%	78%	5%	100%	
Quota			52%	48%	0%	100%	

Source: our simulations.

In 2012 and 2011, about 3 per cent of women in the sample had a sick-leave spell[15] lasting more than 7 days [16] determining a credit of notional contributions. Graph 1 shows for them the distribution of the sick-leave weeks.

Graph 1 - Distribution of the weeks of sick-leave in 2011 and 2012



Source: Our elaborations on the sample of women with a sick-leave spell in 2012. Observations 619 in 2011 and 649 in 2012. Max value 52 weeks.

[15] The week of sick-leave is defined with the contribution codes: esn_tipcr=310; esn_tipcr=315; esn_tipcr=319; esn_tipcr=350; esn_tipcr=359.

[16] According to INPS data (INPS 2013), about 33 per cent of the women in private employment had at least 1 sick absence in 2012 (1,8 million over 5,2 million of female dependent workers in private employment). However, the 82 per cent of sick absences registered by INPS in 2012 lasted less then 7 days and thus did not lead to the accreditation of notional contributions (our elaborations on INPS 2013 data, pag.4).

The number of sick-leave weeks in 2012, besides being on average very low, is slightly higher in 2012 and for women in the treatment group relative to women in the control group (0.16 weeks versus 0.14). The same is observed also concerning the total number of weeks of sick-leave in the whole career and for the total joint number of weeks of sick-leave and unemployment in the whole career (relevant for the accrual of the seniority requirement, see section 2). However, differences are not statistically significant.

The control and the treatment groups do not differ significantly also in terms of the other observable characteristics except age, that is slightly higher in the control group (see table 4).

Table 4 - Descriptive statistics of the sample

		Year 2012		Year 2011	
Variable	Obs	Mean	Std. Dev.	Mean	Std. Dev.
Treatment group					
Weeks of sick-leave in 2012	16,552	0.16	1.44	0.14	1.32
Delay in retirement due to Monti-Fornero reform (years)	16,552	3.02	1.77	0.00	0.00
Seniority at 2012 (weeks)	16,552	1384.29	425.63	1331.49	425.89
Sick-leave weeks in the whole career	16,552	1.98	7.63	1.84	7.26
Sick-leave and unemployment weeks in the whole career	16,552	15.79	36.00	15.65	35.88
Age	16,552	55.75	2.16	54.75	2.16
Weekly wage (euro)	16,552	478.64	245.25	471.30	240.55
Grandmothers	16,552	0.40	0.49	0.40	0.49
North	16,552	0.57	0.50	0.57	0.50
Center	16,552	0.28	0.45	0.28	0.45
South	16,552	0.15	0.36	0.15	0.36
Control group					
Weeks of sick-leave in 2012	5,790	0.14	1.26	0.13	1.17
Seniority at 2012 (weeks)	5,790	1410.50	680.97	1357.57	680.76
Sick-leave weeks in the whole career	5,790	1.49	5.69	1.36	5.41
Sick-leave and unemployment weeks in the whole career	5,790	12.10	35.53	11.97	35.48
Age	5,790	57.04	3.27	56.04	3.27
Weekly wage (euro)	5,790	475.36	266.22	460.26	229.37
Grandmothers	5,790	0.41	0.49	0.42	0.49
North	5,790	0.61	0.49	0.61	0.49
Center	5,790	0.26	0.44	0.26	0.44
South	5,790	0.12	0.33	0.12	0.33

Source: our elaborations.

5. Results

In the estimations presented in this section, our dependent variable is the variation in the individuals' number of sick-leave weeks that occurred between the year 2011 and 2012.

In our baseline specification, the set of regressors includes a dummy capturing the time trend between 2011 and 2012 (T) and a dummy identifying treated workers (D-treated). The estimated coefficient of the latter variable captures the different reactions of individuals obliged to postpone retirement by the pension reform with respect to the individuals who were not affected. We also control for a set of individual specific characteristics as the individuals' variations in seniority, in the interaction between seniority and age, in the number of weeks of notional contribution in all the working life (all seniority variables are measured at the beginning of each year), in the age squared[17], in the logarithm of the gross weekly wage and in the regional unemployment rate[18].

We observe a negative time trend in the sick-leave absences and a positive effect of the treatment. However, both effects are not significant at any standard significance level. The effect of the other control variables is in line with the literature. Indeed, we find that higher seniority corresponds to higher absences. However, in our regressions such an effect depends on the age. The higher the age, the smaller the effect (the interaction term between age and seniority, besides being small, is negative). In addition, an increase in the total number of weeks of notional contribution because of sick-leave or unemployment reduces the weeks of sick-leave. This result was expected as notional contribution is not considered to have access to seniority pensions. Finally, an increase in the regional unemployment rate reduces absences.

In model 2 specification we allow for a distinguished behavior between grandmothers and non-grandmothers, we indeed add an interaction term between the dummy treated and the dummy identifying grandmothers. The coefficient of such an interaction term is positive and significant at the 10 per cent significance level. Our intuition is indeed that grandmothers are in charge of informal caregiving duties towards grandchildren and could overreact to the postponement in retirement induced by the pension reform.

In model 3 we further allow for a different trend and a different reaction to the treatment according to the sick-leave history of the individuals. We use the dummy identifying individuals with a sick-leave spell in 2011 and we interact it with both the time trend and the treatment dummy. We find that the reaction to the treatment is actually higher for individuals that in 2011 already experienced a sick-leave spell, but we do not find evidence of a specific time trend for them.

Finally in model 4 we differentiate also the effect for treated grandmothers according whether they had or not a sickness spell in 2011. We indeed expect that only healthy grandmothers can actually be in charge of caregiving duties. The estimates are in line with what expected: we find evidence of a positive reaction of grandmothers to the postponement in retirement induced by the reform only for grandmothers that in 2011 did not experienced a sick-spell. The dummy identifying grandmothers that experienced a sick-spell in 2011 has, on the contrary, a negative sign. This evidence can have several explanations: perhaps, in this case, being a grandmother simply captures an overall better health condition with respect to non-grandmothers. However, the limited dimension of the group of grandmothers that in 2011 were observed in sick-leave, suggests caution in the interpretation of this result.

[17] In a FD setting, we cannot disentangle the variation in the age from the time trend.

[18] Literature shows as absence normally increases with usual hours of work (Barmby et al. 2002). Unfortunately, we do not have any information about the usual hours of work of the individuals.

Table 5 - Regression results I: FD - Dependent variable: variation in weeks of sick-leave between 2011 and 2012

	Model1 b/se	**Model2** b/se	**Model4** b/se	**Model5** b/se
T	-0.501	-0.531		
	(0.346)	(0.344)		
$T_{\text{sick in 2011}}$			-0.301	-0.302
			(0.302)	(0.302)
$T_{\text{not sick in 2011}}$			-0.509	-0.509
			(0.302)	(0.302)
Dtreated	0.020	0.005		
	(0.026)	(0.027)		
$\text{Dtreated}_{\text{sick in 2011}}$			0.317**	0.361**
			(0.009)	(0.007)
$\text{Dtreated}_{\text{not sick in 2011}}$			-0.004	-0.006
			(0.009)	(0.007)
Dtreated* grandmother		0.038*	0.037*	
		(0.003)	(0.006)	
$\text{Dtreated* grandmother}_{\text{sick in 2011}}$				-0.069**
				(0.001)
$\text{Dtreated* grandmother}_{\text{not sick in 2011}}$				0.040***
				(0.000)
ΔSeniority	0.005**	0.005**	0.005*	0.005
	(0.000)	(0.000)	(0.001)	(0.001)
ΔSeniority*age	-0.000*	-0.000*	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
ΔNotional seniority	-0.740***	-0.740***	-0.776***	-0.775***
	(0.001)	(0.001)	(0.000)	(0.000)
ΔAge^2	0.006	0.006	0.006	0.006
	(0.003)	(0.003)	(0.003)	(0.003)
ΔLog(wage)	-0.264	-0.266	-0.269	-0.268
	(0.107)	(0.107)	(0.113)	(0.112)
ΔRegional unemployment rate	-0.003**	-0.002*	-0.001	-0.001
	(0.000)	(0.000)	(0.002)	(0.002)
Adjusted R-square	0.332	0.332	0.333	0.333
N	22,342	22,342	22,342	22,342

Note: Significance levels:* 0.10 ** 0.05 *** 0.01. Robust errors clustered at level of dummy "sick in 2011".

We then use the delay in retirement (Delay) in place of the dummy identifying treated workers (D-treated). The delay is the number of years of postponement in retirement induced by the pension reform; values are rounded up to the nearest integer. For the control group, the variable Delay is zero. As before we try different specifications, results are reported in table 6. This new set of regressions confirms previous findings and reveals that the effect of the treatment is actually proportional to the number of years of postponement in retirement induced by the reform.

Table 6 - Regression results II: FD - Dependent variable: variation in weeks of sick-leave between 2011 and 2012

	Model6 b/se	**Model7** b/se	**Model9** b/se	**Model10** b/se
T	-0.435	-0.464		
	(0.259)	(0.254)		
$T_{\text{sick in 2011}}$			-0.243	-0.244
			(0.216)	(0.214)
$T_{\text{not sick in 2011}}$			-0.444	-0.443
			(0.217)	(0.216)
Delay	0.004	-0.002		
	(0.006)	(0.007)		
$\text{Delay}_{\text{sick in 2011}}$			0.092***	0.118***
			(0.001)	(0.000)
$\text{Delay}_{\text{not sick in 2011}}$			-0.005	-0.006**
			(0.001)	(0.000)
Delay* grandmother		0.016*	0.015	
		(0.003)	(0.004)	
$\text{Delay* grandmother}_{\text{sick in 2011}}$				-0.047***
				(0.001)
$\text{Delay*grandmother}_{\text{not sick in 2011}}$				0.018***
				(0.000)
ΔSeniority	0.004*	0.005*	0.005	0.005
	(0.000)	(0.000)	(0.001)	(0.001)
ΔSeniority*age	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
ΔNotional seniority	-0.740***	-0.740***	-0.775***	-0.775***
	(0.001)	(0.001)	(0.000)	(0.000)
ΔAge^2	0.005	0.006	0.005	0.005
	(0.003)	(0.003)	(0.002)	(0.002)
ΔLog(wage)	-0.265	-0.267	-0.271	-0.271
	(0.108)	(0.108)	(0.115)	(0.115)
ΔRegional unemployment rate	-0.003**	-0.002*	-0.001	-0.001
	(0.000)	(0.000)	(0.002)	(0.002)
Adjusted R-square	0.332	0.332	0.334	0.334
N	22,342	22,342	22,342	22,342

Note: Significance levels:* 0.10 ** 0.05 *** 0.01. Robust errors clustered at level of dummy "sick in 2011".

For sake of brevity, we focus on Model 8 that accounts for the differential time trend and effect of delay in retirement of individuals that did or did not experienced in 2011 a sick-leave spell. As before, the treatment has a positive significant effect on women that did experience a sick-spell in 2011 and on grandmothers with no sick-leave spell in 2011. Women that in 2011 did not experience a sick-leave spell and are not grandmothers show a small decrease in their sick–leave absences. Grandmothers with a sick-leave spell in 2011 increase their sick-leave absences less than non-grandmothers, but once again the interpretation of this finding is compromised by the limited size of the group.

According our estimations, the average variation in the length of the sick-leave spell for the average women is very low, about 0.004 weeks if we suppose no delay in retirement. If she had no sick-leave spell in 2011 and experiences 1 year of delaying retirement as a consequence of the pension reform, the average length of her sick-leave almost triplicates. With 6 years of delay it becomes 16 times bigger.

6. Conclusions

In this paper, we analyze the determinants of recourse to sick-leave by Italian women near retirement, by establishing a bridge between (determinants of) absenteeism and (effects of) pension reforms. We focus, in particular, on the effects of a significant increase in the (minimum) age/seniority requirements on sick-leave take up. To the best of our knowledge it is the first attempt in the direction.

We choose Italy as a case study since it recently implemented a far-reaching pension reform increasing swiftly and significantly pension requirements, particularly for women in private employment who had been more protected from previous reforms.

We do find evidence of a substantial response of individuals to changes in pension rules. However, such a response differs on the basis of their past sick-leave record. Women that in 2011 already experienced a sick-leave spell and were forced by the pension reform to postpone retirement appear to increase their sick-leave spells proportionally to the number of years of delay imposed to them by the reform. Women that did not have a sick-leave spell in 2011 behave the same manner, but less intensively and only if they are grandmothers, i.e. presumably in charge of caregiving duties towards the grandchildren.

Notwithstanding that pension reform was needed to recover the financial sustainability of the pension system, it certainly had stringent effects on many Italian workers not too far from retirement, and on women in particular. We cannot say (and we do not want to suggest) that our findings concerning grandmothers point to opportunistic behavior. Indeed, a careful consideration of our results seems to support a different thesis. Italy suffers from a chronic lack of well-structured high-quality care facilities, and middle–aged women are often called to stand in (Del Boca et al. 2005, Brilli et al. 2013). Sick-leave may then be the response of last resort. Our final point is that the success of a pension reform depends on many factors. Information and financial literacy that boost understanding of the reforms certainly facilitate (Boeri and Tabellini 2012 and Fornero 2015) their acceptance. However, a key role is also played by matching welfare policies, such as an improvement of care facilities addressed to alleviate the family chores that still heavily fall on women.

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Appendix A – Normative appendix

Table A1 - Pension requisites pre and post the Monti-Fornero pension reform for DB and MDB female workers in private employment

	Before Monti-Fornero Reform**	**After Monti-Fornero Reform**
Pure seniority	*Seniority requirement:* 40 years + 1 months in 2012; +2 months in 2013; +3 months from 2014 on joint with min 35 years of effective contribution°	*Seniority requirement:* 41 years + 1 months in 2012; +5 months in 2013; +6 months in 2014 and 2015*; +10 months from 2016 on* joint with min 35 years of effective contribution°
	Age requirement: none	*Age requirement*: none but a penalization is in place for individuals retiring before age 62
Old age	*Seniority requirement*: 20 years	*Seniority requirement*: 20 years
	Age requirement: 60 in 2012 increasing progressively with life-expectancy till reaching 66 years + 7 months in 2026*. In 2040 it is expected to get to 68 years + 2 months	*Age requirement*: 62 in 2012 increasing progressively with life-expectancy till reaching 66 years + 7 months in 2018*. In 2040 it is expected to get to 68 years + 11 months
Quotas	*Seniority requirement*: 35 years of effective contribution °	
	Age requirement: 60 in 2012 progressively increasing with life-expectancy. In 2040 it is expected to reach 64 years + 2 months	
	Age+Seniority requirement: 96 in 2012 progressively increasing with life-expectancy. In 2040 it is expected to reach 100 + 2 months	
NDC option - available until 2015	*Seniority requirement*: 35 years°	*Seniority requirement*: 35 years°
	Age requirement: 57 progressively increasing with life-expectancy and pension fully calculated according to NDC formula	*Age requirement*: 57 progressively increasing with life-expectancy and pension fully calculated according to NDC formula

Note: *these are expected values as requisites are to be updated to life-expectancy increase attested by the National Statistical Institute (ISTAT) every 3 years (every 2 years from 2018 on, under Monti-Fornero reform).

° In computing effective seniority notional contributions for sick-leave and unemployment are excluded.

** A further year is actually added to all the requisites as a consequence of the so-called exit windows.

Appendix B – Sensitivity analysis

Table B1 – Results Table 5 – Sensitivity analysis to the assumptions about the month of birth: all individuals are born in January

	Model1 b/se	**Model2** b/se	**Model3** b/se	**Model4** b/se
T	-0.502	-0.532		
	(0.382)	(0.384)		
$T_{\text{sick in 2011}}$			-0.357	-0.357
			(0.352)	(0.352)
$T_{\text{not sick in 2011}}$			-0.514	-0.514
			(0.349)	(0.349)
Dtreated	0.017	-0.001		
	(0.032)	(0.031)		
$\text{Dtreated}_{\text{sick in 2011}}$			0.372**	0.363**
			(0.013)	(0.015)
$\text{Dtreated}_{\text{not sick in 2011}}$			-0.012	-0.012
			(0.010)	(0.010)
Dtreated* grandmother		0.046**	0.045**	
		(0.003)	(0.002)	
$\text{Dtreated* grandmother}_{\text{sick in 2011}}$				0.067**
				(0.002)
$\text{Dtreated* grandmother}_{\text{not sick in 2011}}$				0.044***
				(0.000)
ΔSeniority	0.005**	0.005**	0.005*	0.005*
	(0.000)	(0.000)	(0.001)	(0.001)
ΔSeniority*age	-0.000*	-0.000*	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
ΔNotional seniority	-0.740***	-0.740***	-0.776***	-0.777***
	(0.001)	(0.001)	(0.000)	(0.000)
ΔAge^2	0.006	0.006	0.006	0.006
	(0.004)	(0.004)	(0.003)	(0.003)
ΔLog(wage)	-0.264	-0.267	-0.269	-0.269
	(0.107)	(0.107)	(0.112)	(0.112)
ΔRegional unemployment rate	-0.002*	-0.002*	-0.001	-0.001
	(0.000)	(0.000)	(0.002)	(0.002)
Adjusted R-square	0.332	0.332	0.333	0.333
N	22,342	22,342	22,342	22,342

Note: Significance levels:* 0.10 ** 0.05 *** 0.01. Robust errors clustered at level of dummy "sick in 2011".

Table B2 – Results Table 6 – Sensitivity analysis to the assumptions about the month of birth: all individuals are born in January

	Model6 b/se	**Model7** b/se	**Model9** b/se	**Model10** b/se
T	-0.448	-0.475		
	(0.279)	(0.276)		
$T_{\text{sick in 2011}}$			-0.167	-0.169
			(0.240)	(0.239)
$T_{\text{not sick in 2011}}$			-0.456	-0.456
			(0.240)	(0.240)
Delay	0.003	-0.003		
	(0.005)	(0.005)		
$\text{Delay}_{\text{sick in 2011}}$			0.058**	0.080***
			(0.002)	(0.001)
$\text{Delay}_{\text{not sick in 2011}}$			-0.005	-0.006***
			(0.001)	(0.000)
Delay* grandmother		0.017*	0.016	
		(0.002)	(0.004)	
$\text{Delay* grandmother}_{\text{sick in 2011}}$				-0.037**
				(0.001)
$\text{Delay*grandmother}_{\text{not sick in 2011}}$				0.018***
				(0.000)
ΔSeniority	0.004**	0.005**	0.005	0.005
	(0.000)	(0.000)	(0.001)	(0.001)
ΔSeniority*age	-0.000*	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
ΔNotional seniority	-0.740***	-0.740***	-0.776***	-0.776***
	(0.001)	(0.001)	(0.000)	(0.000)
ΔAge^2	0.006	0.006	0.006	0.006
	(0.003)	(0.003)	(0.002)	(0.002)
ΔLog(wage)	-0.265	-0.267	-0.272	-0.272
	(0.108)	(0.108)	(0.117)	(0.116)
ΔRegional unemployment rate	-0.002**	-0.002*	-0.001	-0.001
	(0.000)	(0.000)	(0.002)	(0.002)
Adjusted R-square	0.332	0.332	0.333	0.333
N	22,342	22,342	22,342	22,342

Note: Significance levels:* 0.10 ** 0.05 *** 0.01. Robust errors clustered at level of dummy "sick in 2011".

Table B3 - Wooldridge test of exogeneity (Wooldridge 2002)

	Model 4+2012vars	**Model 8+2012vars**
	b/se	b/se
$T_{\text{sick in 2011}}$	-2.348	-2.524
	(3.560)	(4.548)
$T_{\text{not sick in 2011}}$	-2.542	-2.703
	(3.559)	(4.550)
$Dtreated_{\text{sick in 2011}}$	0.349***	
	(0.001)	
$Dtreated_{\text{not sick in 2011}}$	-0.007	
	(0.004)	
Dtreated* $grandmother_{\text{sick in 2011}}$	-0.075**	
	(0.003)	
Dtreated* $grandmother_{\text{not sick in 2011}}$	0.034***	
	(0.000)	
$Delay_{\text{sick in 2011}}$		0.115***
		(0.000)
$Delay_{\text{not sick in 2011}}$		-0.007**
		(0.000)
Delay* $grandmother_{\text{sick in 2011}}$		-0.049**
		(0.001)
Delay* $grandmother_{\text{not sick in 2011}}$		0.015**
		(0.001)
ΔSeniority	-0.001	-0.001
	(0.035)	(0.035)
ΔSeniority*age	0.000	0.000
	(0.001)	(0.001)
ΔNotional seniority	-0.777***	-0.776***
	(0.001)	(0.001)
ΔAge^2	0.056	0.059
	(0.045)	(0.062)
ΔLog(wage)	-0.217	-0.221
	(0.129)	(0.131)
ΔRegional unemployment rate	0.015	0.015
	(0.005)	(0.005)
Seniority in 2012	-0.000	-0.000
	(0.001)	(0.001)
Seniority*age in 2012	0.000	0.000
	(0.000)	(0.000)
Age^2 in 2012	-0.001	-0.001
	(0.000)	(0.001)
Notional seniority in 2012	0.001	0.001
	(0.001)	(0.001)
Log(wage) in 2012	-0.079	-0.079
	(0.015)	(0.014)
Unemployment in 2012	-0.006	-0.005
	(0.002)	(0.002)
F-test on variables of year 2012	Prob > F = 0.1168	Prob > F = 0.1113
R-squared	0.334	0.334
N	22,342	22,342

Note: Significance levels:* 0.10 ** 0.05 *** 0.01. Robust errors clustered at level of dummy “sick in 2011”.

Table B4 – Sensitivity analysis to the introduction of the "expected year of retirement before the reform" among the regressors

	Model6 b/se	**Model7** b/se	**Model9** b/se	**Model10** b/se
T	17.287	20.651		
	(4.621)	(5.151)		
T $_{\text{sick in 2011}}$			19.426	19.369
			(7.821)	(7.925)
T $_{\text{not sick in 2011}}$			19.221	19.166
			(7.820)	(7.925)
Delay	0.002	-0.005		
	(0.007)	(0.008)		
Delay $_{\text{sick in 2011}}$			0.087**	0.113***
			(0.003)	(0.001)
Delay $_{\text{not sick in 2011}}$			-0.008	-0.009*
			(0.002)	(0.001)
Delay* grandmother		0.018	0.016	
		(0.003)	(0.005)	
Delay* grandmother $_{\text{sick in 2011}}$				-0.046**
				(0.001)
Delay*grandmother $_{\text{not sick in 2011}}$				0.019**
				(0.000)
ΔSeniority	0.007*	0.008*	0.007	0.007
	(0.001)	(0.001)	(0.002)	(0.002)
ΔSeniority*age	-0.000**	-0.000**	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
ΔNotional seniority	-0.740***	-0.740***	-0.775***	-0.775***
	(0.001)	(0.001)	(0.000)	(0.000)
ΔAge^2	0.002	0.002	0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)
ΔLog(wage)	-0.265	-0.268	-0.272	-0.272
	(0.108)	(0.107)	(0.115)	(0.115)
ΔRegional unemployment rate	-0.002	-0.001	0.001	0.001
	(0.000)	(0.000)	(0.002)	(0.002)
Expected year of retirement before the reform	-0.009	-0.010	-0.010	-0.010
	(0.002)	(0.002)	(0.004)	(0.004)
Adjusted R-square	0.332	0.332	0.334	0.334
N	22,342	22,342	22,342	22,342

Note: Significance levels:* 0.10 ** 0.05 *** 0.01. Robust errors clustered at level of dummy "sick in 2011".

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