Absenteeism, Pension Reforms and Grandmothers

Flavia Coda Moscarola[·], Elsa Fornero[*] and Steinar Strøm[·]

Abstract

Both economic and epidemiological literature have shown that perceived high strain at work and lack of social infrastructures are good predictors of sick-leaves. 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-leaves. 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.

JEL: C21, J26, J13

Keywords: Pension reform, sick-leave, switching model

[·] University of Turin and CeRP-Collegio Carlo Alberto (e-mail: flavia.codamoscarola@carloalberto.org)

[*] University of Turin and CeRP-Collegio Carlo Alberto (e-mail: elsa.fornero@unito.it)

[·] The Ragnar Frisch Centre for Economic Research (e-mail: steinar.strom@econ.uio.no)

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-leaves. The exercise is complicated by the fact that recourse to sick-leaves 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-leaves (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-leaves 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-leaves (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-leaves are 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 obliged to postpone retirement by the 2011 Italian reform, with a significant direct correlation between weeks of absence and years of retirement delay. Grandmothers, who are probably in charge of caregiving duties and show a higher number of sick-leave weeks, reacted more than non-grandmothers to the delay. Finally, we find evidence of significant regional effects, with Southern Italian regions exhibiting a higher number of sick-leave absences with respect to in other Italian regions.

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 the1992 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.

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

[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.

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

- 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. Finally, starting from 2015, age/seniority requirements 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).

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 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

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

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-leaves. 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-leaves 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-leaves.

3.2 The econometric specification

Let Y_{1it} be the number of sick-leave weeks in period t for a woman who suffers the restrictions of a pension reform and Y_{0it} the same number for a woman who is unaffected.

In the former state (eq. 1), the number of sick-leave weeks in period t is:

$$(1)\ Y_{1it}=X_{it}\beta_1+U_{1it}$$

In the latter state (eq. 2), the number of sick-leave weeks in period t is:

$$(2)\ Y_{0it}=X_{it}\beta_0+U_{0it}$$

X_{it} is a vector of individual characteristics (age, residential area, etc); β_1 is a vector of coefficients that measure the impact of the characteristics on sick-leave weeks in eq. 1; β_0 is the same vector in eq. 2. $U_{1it,}$ with $E(U_{1i})=0$, are unobservable variables for eq. 1, while U_{0it}, with $E(U_{0i})=0$ are

[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).

unobservable variables for eq. 2. In both cases, the number of sick-leave weeks is clearly non-negative, which means that they can be zero for both categories of individuals.

Let now define the treatment dummy, a variable D_i that assumes value 1 if the individual is affected by the reform (she is in the "treated" group) and value 0 if, on the contrary, she is unaffected (she is in the control group).

The expected "treatment effect on the treated" is given by:

$$(3)\ E[Y_{1it}-Y_{01t}|X_{it},D_i=1]=X_{it}(\beta_1-\beta_0)$$

The effect can be positive for all characteristics in the X-vector or for some of them, so that

$$(4)\ E[Y_{1it}-Y_{01t}|X_{it},D_i=1]=X_{it}(\beta_1-\beta_0)>0$$

To find out if women who are affected by the reform have an increase in sick-leaves is problematic because we only observe one state: the woman is either affected or unaffected..

To overcome the problem, we proceed as follows. Let:

$$(5)\ Y_{it}=D_iY_{1it}+(1-D_i)Y_{01t} \qquad with\ Y_i=Y_{1it}\ if\ D_i=1\ and\ Y_i=Y_{0it}\ if\ D_i=0$$

Inserting (1) and (2) in (5), we get the following switching regression:

$$(6)\ Y_{it}=D_i(X_{it}\beta_1+U_{1it})+(1-D_i)(X_{it}\beta_0+U_{0i})=D_i(X_{it}\beta_1-X_{it}\beta_0)+X_{it}\beta_0+D_i(U_{1it}-U_{0it})+U_{0it}$$

Assume now that $X_{it}\beta_1-X_{it}\beta_0=\alpha$ (there is only a constant in state 1 that is different), the other β-s are the same, and assume that $U_{1it}=U_{01t}$, that is the unobserved effects are the same across the two states. Then we have the following straightforward regression that can be estimated on the whole population:

$$(7)\ Y_{it}=\alpha D_i+X_{it}\beta_0+U_{0it}$$

If being affected by the pension reform has a positive impact on number of sick-leave weeks, the estimates of α is positive. Indeed, in the first specification of our model, we assume that: a) *ceteris paribus*, the number of weeks of leave depend uniquely on the contemporaneous realization of the observed covariates; b) the treatment group differs from the control only because of the treatment. To loosen a bit this restrictive assumptions, we also try alternative specifications, including state dependency and a set of intereaction terms between the treatment dummy and some of the socio-demographic controls.

In particular, in order to account for state dependency we assume that the current number of sick-leave weeks in year t depends on sick-leave weeks in the previous years (before the reform):

$$(8)\ Y_{it}=\alpha D_i+X_{it}\beta_0+\lambda Y_{it-1}+U_{0it}$$

In addition, we allow for interaction terms between some of the observed covariates - in particular in case the woman is a grandmother - and the dummy for being treated D_i.

Allowing for state dependency can give rise to an endogeneity issue if the error term has an individual specific time invariant component (Hyslop 1999). In our analysis we did control for this possibility by running a regression of predicted error terms of our estimated models on the set of regressors. Results did not reveal the presence of endogeneity (as can be seen from table B5 in the Appendix B).

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[7]. 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..); the earnings valid for pension calculation. 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 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 all illness-due absences lasting more than one week and provides no information on seniorities build up by individuals in other pension schemes (i.e. as civil servants or as freelance professionals), which leads to the impossibility to get the complete picture for workers with mixed careers. It further 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[8].

We focus on the sub-sample of women registered in the main private employee scheme (FPLD scheme), born between 1947 and 1960 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[9]. We analyze the determinants of the length of their sick-leave spells in 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 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, an 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[10].

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[7] 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).

[8] Maternity leaves 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) and spells for informal caregiving as esn_tipcr==324.

[9] We start with a sample of 7,722,231 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 leaves to provide care-giving to relatives (they are less than 1 per cent of the sample) as they have special pension rules. We drop also: individuals that 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); 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 individuals in unemployment (*mobilità, cassa integrazione e disoccupazione*) for 52 weeks in 2012. We end up with a sample of 54,371 women observed working in 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.

[10] Sensitivity analysis to these assumptions is done in tables 3B and 4B in the Appendix.

According to our simulations, as a consequence of the 2011 pension reform, about half of women (56 per cent) in private employment experienced an increase in the minimum age requirements for retirement from 1 up to 6 years; these women represent our "treatment group". The other half (44 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.

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	23,909	44%
1	8,507	16%
2	4,673	9%
3	5,072	9%
4	3,431	6%
5	5,679	10%
6	3,1	6%
Total	54,371	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 54 or from the age of 60 on is about 2 years. It increases to 3 years for women aged 55 and to more than 4 years for individuals aged 56-59. This is due to the joint effect of the new age/seniority requirements to access retirement and of the workers heterogeneneity in the age and seniority at the time the reform has been introduced. Women aged 62+ were unaffected[11].

[11] 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*
52	4,853	4,174	1.87
53	5,454	2,761	1.74
54	4,738	2,575	2.49
55	3,821	2,963	3.38
56	3,264	2,673	4.32
57	2,555	2,511	4.90
58	2,253	1,13	4.87
59	1,885	1,446	4.61
60	1,61	1,17	2.60
61	29	586	1.52
62	729		
63	508		
64	422		
65	261		
Total	23,909	30,462	
Mean age	55.89	55.02	
Mean delay (years)			**3.08**

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[12]. Within the control group, 63 per cent of women reached first the old age requirements, 26 per cent the DC option, 12 per cent the pure seniority requirements; in the treatment group, the same numbers for the pre-reform provision were 71, 14 and 15 per cent.

Once the reform is introduced, the "quota" pensions are abolished. As a consequence, 42 per cent of women that fulfilled the quota requirements under the pre-reform regime can retire on pure seniority requirements, while 58 per cent have to wait the accrual of old age requirements.

Most of the women that in the pre-reform regime have 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). Only few of them (i.e. only 2 per cent of the women that in the pre-reform regime have access to old age pension and 5 per cent of those having access to seniority pensions) have access to retirement under the reformed regime with the DC option rules.

[12] This result does not account for the fact that opting for DC pension rule, the pension benefit can be sensibly reduced.

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*	*DC option*	*Total*	*Total %*
Pure seniority	2,775	12%	4,278	3	0	238	4,519	15%
Old age	14,954	63%	336	20,047	780	439	21,602	71%
Quotas			1,809	2,532	0	0	4,341	14%
DC option	6,180	26%	0	0	0	0	0	
Total	23,909	100%	6,423	22,582	780	677	30,462	100%
Total (%)			21%	74%	3%	2%	100%	
Pure seniority			95%	0%	0%	5%	100%	
Old age			2%	93%	4%	2%	100%	
Quota			42%	58%	0%	0%	100%	
DC option			0%	0%	0%	0%	100%	

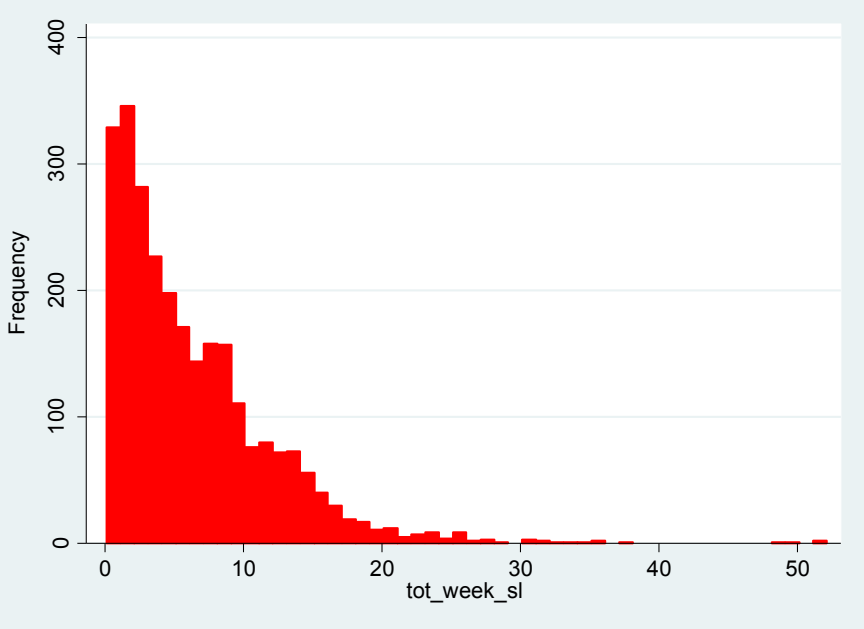
Source: our simulations.

In 2012, 5 per cent of women in the sample had a sick-leave spell[13] lasting more than 7 days[14] determining a credit of notional contributions. Graph 1 shows for them (2,664 observations) the distribution of the sick-leave weeks.

[13] 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.

[14] 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).

Graph 1 - Distribution of the weeks of sick-leave



Source: Our elaborations on the sample of women with a sick-leave spell in 2012. Observations 2,664. Min value 0.14285715 weeks, max value 52 weeks.

The number of sick-leave weeks in 2012, besides being on average very low, is higher for women in the treatment group relative to women in the control group (0.41 weeks versus 0.21). 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).

In addition the treatment group differentiates from the control group also for the slightly higher yearly wage and number of women with a maternity spell during their working career - variable that we use to proxy their role of grandmothers - and of women living in the South (see table 4).

Table 4 - Descriptive statistics of the sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Treatment group					
Weeks of sick-leave in 2012	30,462	0.41	2.12	0	52
Delay in retirement due to Monti-Fornero reform (years)	30,462	3.08	1.74	1	6
Seniority at 2012 (weeks)	30,462	1,211.09	411.80	312	2,246
Sick-leave weeks in the whole career	30,462	10.61	37.95	0	654
Sick-leave and unemployment weeks in the whole career	30,462	37.36	74.66	0	926
Age	30,462	55.02	2.40	52	61
Yearly wage (euro)	30,462	17,338.62	12,788.13	300	70,425
Grandmothers	30,462	0.39	0.49	0	1
North	30,462	0.44	0.50	0	1
Center	30,462	0.34	0.47	0	1
South	30,462	0.22	0.42	0	1
Control group					
Weeks of sick-leave in 2012	23,909	0.21	1.55	0	52
Seniority at 2012 (weeks)	23,909	1,134.04	705.28	104.71	2,335
Sick-leave weeks in the whole career	23,909	4.22	21.04	0	1,033.57
Sick-leave and unemployment weeks in the whole career	23,909	22.90	54.84	0	1,033.57
Age	23,909	55.89	3.28	52	65
Yearly wage (euro)	23,909	16,725.80	13,529.57	300	70,386
Grandmothers	23,909	0.33	0.47	0	1
North	23,909	0.46	0.50	0	1
Center	23,909	0.36	0.48	0	1
South	23,909	0.18	0.38	0	1

Source: our elaborations.

5. Results

We start with a simple regression of the number of sick-leave weeks with a dummy identifying treated and control workers, as well as age, log annual wage and macro-regional dummies[15]. We also use a dummy identifying if the woman had a maternity leave spell during her career as a proxy for being a grandmother and in charge of looking after grandchildren (we label it "grandmother").

As shown in column 1 of table 5, individuals forced to delay retirement as a consequence of the pension reform are more prone to sick-leave spells. Being in the "treatment group" increases the duration of the sick-leaves (the coefficient of the dummy is positive and statistically significant) by 0.174 weeks (1.3 days). This variation, that seems very small, depends on the fact that we are observing only illness-due absences lasting more than one week and nevertheless is quite big in relative terms. The average number of weeks for the control group is indeed 0.225 and an increase of 0.174 weeks corresponds to +77 per cent.

Individuals in charge of care duties have longer sick-leave spells. Being a grandmother increases the sick-leave on average of about 0.282 weeks with respect to the average sick-leave length of about 0.220 weeks of non-grandmothers (+128 per cent). At the opposite, higher wages correspond to lower absences. Women with higher annual wages appear to be less prone to sick-leaves: a salary 1,000 euro higher than the average leads to a decrease of 63% in the number of weeks of sick-leave[16].

The geographic effect is remarkable: workers in Southern regions show sensibly longer sick-leave spells (the coefficient is 0.728), while age has a positive significant but very small effect on sick-leave duration[17].

[15] 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.

[16] One potential explanation of this evidence lies on the fact that long sick-leaves determine for them higher career penalties (Marcussen 2012).

[17] This result can be explained with the higher propensity to opportunistic behaviours characterizing the Southern Italian regions (Ichino and Maggi 2000) and attributable both to their lower endowment with social capital (Guiso, Sapienza and Zingales 2004) and to their higher relative incidence of employees in the public sector and in big firms. Indeed these sectors are normally characterized by a lower probability of incurring in severe controls (Winkelmann 1999 and Barmby and Stephan 2000).

Table 5 - Regression results I: OLS - Dependent variable: weeks of sick-leave in 2012

	Model 1	**Model 2**	**Model 3**	**Model 4**
	b/se	b/se	b/se	b/se
Treated	0.174***	0.161***	0.070***	0.045**
	(0.016)	(0.016)	(0.014)	(0.018)
Weeks of sick-leave in t-1			0.512***	0.512***
			(0.004)	(0.004)
Age	0.008***	0.471***	0.210***	0.231***
	(0.003)	(0.090)	(0.077)	(0.078)
Age2		-0.004***	-0.002***	-0.002***
		(0.001)	(0.001)	(0.001)
Logwage	-0.201***	-0.204***	-0.087***	-0.085***
	(0.009)	(0.009)	(0.008)	(0.008)
Grandmother	0.282***	0.279***	0.125***	0.085***
	(0.017)	(0.017)	(0.014)	(0.022)
Treated*grandmother				0.068**
				(0.029)
North	-0.016	-0.017	-0.001	-0.001
	(0.018)	(0.018)	(0.015)	(0.015)
South	0.728***	0.726***	0.332***	0.331***
	(0.022)	(0.022)	(0.019)	(0.019)
Constant	1.445***	-11.573***	-5.166**	-5.759***
	(0.182)	(2.529)	(2.169)	(2.184)
R-squared	0.048	0.048	0.300	0.300
N	54,371	54,371	54,371	54,371

Note: Omitted dummy: Center. Significance levels:* 0.10 ** 0.05 *** 0.01

We then try other specifications, reported in columns 2, 3 and 4 in table 5, which, for sake of brevity, we describe here focussing only on the main variables of interest.

In model 2, we add the variable "age squared" to account for non-linearities in the pattern of the effect of age and we find evidence of a hump-shaped effect of age on sick-leave duration. The coefficient of the variable age is now 0.471, while the coefficient of age squared is -0.004.

In model 3 we add the lagged number of sick-leave weeks (i.e. in 2011) to account for the state dependency. Interestingly, we find a positive and significant coefficient for the variable: having had a 4 weeks sick-leave in 2011 leads to an increase of about 2.2 weeks in 2012. As we introduce this new variable, the effect of the other explanatory variables, especially the one of the dummy "treated", decreases sensibly (to 0.070) but remain significant.

Finally, in model 4 we further add the interaction term between dummy "treated" and the dummy proxy for being a grandmother and we find that caregiving duties can reinforce the effect of the treatment (the coefficient of the interaction term is 0.068), while the coefficient of the variable "treated" decreases to 0.045. According to model 4, treatment if applied to all individuals in our sample would lead to an average number of predicted sick-leave weeks of about 0.38. In the absence of the treatment, the average number of predicted weeks will be instead about 26 per cent (0.10 weeks) lower (see table 6).

Table 6 – Predicted weeks of sick-leave (Y_i)

	Mean ($Y_{i,}$)	Std. Dev. ($Y_{i,}$)	Min ($Y_{i,}$)	Max ($Y_{i,}$)	$\Sigma_i Y_i$
Treated	0.383	1.042	-0.166	29.929	20,799
Non treated	0.282	1.032	-0.210	29.702	15,355

Source: our simulations using table 5– model 4 estimated coefficients on the sample of 54,371 workers.

We then use the delay in retirement (delay) in place of the dummy identifying treated workers (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 7.

Table 7 - Regression results II: OLS - Dependent variable: weeks of sick-leave in 2012

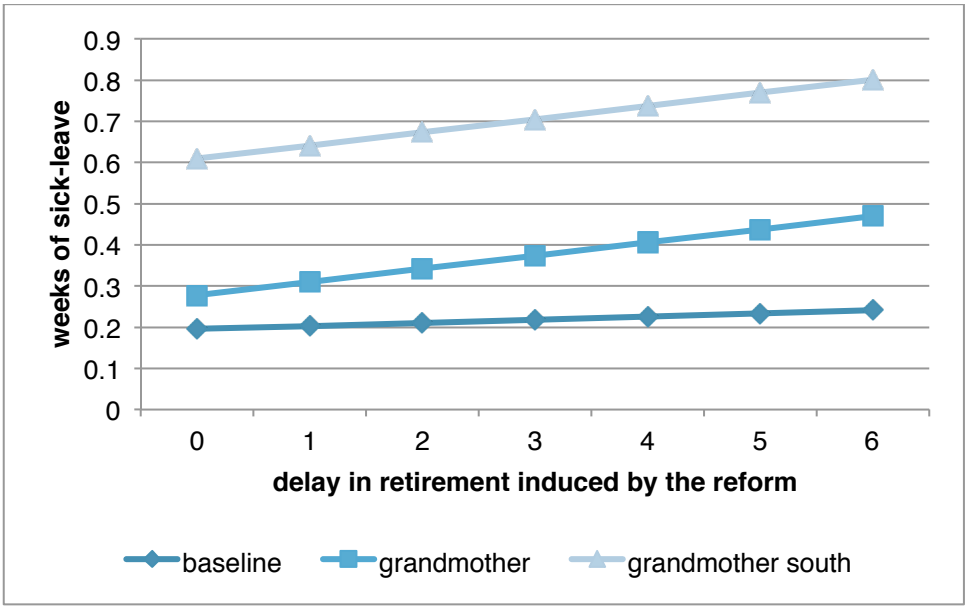
	Model 5	**Model6**	**Model 7**	**Model 8**
	b/se	b/se	b/se	b/se
Delay	0.043***	0.038***	0.017***	0.008*
	(0.004)	(0.004)	(0.004)	(0.004)
Weeks of sick-leave in t-1			0.512***	0.512***
			(0.004)	(0.004)
Age	-0.000	0.327***	0.146*	0.165**
	(0.003)	(0.094)	(0.080)	(0.080)
Age2		-0.003***	-0.001*	-0.001**
		(0.001)	(0.001)	(0.001)
Logwage	-0.200***	-0.202***	-0.086***	-0.082***
	(0.009)	(0.009)	(0.007)	(0.008)
Grandmother	0.285***	0.283***	0.126***	0.082***
	(0.017)	(0.017)	(0.014)	(0.019)
Delay*grandmother				0.024***
				(0.007)
North	-0.015	-0.015	-0.001	0.001
	(0.018)	(0.018)	(0.015)	(0.015)
South	0.726***	0.726***	0.331***	0.331***
	(0.022)	(0.022)	(0.019)	(0.019)
Constant	1.880***	-7.330***	-3.276	-3.825*
	(0.180)	(2.638)	(2.262)	(2.268)
R-squared	0.048	0.048	0.300	0.300
N	54,371	54,371	54,371	54,371

Note: Omitted dummy: Center. Significance levels:* 0.10 ** 0.05 *** 0.01

Model 8 accounts for the non-linear patterns in the age effect, and for the interaction effect between delay and being a grandmother (delay*grandmother). As a baseline we take a woman that lives in the Center and is not a grandmother. Graph 2 shows that her average number of weeks of sick-leave is 0.20 in the case she has not to delay retirement because of the reform and it increases linearly to 0.27 if she has to postpone retirement by 6 years (the maximum imposed by the reform). Graph 2 shows also the case of a similar woman that, at the opposite, is a grandmother. Her average number of sick-leave weeks in case of no delay is 0.28 and it becomes 0.60 if the delay increases to 6 years. Indeed, being a grandmother, besides having a positive direct effect on the number of absences from work (the coefficient is 0.082), reinforces the effect of being in the treated group: the

coefficient of the interaction variable is statistically significant and equal to 0.024. Finally we show the case of a women that is a grandmother and lives in the South. The regional effect is very significant. Indeed, living in the South increases the average number of weeks by 0.33[18].

Graph 2 – Average number of weeks of sick-leave by number of years of delay in retirement imposed by the reform and main socio-demographical characteristics



Source: our simulations using table 7 – model 8 estimated coefficients.

Baseline identifies the average woman living in the Center and non-grandmother.

6. Conclusions

In this paper, we analyse 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 previuos reforms.

Sick-leave take up appears to be highly state dependent, the number of weeks of leave in the past year explaining the current year's number. However, we do also find evidence of a substantial response of individuals to changes in pension rules. Women 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. Further, the reaction is stronger for women who are more

[18] This result is in line with the literature showing that Southern Italian regions are characterized by a higher propensity to opportunistic behaviours (Ichino and Maggi 2000) because they are less endowed with social capital (Guiso, Sapienza and Zingales 2004) or just because they have a higher relative incidence of big firms and in large firms there is normally a lower probability of incurring in severe controls (Winkelmann 1999 and Barmby and Stephan 2000).

likely to be in charge of caregiving. Finally we also find higher sick-leave take up in Southern regions, where care facilities are less than the country's average.

Notwithstanding the 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. Our results show that women working in the private sector responded to the reform by increasing sick-leave take up. We cannot say and (and we do not want to suggest) that this finding points 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 for (Del Boca et al. 2005, Brilli et al. 2013). Sick-leave may then be thelast resot response. 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 plaid 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° *Age requirement*: none	*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 but a penalization is in place for individuals retiring before age 62
Old age	*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	*Seniority requirement*: 20 years *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° *Age requirement*: 57 progressively increasing with life-expectancy and pension fully calculated according to NDC formula	*Seniority requirement*: 35 years° *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 excluding individuals with more than 52 weeks of seniority accrued in 2012 (accreditation of more than 52 weeks is due mainly to volountary contributions or to the accreditation of contributions related to previous years)

	Model 1	**Model 2**	**Model 3**	**Model 4**
	b/se	b/se	b/se	b/se
Treated	0.170***	0.157***	0.062***	0.037**
	(0.016)	(0.016)	(0.013)	(0.016)
Weeks of sick-leave in t-1			0.529***	0.529***
			(0.003)	(0.003)
Age	0.003	0.462***	0.193***	0.216***
	(0.002)	(0.080)	(0.066)	(0.067)
Age2		-0.004***	-0.002***	-0.002***
		(0.001)	(0.001)	(0.001)
Logwage	-0.213***	-0.216***	-0.095***	-0.093***
	(0.008)	(0.008)	(0.007)	(0.007)
Grandmother	0.309***	0.306***	0.130***	0.090***
	(0.016)	(0.016)	(0.013)	(0.020)
Treated*grandmother				0.069***
				(0.027)
North	-0.030*	-0.031*	-0.003	-0.003
	(0.017)	(0.017)	(0.014)	(0.014)
South	0.822***	0.819***	0.369***	0.368***
	(0.021)	(0.021)	(0.018)	(0.018)
Constant	1.677***	-12.132***	-5.047**	-5.619***
	(0.173)	(2.414)	(1.976)	(1.988)
R-squared	0.073	0.074	0.380	0.380
N	47,720	47,720	47,720	47,720

Note: Omitted dummy: Center. Significance levels:* 0.10 ** 0.05 *** 0.01

Table B2 – Results excluding individuals with more than 52 weeks of seniority accrued in 2012 (accreditation of more than 52 weeks is due mainly to volountary contributions or to the accreditation of contributions related to previous years)

	Model 5	**Model 6**	**Model 7**	**Model 8**
	b/se	b/se	b/se	b/se
Delay	0.044***	0.039***	0.016***	0.006
	(0.004)	(0.004)	(0.003)	(0.004)
Weeks of sick-leave in t-1			0.529***	0.529***
			(0.003)	(0.003)
Age	-0.003	0.350***	0.151**	0.170**
	(0.003)	(0.089)	(0.073)	(0.073)
Age2		-0.003***	-0.001**	-0.002**
		(0.001)	(0.001)	(0.001)
Logwage	-0.212***	-0.215***	-0.095***	-0.091***
	(0.008)	(0.008)	(0.007)	(0.007)
Grandmother	0.311***	0.310***	0.132***	0.085***
	(0.016)	(0.016)	(0.013)	(0.018)
Delay*grandmother				0.026***
				(0.007)
North	-0.028	-0.029*	-0.003	-0.001
	(0.017)	(0.017)	(0.014)	(0.014)
South	0.819***	0.818***	0.368***	0.368***
	(0.021)	(0.021)	(0.018)	(0.018)
Constant	2.099***	-7.830***	-3.286	-3.843*
	(0.171)	(2.515)	(2.058)	(2.062)
R-squared	0.074	0.074	0.380	0.380
N	47,720	47,720	47,720	47,720

Note: Omitted dummy: Center. Significance levels:* 0.10 ** 0.05 *** 0.01

Table B3 – Results – Sensitivity analysis to the assumptions about the month of birth: all individuals are born in January

	Model 1	**Model 2**	**Model 3**	**Model 4**
	b/se	b/se	b/se	b/se
Treated	0.178***	0.164***	0.068***	0.036**
	(0.016)	(0.016)	(0.014)	(0.018)
Weeks of sick-leave in t-1			0.512***	0.512***
			(0.004)	(0.004)
Age	0.007**	0.439***	0.200***	0.227***
	(0.003)	(0.090)	(0.077)	(0.078)
Age2		-0.004***	-0.002**	-0.002***
		(0.001)	(0.001)	(0.001)
Logwage	-0.202***	-0.205***	-0.087***	-0.084***
	(0.009)	(0.009)	(0.008)	(0.008)
Grandmother	0.281***	0.279***	0.125***	0.076***
	(0.017)	(0.017)	(0.014)	(0.022)
Treated*grandmother				0.087***
				(0.029)
North	-0.016	-0.017	-0.001	-0.000
	(0.018)	(0.018)	(0.015)	(0.015)
South	0.728***	0.726***	0.332***	0.332***
	(0.022)	(0.022)	(0.019)	(0.019)
Constant	1.486***	-10.660***	-4.856**	-5.628**
	(0.181)	(2.542)	(2.180)	(2.195)
R-squared	0.048	0.048	0.300	0.300
N	54,371	54,371	54,371	54,371

Note: Omitted dummy: Center. Significance levels:* 0.10 ** 0.05 *** 0.01

Table B4 – Results – Sensitivity analysis to the assumptions about the month of birth: all individuals are born in January

	Model 5	**Model 6**	**Model 7**	**Model 8**
	b/se	b/se	b/se	b/se
Delay	0.042***	0.038***	0.015***	0.006
	(0.004)	(0.004)	(0.004)	(0.004)
Weeks of sick-leave in t-1			0.512***	0.512***
			(0.004)	(0.004)
Age	0.001	0.312***	0.148*	0.165**
	(0.003)	(0.094)	(0.081)	(0.081)
Age2		-0.003***	-0.001*	-0.001**
		(0.001)	(0.001)	(0.001)
Logwage	-0.200***	-0.202***	-0.086***	-0.083***
	(0.009)	(0.009)	(0.008)	(0.008)
Grandmother	0.284***	0.283***	0.126***	0.084***
	(0.017)	(0.017)	(0.014)	(0.019)
Delay*grandmother				0.024***
				(0.007)
North	-0.015	-0.015	-0.001	0.000
	(0.018)	(0.018)	(0.015)	(0.015)
South	0.727***	0.727***	0.332***	0.332***
	(0.022)	(0.022)	(0.019)	(0.019)
Constant	1.822***	-6.937***	-3.324	-3.844*
	(0.180)	(2.657)	(2.278)	(2.283)
R-squared	0.300	0.048	0.300	0.300
N	54,371	54,371	54,371	54,371

Note: Omitted dummy: Center. Significance levels:* 0.10 ** 0.05 *** 0.01

Table B5 – Test of endogeneity: OLS – dependent variable: predicted errors of models 5÷8

	Model 5e	**Model 6e**	**Model 7e**	**Model 8e**
	b/se	b/se	b/se	b/se
Delay	-0.000	0.000	0.000	-0.000
	(0.004)	(0.004)	(0.004)	(0.004)
Weeks of sick-leave in t-1			0.000	0.000
			(0.004)	(0.004)
Age	-0.000	-0.000	0.000	-0.000
	(0.003)	(0.094)	(0.080)	(0.080)
Age2		0.000	-0.000	0.000
		(0.001)	(0.001)	(0.001)
Logwage	-0.000	0.000	-0.000	0.000
	(0.009)	(0.009)	(0.007)	(0.008)
Grandmother	0.000	-0.000	0.000	-0.000
	(0.017)	(0.017)	(0.014)	(0.019)
Delay*grandmother				-0.000
				(0.007)
North	0.000	0.000	-0.000	0.000
	(0.018)	(0.018)	(0.015)	(0.015)
South	0.000	-0.000	-0.000	-0.000
	(0.022)	(0.022)	(0.019)	(0.019)
Constant	0.000	0.000	-0.000	0.000
	(0.180)	(2.638)	(2.262)	(2.268)
R-squared	-0.000	-0.000	-0.000	-0.000
N	54,371	54,371	54,371	54,371

Note: Omitted dummy: Center. Significance levels:* 0.10 ** 0.05 *** 0.01