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The Effect of Subsidies to Mature-Age Employment: a Quasi-Experimental Analysis

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Abstract

This paper evaluates the effect of subsidies to employment maintenance on the probability of mature-age workers staying in the firm. Implementing a quasi-experimental design provided by changes in Spanish labor market regulations, we are able to estimate that the end of subsidies had a small though statistically significant and negative impact on workers' firm attachment rate. Our results show that a 1 pp. increase in the worker's cost translates into a 0.11 pp. increase in the cumulative probability of the worker separating from the firm in the next five months. This effect is mainly driven by workers with relatively less seniority in the firm, who present lower dismissal costs; and by workers in low-skill jobs, for which the wage productivity gap seems to negatively evolve with age. In terms of a cost-benefit analysis, we document that the previous higher rate of job maintenance was achieved at a disproportionate cost, and therefore the elimination of the subsidy resulted in in Social Security savings larger than foregone wages.

Keywords Labor tax subsidy · Deadweight loss · Labor demand · Dismissal costs · Social security

JEL Classification H21 · H31 · J23 · J32

Introduction

Employment incentives have been widely used in many European countries to both foster employment prospects among certain disadvantaged groups and to reduce the high level of job turnover rates that some collectives experience. However, the

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extensive empirical literature on the topic has revealed a modest impact of such policies to achieve the foreseen results (see for instance Boone and Van Ours, 2004; and Kluve and Schmidt, 2002). Card et al. (2010) and Card et al. (2016) conduct a meta-analysis on the impact of different active labor market programs (ALMP) on a large set of countries, showing more optimistic but rather small effects on the impact of employment incentives on the employment rate (similar in magnitude to the effect of job-search assistance programs but larger than the ones observed from public employment programs). Moreover, differences in the timing and persistence of the effects of different ALMPs exist, with training programs providing larger positive effects in the long-run than employment incentives.

In Spain, most of the employment subsidies have focused on youngsters, older workers, females, and long-term unemployed individuals, showing limited effects on their capacity to increase the employment levels of targeted group. In particular, Barceló and Villanueva (2016) find some positive effects from regional subsidies on permanent employment of new hires under open-ended contracts. However, there is ample evidence that increases in the employment of targeted groups come often at the expense of other collectives, cancelling out any impact in the aggregate employment rate. For instance, Kugler et al. (2003), and Toharia et al. (2008) analyze the incentives to open-ended contracts introduced in the 1997 labor market reform and find very small effects on the employment rate of different groups of workers, and limited impacts on sustaining the initial decrease in workers' turnover rate (which returns to its pre-subsidized levels once the monetary incentives fade out). Similar results are found by García Pérez and Rebollo (2009) when analyzing regional incentives to permanent employment in Spain over the 2000s, and more recently from Gamberoni et al. (2016) assessing the impact of a newly introduced fiscal incentive to hire workers in small and medium firms with permanent contracts in the 2012 labor marker reform.

The most prevalent employment incentive in Spain has been to offer cuts in the employers' social security contributions, which could be considered as a subsidy to the firm, as it reduces the total firm's labor cost. Whether the foregone income to the Social Security system is a profitable investment or results in a loss for the public accounts and the wide economy depends on the ability of the incentives to foster jobs that otherwise would have not existed. However, the importance of the causal link between employment incentives and job creation or job maintenance at the time of evaluating the efficiency of such policies is often neglected by their promoters.

Employment incentives can be divided between recruitment incentives, which incentivize new hires through subsidies for a limited period of time; and between employment maintenance incentives, which objective is to subsidize keeping employment of workers previously hired. While the formers haven been widely studied, much less is known about the effect of incentives that seek to maintain workers in the firm. However, there are reasons to believe that the dynamics of such two different types of incentives might differ from one another.

The purpose of this paper is precisely to fill this gap in the literature. To do so, we exploit a removal of job maintenance incentives for elder (60+) people, occurred in 2012. The removal was a response to the urge of cutting public expenses in the context of the financial crisis, and because of this, it was completely unanticipated. Furthermore, a legal artifact made the incentive survived five more months for similar workers

aged 59. These two features together constitute a good framework to analyze the effectiveness of such a policy through a quasi-experimental design.

The results of the analysis are two. First, we provide insights regarding the extent to which incentives to employment maintenance affect workers' firm attachment; and second, we evaluate the cost and efficiency of such policy. Regarding the first, we find that subsidies to employment maintenance had a positive effect on the probability of mature-age workers maintaining their job. This effect is statistically significant, but small in magnitude: The removal of the subsidies resulted in an overall increase of 1.6 pp. points in the probability of mature-age workers separating form the firm, with a higher probability among workers with relatively lower seniority and in low-skill jobs. Regarding the second, the subsidy seemed to be highly inefficient from a cost-benefit point of view. According to our estimations, less than one quarter of the cost of the policy was recovered in terms of wages from kept jobs, leading to an important deadweight loss that accounted for 74.1% of the subsidy cost.

The analysis developed here has some drawbacks, which should be kept in mind when interpreting the results. First, the quasi-experimental setting only lasted for 5 months, until subsidy in the control group was also removed. Therefore, our results refer only to the very short term effects of the policy. Second, the subsidy removal affected a very specific set of workers (permanent elder workers with high seniority), hence it is difficult to extrapolate our results to other designs. And third, the employment maintenance subsidy cannot be isolated from other labor market institutions operating at the same time. For example, the high dismissal cost for permanent workers operating in Spain could probably explain much of the small result, as the firing cost would be high compared with wages to be saved until retirement. On the other hand, wages in Spain are highly rigid, which could difficult employment prospects of elder people in a decreasing part of their productivity profile. Hence, a similar subsidy could work differently in other labor markets with different firing costs, or different wage rigidities.

The paper is organized as follows: in Section 2 we describe the nature and characteristics of the subsidies to employment maintenance in Spain. In Section 3 we detail our quasi-experimental setting and identification strategy exploiting changes in the Spanish labor market regulation, and present the results in Section 4. In Section 5 we conduct robustness tests. We discuss the efficiency of employment maintenance incentives in Section 6, and provide a conclusion of the results in Section 7.

Subsidizing Mature-Age Employment in Spain

In Spain there have been a wide variety of incentive schemes to promote employment among particular groups, especially between the youth, long-term unemployed and the more mature-age workers. Figure 1 shows the expenditure on subsidies to employment of some OECD countries in 2010 as percentage of their GDP.[1] Spain ranks 5th in the countries that spend the most in employment incentives (with a 0.3% of its GDP), and

[1] The picture is quite similar if we look at the average of the period 2004–2011. However, in 2013, the expenditure level in these incentives decreased significantly in Spain (to less than 0.1% of GDP), due to the different measures approved to reduce the high fiscal deficit.

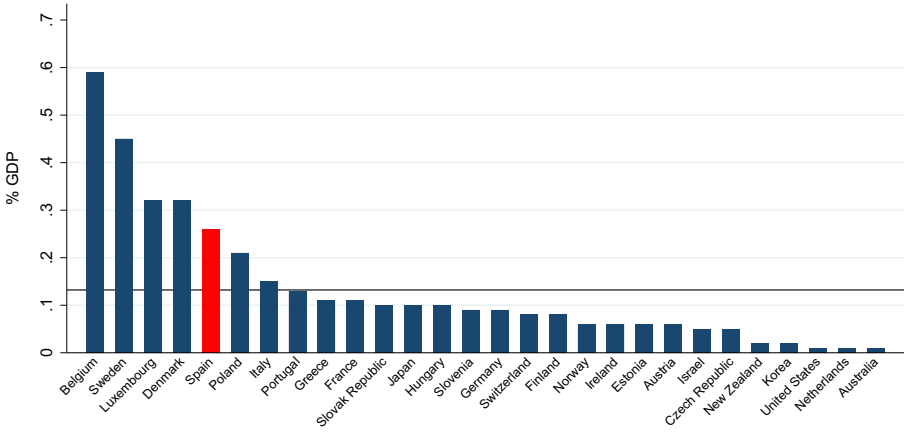

Fig. 1 Public expenditure on employment incentives in 2010 (% GDP). *Source*: OECD

only surpassed by Belgium, Sweden, Denmark, and Luxembourg. The picture in terms of individuals affected by employment incentives is similar, showing that Spain ranks first among OECD countries with 8.6% of the total labor force subject to some bonus scheme (Fig. 2), and well above the 1.7% average of OECD countries with available information.

Our study focuses on one of these schemes, aimed at maintaining mature-age workers in the firm. More specifically, the Royal Decree-Law (RDL) of June 2006 introduced rebates in the employer's social security contributions to increase firm's attachment of mature-age workers.[2] The policy targeted workers 60 years of age and older, hired under a permanent contract, and with at least 5 years of seniority within the firm. The social security rebate amounted to 50% of the payroll tax at the age of 60, and it increased 10 percentage points (pp) per year and up to a maximum of a 100% at the age of 64.

To possibly explain the rationale of such a measure one has to evaluate how employees' productivity evolves throughout their working life. Some empirical research has pointed towards an inverse relationship between productivity and age after some peak is reached (Skirbekk, 2004), and that the pay-productivity gap increases with age (Ilmakunnas and Maliranta 2005), as a consequence of wage rigidities. This wage-productivity gap would evolve differently depending on the type of tasks workers develop within the firm (Skirbekk, 2004; and Roger and Wasmer, 2011). If such a gap exists, employment incentives to maintain older workers in their job could be rationalized as a way to compensate firms for the undergone productivity that mature-age workers experience in a context of downwardly rigid wages. The aim of this study is to estimate the causal impact of such a policy in maintaining older workers employed in the firm, and analyze the extent to which it can be justified in terms of its cost-benefit.

Note that the success of this type of policy could in principle be affected by many other labor market institutions. On one hand, we already mentioned rigid wages as the core of the problem. In a world of flexible wages, the pay of elder workers with a declining productivity pattern would simply decrease, with no effects on employment

[2] RDL 5/2006 of 9th of June.

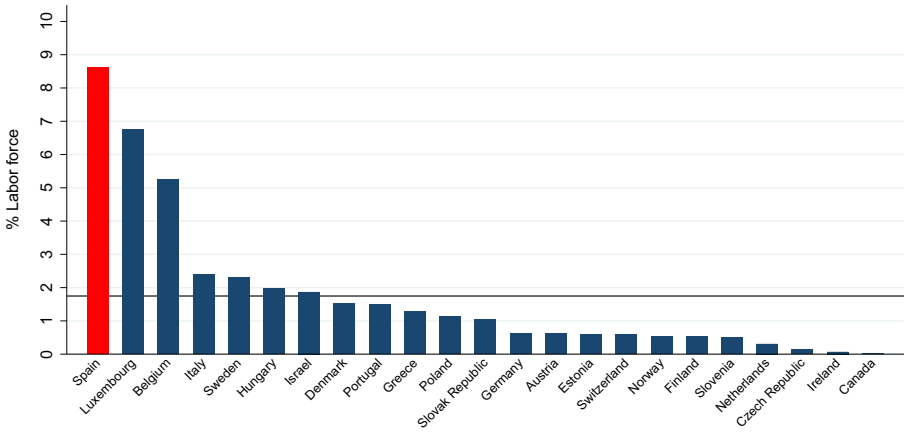

Fig. 2 Share of total labor force under employment incentives in 2010 (%). *Source*: OECD

prospects. Wage rigidities are an important problem in Spain (Font et al. 2015), especially for elder people, as the collective bargaining process typically results in wage agreements with fixed wage increments by age and tenure. This makes the Spanish labor market suited to policies aimed at job maintenance of elder workers. But, on the other hand, the policy under evaluation here only targeted workers with high seniority in the firm. Dismissal costs in Spain are quite high,[3] and this could have reduced the effectiveness of the policy, as these workers were already protected by the high firing costs, which in some cases could be even larger than pending wages until retirement.

These two elements (high wage rigidity and high dismissal costs) are affecting the success of job maintenance incentives in opposite ways. Therefore, the evaluation of such a policy needs to be based on an empirical exercise, which is explained in the next section.

The Elimination of Employment Incentives as a Quasi-Experiment for their Evaluation

To estimate the impact of incentives to maintain mature-age workers in the firm we exploit changes in incentive schemes originating from the labor market reform that Spain carried in 2012. Of special relevance to our identification strategy is the RDL 20/2012 of 13th of July, which, and after 6 years in force, erased the abovementioned incentives to employment maintenance from August 2012. The removal was one of the many fast reactions taken to tackle fiscal pressure in the context of the financial crisis. Therefore, it resulted in an unanticipated exogenous upward shift in the labor cost of firms that employed workers subject to subsidies. In terms of the change in the labor

[3] Firing costs of permanent workers amounted to 45 days of salary per year of tenure, with a maximum of 42 months. RDL 3/2012 reduced them to 33 days per year, with a maximum of 24 months. However, this reduction entered in force since February 2012, without reducing the accrued rights before this date. Hence, most of the workers analyzed in this paper had dismissal costs in line with the old system.

cost per-worker, the elimination of the employment incentive in 2012 led to a rise in the labor cost ranging from 10% to 22.2%[4] (see Table 1). Whether this increase in the worker's labor cost had consequences for the worker's continuation in the firm is the first empirical question we address.

Ideally, one would like to observe the probability of continuing in the firm of the same set of workers both with a subsidy in force and with no subsidy in place. As only one outcome can ever be observed, we look for a suitable comparison or control group to proxy for the unobserved event and outcome, in our case, the workers' firm attachment rate when the subsidy is not suppressed. One possible control group could be workers aged 60 and older, subject to a permanent contract, and with less than 5 years of seniority within the firm. This group was not affected by the subsidy removal (as they never benefited from it) and shared the same macroeconomic conditions and age than their counterparts with greater seniority. However, there are reasons to believe that workers who manage to remain in the same firm for longer periods might substantially differ from those workers that do not. Table 2 confirms this concern. Workers with 5 or more years of seniority in the firm have on average 36% more professional experience, are more highly represented by men, present a significantly lower part-time ratio, and enjoy higher wages than workers with between 2 to 4 years in the firm. More likely, these two groups also differ in terms of other unobservable characteristics. Hence, it is a weak control group.

To overcome this problem, we make use of a legal artifact which allows us to get a good control group. In particular, we use another employment maintenance incentive scheme, in force at the same time: The Law 42/2006, of 28th December (2007 State Budget) introduced "reductions on social security contributions to job maintenance" for workers aged 59 years and older, subject to a permanent contract, and with at least 4 years of seniority within the firm. This incentive had a maximum duration of one year, and entitled to a reduction of 40% in the payroll tax. Moreover, the incentive survived the RDL/2012 of 13th of July, and as a result, workers aged 59 with a permanent contract and with at least 5 years of seniority in the firm remained subsidized throughout 2012. The reason that explains the survival of this measure lies in the different legal origins of the different subsidies in place: The bonus on the social security contributions of workers aged 60 and older was introduced by a RDL in the labor market regulation at one point in time, and remained in force until its suppression by the reform in the middle of 2012. On the contrary, the subsidy on the contributions of workers aged 59 and older was regulated by the State's Budget Law, which has a yearly frequency and validity. In fact, the State's Budget in 2013 did not include any incentives to employment maintenance (which the facto eliminated them).[5] As a result, we can potentially exploit differences in the dismissal rate of these two sets of workers:

[4] Note that the rebate only affected the so called "common contingencies", which account for a tax rate of 23.6% on the contribution base. However, there is still a remaining contribution rate of 6.3% which was not subsidized. Hence, the figures of the per-worker cost change are computed comparing the total labor cost (including the additional 6.3%) with and without applying the subsidy to the 23.6% rate of common contingencies. Also note that the cost change could be smaller for those workers earning more than 3262.5 € per month, the upper bound for Social Security contribution base in force in year 2012 (results excluding these observations are reported as a robustness test in Section 5).

[5] It maintained nevertheless the right to deductions in the social security contributions for those workers that had acquired the right to receive them.

Table 1 Change in the labor cost by worker's age after the elimination of the subsidy

Age (years)	60	61	62	63	64	65+
% discounted	50%	60%	70%	80%	90%	100%
Per-worker cost change	+10.0%	+12.2%	+14.6%	+17.0%	+19.5%	+22.2%

Note: The change in the workers' cost reflects the end of the discount in the tax rate of "common contingencies", which accounted for a tax rate of 23.6% of the contribution base. There was still a remaining contribution rate of 6.3% which was not subsidized

(a) aged 60 and older, 5+ years of seniority and losing the subsidy, (b)aged 59, 5+ years of seniority, and keeping the subsidy at least until the end of the year of 2012.

To assess the suitability of 59 years old workers with a permanent contract and with at least 5 years of seniority as a comparison group we draw our attention once again on some descriptive statistics. In Table 2 we observe that this group is reasonably similar to the group of workers aged 60 and older with the same type of contract and seniority. Although this homogeneity diminishes somewhat as worker's age increases, it constitutes an interesting and plausible control group in our case study.[6] Notice once more that because incentives to employment maintenance were eliminated too in the 2013 for our control group, we are limited to a five-month window to assess the effect of the subsidy removal. However, we argue that five months is a reasonable time elapse to analyze how firms reacted to the exogenous shift in the worker's cost.

In what follows, we define the elimination of the subsidies as the treatment, and the workers aged 60 and older subject to a permanent contract and with at least 5 years of seniority in the firm as the treated group. To estimate the counterfactual outcome, we exploit the continuation of the subsidies to employment maintenance for workers aged 59 and with at least 5 years of seniority in the firm, which constitutes out control group. See Fig. 3 for a graphical representation of our identification strategy.[7]

As an illustration, Fig. 4 plots the cumulative job separation rate since January 2012; in particular, we are interested in asymmetric behavior between treatment and control groups, so we plot the difference between them throughout 2012 (solid blue line). We first notice that this difference has a positive slope (increasing in time), which accounts for a pre-treatment higher probability of separating from the firm in the treated group (60 to 64 years of age) than in the control group (59 years old). Secondly, this increase in the job separation rate between the treated and the control group is continuous in time until the subsidy is suppressed, when a discontinuous increase in the slope is observed. The break in the trend observed in the figure supports the argument that incentives to employment maintenance of mature-age workers were positively associated with a higher firm attachment. Once the incentives are eliminated, affected workers faced an increase in their probability of losing their job.

[6] Note that our results still hold if we restrict our sample to workers only 59 and 60 years old. See Table 10 in the Appendix.

[7] Note that although this is a robust design for estimating treatment effects, our results are difficult to extrapolate to other employment incentives and groups of interest. The latter caveat is especially relevant in our case, as the set of workers analyzed in this study are a very particular group of the labor force, not only in terms of age but also in tenure. As a result, firms willing to fire a worker after the subsidy removal will encounter important financial obstacles due to the high severance payments that these workers are entitled to.

Table 2 Worker' characteristics by age and seniority

	Worked years		Percentage men		Part-time work		Daily median wage	
Seniority	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**
Age	(+5)	(2–4)	(+5)	(2–4)	(+5)	(2–4)	(+5)	(2–4)
59 years	23.7	18.3	70.1	58.6	7.4	20.2	70.8	61.9
60 years	23.7	18.5	67.7	60.9	8.1	18.6	70.7	59.2
61 years	23.1	17.3	69.5	55.3	8.0	22.4	66.6	56.8
62 years	22.4	16.3	66.9	56.9	8.8	22.6	60.6	55.8
63 years	22.0	16.3	68.2	55.4	13.0	24.3	60.0	54.0
64 years	22.1	15.4	66.6	52.1	10.4	25.3	62.2	53.3

Note: High seniority is defined as 5 or more years in the firm (elegible to the subsidy). Low seniority is defined as 2 to 4 years of seniority in the firm (not elegible to the subsidy). All summary statistics refer to workers with a permanent contract

If we consider that the job separation rate between the treated and the control group in the first half of the year would have continued the linear, continuous, and increasing monotonic trend throughout the year had the subsidies remained in place (dashed black line), the higher probability of losing the job after the suppression of the subsidy would be given by the difference between these two lines (the observed versus the expected probability of job dismissal). If potential concerns exits as to whether the difference in the worker's firm attachment rate between the treated and the control groups needs not to be a continuous function of time, in Fig. 5 we plot the dismissal rate difference among the control and treated group in the previous years (when both groups were entitled to subsidies). As it can be observed, the difference in the job separation rate between these two groups is a linear and increasing function of time, and no discontinuous change in the slope is observed at any of the months.[8]

Data, Estimation Strategy and Empirical Results

Our data comes from Spain's Social Security Administrative Labor Records (Muestra Continua de Vidas Laborales or MCVL). It contains the employment histories of a 4% non-stratified random sample of workers that related with the social security system at some point between 2005 and 2013. For these workers, the MCVL records all labor market transitions and job characteristics since 1980 or since first appearance in the social security system. Given the administrative nature of the data, this dataset allows us to accurately estimate the effect that cuts in the employer's social security contributions have on employment, income from contributions, and cost of unemployment benefits.

To assess the effect that incentives to employment maintenance have on the probability of mature-age workers staying in the firm, we estimate a model that incorporates our quasi-experimental design and our diff-in-diff strategy. The question

[8] These placebo test are also included in the estimations in Tables 11 (probit model) and 14 (linear model) in the appendix, with an estimated null effect, as expected.

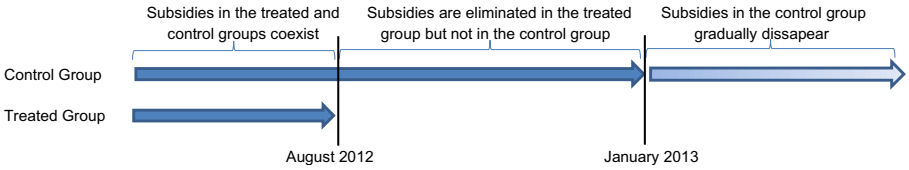

Fig. 3 Timing of subsidies. *Note*: The figure displays our quasi-experimental design, which exploits the timing in the elimination of subsidies to different groups of workers

we address empirically is the following: Given that a worker has kept her job as far as July (the month in which subsidies in the treated group are eliminated), what is the probability that she will lose her job between august and the end of the year? For this purpose, we take all workers aged 59+, with 5+ years of tenure, and active in July of each year between 2008 and 2012 as observations (one observation per year-worker). The outcome variable of interest is the probability of losing job at any time between August and the end of the year. The coefficient of interest is a dummy indicating treatment, which takes value 1 only for 60+ aged workers in year 2012, i.e. those workers who lost the incentive in year 2012.[9] In this way, identification comes from the differential behavior between treatment and control groups in the year of the treatment, compared to other, non-treated years.

In particular, we estimate the following probit[10]model:

$$Y^*_{it} = c + \alpha D_{it} + \theta Z_{it} + \mu_t + \varepsilon_{it} \qquad \varepsilon_{it} \sim N(0,1) \tag{1}$$

$Y = 1$ if $Y^* > 0$.
$Y = 0$ otherwise.

Where Y is a binary variable that equals 1 if the worker separates from the firm between August and December and is 0 otherwise, D is our treatment dummy variable that equals 1 when the subsidies to employment maintenance are no longer in place, Z is a vector of workers' characteristics that include dummies of age, three groups of seniority level (low, medium, and high seniority),[11] gender, and whether the worker is employed in a high-skilled job, μ_t are year fixed effects,[12] and ε is the error term assumed to be normally distributed. In further specifications, we also interact the treatment variable

[9] Table 15 in the appendix explores the possibility of estimating a model with monthly observations, instead of yearly ones. In this model, observations are workers aged 59+ with 5+ years of tenure, active in a given month between years 2008 and 2012, and the outcome variable is the probability of losing job in the next month. Treatment variable is active for the treatment group only in months after the subsidy removal (since August 2012). Its interpretation is the increase in the monthly probability of losing the job after the subsidy removal. Hence, it should be roughly equal to 1/5 of the cumulative coefficient estimated in the main text using yearly observations, because there are five months at risk, from August to December. Comparison of Tables 13 and 15 shows that this is indeed the case.

[10] Kitchens et al. (2019) show that a linear probability model could be better to assess changes in trends after treatment, as it does not impose any non-linear functional form. Therefore, we explore in Table 13 in the appendix different specifications of a linear probability model. The results are essentially the same.

[11] Low seniority: 5 to 9 years, medium seniority: 10 to 17 years, and high seniority: 18 or more years in the firm. These ranges are the result of evenly distributing the workers in 3 groups of seniority.

[12] Year dummies are a semi-parametric way to control for time trends. Table 13 (column 3) in the appendix explores a linear trend instead, with essentially the same results.

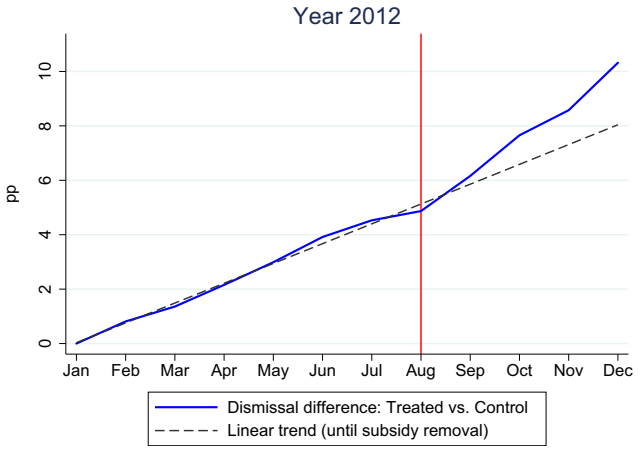

Fig. 4 Cumulative dismissal rate since January: Difference between treated and control groups in 2012. *Note*: The treated group refers to those workers aged 60 to 64 with a permanent contract and with at least 5 years of seniority in the firm. The control group refers to those workers aged 59 with a permanent contract and with at least 5 years of seniority in the firm

with the worker's age, seniority level, and skill-level job to assess whether there are heterogeneous treatment effects from the subsidy removal.

The results of estimating the basic model presented in eq. (1), and subsequent models interacting the treatment with workers' characteristics are shown in Table 3 (marginal effects reported). In Column (1) we can see that removing the subsidies to employment maintenance increased the probability of job displacement by 1.6 pp. (significant at the 1% level).[13] To account for the effect that the end of subsidies to employment maintenance had on workers with different levels of tenure in the firm, in Column (2) we interact the treatment with the three levels of seniority. It can be now seen that the workers most affected by the end of subsidies were those with relatively less seniority in the firm (2.2 pp. increase in the probability of losing the job among workers between 5 and 9 years of seniority, significant at the 1% level) which was similar to the probability increase among workers between 10 and 17 years of tenure in the firm. On the other hand, there are no statistically significant effects of the end of subsidies for workers with 18 or more years of seniority. This result is likely to be mostly explained by the fact that dismissal costs are proportional to seniority, as explained before. Therefore, it suggests that dismissal costs were already acting as an incentive to maintain workers in the firm (or as a deterrent to dismissing them), and hence the end of subsidies did not have a large impact on the firm attachment rate of high seniority workers.

Accounting for differential effects of the end of incentives to employment maintenance for different age levels (Column 3) we observe that the increase in the probability of separating from the firm increased for all age levels. However, the increase among the group of workers aged 64 is twice the increase among workers aged 60 to 63 (2.8 pp. versus 1.4 pp), the difference being significant at the 1% level. This result seems striking at first, since workers aged 64 were very close to the legal retirement age

[13] To facilitate putting these estimates into context, note that average probability of losing the job for an individual in our sample between August and December 2012 was 7,7%.

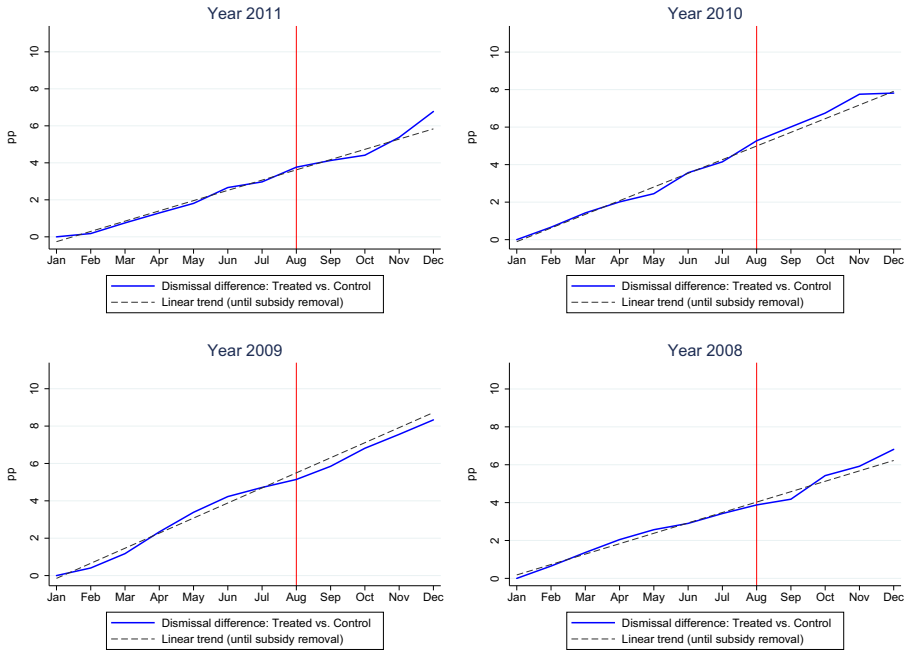

Fig. 5 Cumulative dismissal rate since January: Difference between treated and control groups in previous years. *Note*: The treated group refers to those workers aged 60 to 64 with a permanent contract and with at least 5 years of seniority in the firm. The control group refers to those workers aged 59 with a permanent contract and with at least 5 years of seniority in the firm

in Spain in 2012 (65 years old). Why would a firm incur in the cost of dismissing a worker when she is so close to retirement? One possible explanation would be that workers separating from their job are negotiating an exit to retirement with the firm, and therefore the separation would not be coming from a strictly dismissal procedure, but rather from a bargaining process throughout which both parts, firm and employee, negotiate an end to the employment contract that is beneficial for both parts. In practice however, it is not straightforward to disentangle whether a worker exits a firm involuntarily or voluntarily. This is particularly the case when a worker does not exit the firm directly to retirement, but rather chooses a two-step strategy by which first exits to unemployment to receive unemployment benefits before transitioning to retirement.

In Section 5 we will partly test the suspicion that the increase in the separation rate of workers aged 64 after the subsidy is suppressed arises from exits to retirement. It is important to notice however that this concern does not invalidate the scope and estimates of our study, which seeks to evaluate the effect that incentives to employment maintenance have on the probability of mature age workers remaining employed in the firm. Discerning between exits to unemployment and exits to retirement therefore is indifferent to the purpose of the policy, which final goal is to maintain the jobs of those workers previously hired. This partial analysis is therefore motivated to understand the high increase observed in the probability of separating from the firm of those workers 64 years old.

Table 3 Job displacement effect of subsidy removal

	(1)	(2)	(3)	(4)	(5)
Treated	0.016***	0.022***	0.014***	0.017***	0.021***
	(0.003)	(0.005)	(0.003)	(0.003)	(0.005)
Treated X MedSeniority		−0.004			−0.004
		(0.006)			(0.006)
Treated X HighSeniority		−0.015**			−0.014*
		(0.007)			(0.007)
Treated X 61 years			−0.003		−0.003
			(0.005)		(0.005)
Treated X 62 years			0.006		0.005
			(0.006)		(0.006)
Treated X 63 years			−0.002		−0.003
			(0.004)		(0.004)
Treated X 64 years			0.014***		0.013***
			(0.004)		(0.004)
Treated X High Skilled				−0.012	−0.012
				(0.010)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Observations	42,855	42,855	42,855	42,855	42,855

Note: The coefficients depict marginal effects estimated after a probit model of probability of job displacement. Controls include 2 levels of seniority (medium - between 10 and 17 years in the firm -, and high – 18 or more years in the firm -), 5 age dummies, a dummy for gender, and a dummy for high-skilled worker

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

We argued that the logic behind the introduction of cuts in the employer's social security contributions for mature-age workers stems from the decrease in the workers' productivity at the end of their working life in a context of downwardly rigid wages. In addition, some studies have evidenced an asymmetric evolution of workers' productivity arising from differences in the type of tasks that different jobs demand. According to these studies, productivity does not decrease for high-skill workers in high-skill jobs, but it does for workers involved in more manual tasks in low-skill jobs. If this is the case, we should expect the end of subsidies to employment maintenance to have an asymmetric impact on the probability of a worker separating from the firm by skill level. In Column (4) we interact the treatment with the skill level a job demands and observe a change in the expected direction. While the probability of separating from the firm of a worker in a low-skill job increased in 1.7 pp. after the subsidy removal (significant at the 1% level), the probability of separating from the firm among workers in high-skill jobs increased much less (0.5 pp). However, the coefficient is not estimated with precision, so the difference between the two skill levels is not significant. This finding weakly supports the argument that workers' productivity evolves differently with age according to the different level of skills a job demands. Finally, in Column (5) we include all the treatment interactions analyzed simultaneously and observe very similar results.

Robustness

In the previous section we observed the highest increase in the probability of losing the job after the end of the subsidies among workers 64 years old. In Table 4 we exclude exits to retirement and estimate the same set of models. The table displays similar although somewhat smaller effects, so the end of incentives to employment maintenance therefore seems to have had an effect in the workers' probability of exiting to early retirement. Moreover, the results confirm the suspicion that the high increase in the probability of separating from the firm among workers aged 64 after the end of incentives is mostly explained by its effects on exits to early retirement. As it can be observed in Column (3), once exits to retirement are excluded, there are no differential effects from the end of subsidies across the different age groups (the coefficient on the interaction between treatment and being 64 years old becomes statistically zero). In terms of policy cost, this early exit from the labor force to receive retirement benefits does not generate significant additional costs for the Social Security in the long run, as retiring earlier than the legal age carries permanent penalties, proportional to the number of years remaining until the legal retirement age.

We have previously discussed that the increase in the cost of workers after the subsidy was eliminated is proportional to the worker's contribution base. However, there is a maximum cap in the contribution base. As a result, those individuals with wages above the maximum contribution base experienced a smaller increase (in relative terms) in their labor cost than workers with wages below the maximum contribution after the incentives to employment maintenance were eliminated. In Table 5 we run the same set of models excluding individuals with wages above its maximum contribution base and obtain similar results.[14]

The exogenous upward shift in the cost of those workers affected by the end of subsides is not homogeneous, but instead it varies with tenure and age (see Table 1). We can use this variation to estimate the elasticity of job separation to changes in worker's cost. This in turn provides us with a reference of the magnitude of the increase in the probability of separating from the firm of those workers previously subsidized. We estimate a probit model where the dependent variable is still the probability of losing the job after the removal of the subsidy, but substituting the independent variable to the relative change in the worker's cost.[15] In addition, the regression includes all control variables used in our baseline model. The results (not displayed) show that a 1 pp. increase in the worker's cost translates into an increase of 0.11 pp. in the probability that the worker separates form the firm, significantly different from zero at the 5% level.[16] This low elasticity of job separation to worker's cost is explained by the nature of the workers in our sample, which are characterized by high seniority in the firm and high dismissal costs.

[14] Note that most of censored wages are indeed close to the upper bound. Therefore, for most of the censored observations, the relative cost change is similar to uncensored.

[15] The policy specifies that those workers aged 60 and older and with at least 5 years of seniority in the firm are entitled to a 50% reduction in the social security contribution, which increases 10 pp. yearly. This implies that, for example, a worker that turns 61 years old but has only 5 years of seniority in the firm is only entitled to a 50% reduction, while a worker of the same age with 6 years of seniority or more is entitled to a 60% reduction (after benefiting from a 50% reduction the previous year), and so forth.

[16] 0.12 pp. increase excluding those observations with right-censored wages. Our dataset reports contribution bases, and so our observed wages are right-censored. Because the increase in the worker's cost is proportional to the worker's wage up to the maximum contribution base, we perform a second regression excluding those observations with right-censored wages for which we do not exactly know the cost's variation.

Table 4 Job displacement effect of subsidy removal excluding exits to retirement

	(1)	(2)	(3)	(4)	(5)
Treated	0.010***	0.016***	0.009***	0.010***	0.016***
	(0.002)	(0.005)	(0.003)	(0.002)	(0.005)
Treated X MedSeniority		−0.005			−0.005
		(0.005)			(0.005)
Treated X HighSeniority		−0.016**			−0.016**
		(0.007)			(0.007)
Treated X 61 years			−0.003		−0.003
			(0.005)		(0.005)
Treated X 62 years			0.005		0.005
			(0.005)		(0.005)
Treated X 63 years			0.001		0.000
			(0.003)		(0.003)
Treated X 64 years			0.004		0.003
			(0.004)		(0.004)
Treated X High Skilled				−0.008	−0.007
				(0.010)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Observations	42,457	42,457	42,457	42,457	42,457

Note: The coefficients depict marginal effects estimated after a probit model of probability of job displacement. Controls include 2 levels of seniority (medium - between 10 and 17 years in the firm -, and high – 18 or more years in the firm -), 5 age dummies, a dummy for gender, and a dummy for high-skilled worker

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

So far we have only considered the firms response to the end of subsidies through decisions on the continuation of an existent job. However, firms might have reacted to the end of subsidies by deducting the increase in the worker's social contribution expenses from the worker's wage, with no consequences on the employment level. Nevertheless, this possibility seems implausible in the case of Spain, where the labor market is characterized by strong downwardly rigid wages.[17] As a matter of fact, in Fig. 6 we observe that the wages of those workers that kept their job after the subsidy was eliminated were not affected. Had firms been able to adjust the increase in the workers' cost through a reduction in wages (adjust the workers' wage to their marginal productivity), the suppression of incentives to employment maintenance could have left unchanged the employment prospects of those workers previously subsidized.

[17] For instance, Font et al. (2015) show a very mild procyclical wage pattern in Spain and highlight the existence of downward wage rigidities that reduce wage cyclicality even further during recessions.

Table 5 Job displacement effect of subsidy removal excluding workers with censored wages

	(1)	(2)	(3)	(4)	(5)
Treated	0.015***	0.018***	0.015***	0.016***	0.019***
	(0.004)	(0.005)	(0.003)	(0.004)	(0.006)
Treated X MedSeniority		−0.002			−0.002
		(0.007)			(0.007)
Treated X HighSeniority		−0.008			−0.008
		(0.007)			(0.007)
Treated X 61 years			−0.011**		−0.011**
			(0.005)		(0.005)
Treated X 62 years			0.002		0.002
			(0.004)		(0.004)
Treated X 63 years			−0.001		−0.001
			(0.004)		(0.004)
Treated X 64 years			0.013***		0.013***
			(0.003)		(0.003)
Treated X High Skilled				−0.022	−0.022
				(0.023)	(0.023)
Controls	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Observations	33,260	33,260	33,260	33,260	33,260

Note: The coefficients depict marginal effects estimated after a probit model of probability of job displacement. Controls include 2 levels of seniority (medium - between 10 and 17 years in the firm -, and high – 18 or more years in the firm -), 5 age dummies, a dummy for gender, and a dummy for high-skilled worker

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

Cost-Benefit Analysis

We have seen that the end of subsides to employment maintenance had a small but statistically significant effect on the probability of a previously subsidized worker losing her job. This small effect points towards the existence of a large deadweight stemming from the implementation of the policy. In what follows we conduct a cost-benefit analysis on the elimination of the subsidy, and estimate the efficiency of policies aimed at incentivizing the maintenance of mature-age workers' jobs.[18] In order to do that, we use our model to estimate the probability of each worker in our treatment group to be displaced from the firm, both with and without the effect of the subsidy. We do so by computing the predicted probability of job separation in both the scenario of subsidies in place, and the scenario of subsidies removed. The predicted probabilities are then used to estimate the expected level of wages, social security contributions, and unemployment benefits both in a world where the cuts in the employers' social security contributions no longer exist (the observed world), and in a world where these incentives to employment maintenance persist (the counterfactual). All these calculations refer only to wages paid in December 2012.

[18] Of course, this efficiency assessment is only valid as long as the introduction of a subsidy has no asymmetrical effects with respect to its removal.

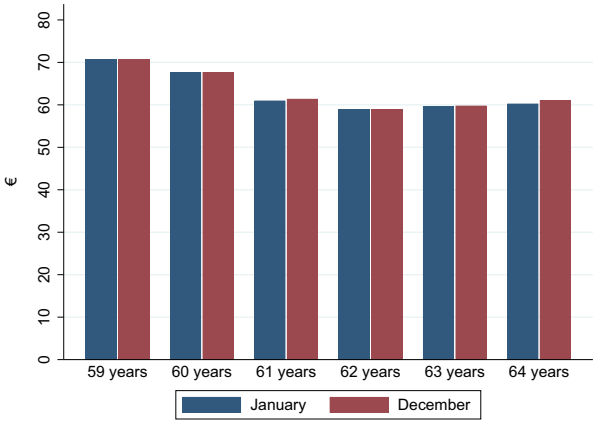

Fig. 6 Daily median wage in 2012 of those workers that remained employed (euros)

In particular, our treated groups consist of 6383 individuals who had a permanent job with at least 5 years of tenure, and at least 60 years of age, in July 2012. We look at their situation in December 2012, when several outcomes have occurred. Most of them (5824) are still working for the same firm. Very few (86) are still working, but for a different firm. Finally, some of them (473) are not working. Our observed world (without subsidies) is computed by adding wages and unemployment benefits separately for those three groups.

We construct the counterfactual world (with subsidies) in the following way. The first group (those that kept their job) is left unchanged with the same individuals and same wages. For each of the individuals in the other two groups, we compute the probability of recovering their old job based on the estimated effect of the subsidy predicted after running the model of Table 3 Column (5).[19] We apply these probabilities to the second group (those workers that are working in a different firm), replacing the December wage by the wage in the previous job when appropriate.[20] Finally, we also apply the probabilities to the non-employed group, replacing current unemployment benefits with previous wage when appropriate.

Table 6 shows the results.[21] Eliminating the subsidies to employment maintenance generated a net increase of 37.3 million € in the Social Security funds in the month of December[22] alone, detailed as follows. The end of incentives translated to a loss of 6.37 million € in total wages, which in turn reduced in 2.31 million € the income from social security contributions. The mild but significant increase in the probability of mature-age workers separating from their job resulted in a greater expense on unemployment insurance benefits, of the order of 2.3 million € higher. On the other hand, the end of

[19] Specifically, for a given individual, let p and p' be the predicted probabilities of losing the job with and without the subsidy, respectively. Then, the probability of keeping the last job in the counterfactual world is given by (p'-p)/p'.

[20] Generally, those workers that separated from the firm and found a job elsewhere are working at a lower wage.

[21] Since MCVL is a random sample of 4% of the population, we consequently elevate these amounts using a flat population weight of 25.

[22] We use the month of December to draw comparisons between the two states of the world. If we consider that 5 months is a big enough lapse of time for companies to decide on whether maintain or fire their previously subsidized employees, the cost of eliminating the subsidies should be around their maximum in the month of December, given that some previously employed workers may increase their reemployment opportunities later on.

Table 6 Cost-benefit analysis of subsidy removal (December, million euros)

	Without subsidy (observed)	With subsidy (counterfactual)	Change (in millions)
Total Labor Income			
Workers that remain in the firm	273.94	273.94	0.00
Workers that separate from the firm and find a job elsewhere	3.29	3.39	0.11
Direct effect of subsidy removal		6.26	6.26
Total	277.22	283.59	6.37
Social Security Contributions			
Workers that remain in the firm	99.30	99.30	0.00
Workers that separate from the firm and find a job elsewhere	1.19	1.23	0.04
Direct effect of subsidy removal		2.27	2.27
Total	100.49	102.80	2.31
Subsidy Cost	–	41.92	–
Unemployment benefits cost	8.63	6.31	−2.31
Net Income Social Security	91.86	54.57	−37.30

the subsidies resulted in direct savings of 41.9 million € for the Social Security (the cost of the subsidy). If we add wages to the picture, the 41.9 million € investment to promote the job maintenance of older workers solely achieved an increase of 6.37 million € in labor wages, 2.27 million € in social security contributions, and a decrease of 2.31 million € in unemployment benefits. This low investment return shows the high inefficiency of the policy to achieve the foreseen results, as 73,86% of the subsidy costs were not recovered in terms of contributions, wages, and savings in unemployment benefits.[23] The intuition is simple. Subsidies managed to keep employment for only a small subset of workers. After the subsidy removal, these workers started earning unemployment benefits, which are clearly greater than the cost of the subsidy for a given individual. However, given their low numbers, the savings coming from not paying the subsidy to the whole treated group more than compensates the extra unemployment benefits paid to the few who lost their jobs.

Conclusions

This study evidences the small, although statistically significant effect that subsidies to employment maintenance have on mature-age workers' firm attachment. Given that the subsidy was targeted at employees with high seniority in the firm, employers' decision over workers' dismissal was highly influenced by the elevated severance payment this group of workers is entitled to. Since dismissal costs were already acting as an incentive

[23] This high share of deadweight loss is also present in an estimation using only 59 and 60 years old workers, see Table 12 in the Appendix.

to firms to maintain workers in the firm, the increase in the workers' cost after the end of incentives to employment maintenance had a weak impact on the probability of workers separating from the firm. Employees with relatively lower seniority in the firm, and hence with smaller dismissal costs, were the group most affected by the end of subsidies; while the probability of continuing in the firm remained unchanged for those employees with relatively higher tenure in the firm. Moreover, the end of cuts in the employer's social security contributions affected the worker's productivity-cost gap. The probability of losing the job for low-skilled workers experienced a significant increase after the subsidy was eliminated, while this probability remained unaffected for high-skilled workers. This finding implies that while low-skilled workers were mildly benefiting from the policy, firms employing high-skilled workers were simply cashing in the subsidies to employment maintenance. The elevated deadweight originated from the policy inefficiency advises against subsides to employment maintenance targeted at highly tenured older workers. If anything, incentives to employment maintenance should be targeted at workers with low seniority in the firm, which present the lowest dismissal cost and the highest turnover rate, and at workers in low-skilled jobs, whose productivity is more likely to be below the wages negotiated in collective agreements. Notwithstanding, subsidizing workers' employment maintenance is mostly likely to carry a high deadweight associated, and desirability of such policies should be questioned.

Appendix

Table 7 Job displacement effect of subsidy removal: All coefficients

	(1)	(2)	(3)	(4)	(5)
Treated	0.016***	0.022***	0.014***	0.017***	0.021***
	(0.003)	(0.005)	(0.003)	(0.003)	(0.005)
Treated X MedSeniority		−0.004			−0.004
		(0.006)			(0.006)
Treated X HighSeniority		−0.015**			−0.014*
		(0.007)			(0.007)
Treated X 61 years			−0.003		−0.003
			(0.005)		(0.005)
Treated X 62 years			0.006		0.005
			(0.006)		(0.006)
Treated X 63 years			−0.002		−0.003
			(0.004)		(0.004)
Treated X 64 years			0.014***		0.013***
			(0.004)		(0.004)
Treated X High Skilled				−0.012	−0.012
				(0.010)	(0.010)
MedSeniority	−0.006**	−0.006*	−0.006**	−0.006**	−0.006*

Table 7 (continued)

	(1)	(2)	(3)	(4)	(5)
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
HighSeniority	−0.008***	−0.005*	−0.008***	−0.008***	−0.005*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
60 years	0.011***	0.011***	0.012***	0.011***	0.012***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
61 years	0.011***	0.012***	0.013***	0.011***	0.013***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
62 years	0.015***	0.015***	0.014***	0.015***	0.014***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
63 years	0.044***	0.044***	0.045***	0.044***	0.045***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
64 years	0.057***	0.057***	0.054***	0.057***	0.054***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Female	−0.013***	−0.013***	−0.013***	−0.013***	−0.013***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
High Skilled	−0.016***	−0.016***	−0.016***	−0.014***	−0.014***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
Year 2009	−0.001	−0.001	−0.001	−0.001	−0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year 2010	0.003	0.003	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year 2011	0.008**	0.007**	0.007**	0.008**	0.007**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Year 2012	0.006**	0.006**	0.006**	0.006**	0.006**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	42,855	42,855	42,855	42,855	42,855

The coefficients depict marginal effects estimated after a probit model of probability of job displacement.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

Table 8 Job displacement effect of subsidy removal excluding exits to retirement: All coefficients

	(1)	(2)	(3)	(4)	(5)
Treated	0.010***	0.016***	0.009***	0.010***	0.016***
	(0.002)	(0.005)	(0.003)	(0.002)	(0.005)
Treated X MedSeniority		−0.005			−0.005
		(0.005)			(0.005)
Treated X HighSeniority		−0.016**			−0.016**
		(0.007)			(0.007)
Treated X 61 years			−0.003		−0.003
			(0.005)		(0.005)
Treated X 62 years			0.005		0.005
			(0.005)		(0.005)
Treated X 63 years			0.001		0.000
			(0.003)		(0.003)
Treated X 64 years			0.004		0.003
			(0.004)		(0.004)
Treated X High Skilled				−0.008	−0.007
				(0.010)	(0.010)
MedSeniority	−0.007***	−0.006**	−0.007***	−0.007***	−0.006**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
HighSeniority	−0.010***	−0.007**	−0.010***	−0.010***	−0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
60 years	0.009***	0.009***	0.009***	0.009***	0.009***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
61 years	0.009**	0.009**	0.010**	0.009**	0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
62 years	0.011***	0.012***	0.010**	0.011***	0.011***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
63 years	0.039***	0.040***	0.039***	0.039***	0.040***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
64 years	0.014***	0.014***	0.014***	0.014***	0.014***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Female	−0.010***	−0.010***	−0.010***	−0.010***	−0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
High Skilled	−0.010***	−0.010**	−0.010***	−0.009**	−0.009**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Year 2009	0.000	−0.000	0.000	0.000	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Year 2010	0.001	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year 2011	0.008**	0.008**	0.008**	0.008**	0.008**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year 2012	0.009***	0.009***	0.009***	0.009***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	42,457	42,457	42,457	42,457	42,457

The coefficients depict marginal effects estimated after a probit model of probability of job displacement.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

Table 9 Job displacement effect of subsidy removal excluding workers with censord wages: All coefficients

	(1)	(2)	(3)	(4)	(5)
Treated	0.015***	0.018***	0.015***	0.016***	0.019***
	(0.004)	(0.005)	(0.003)	(0.004)	(0.006)
Treated X MedSeniority		−0.002			−0.002
		(0.007)			(0.007)
Treated X HighSeniority		−0.008			−0.008
		(0.007)			(0.007)
Treated X 61 years			−0.011**		−0.011**
			(0.005)		(0.005)
Treated X 62 years			0.002		0.002
			(0.004)		(0.004)
Treated X 63 years			−0.001		−0.001
			(0.004)		(0.004)
Treated X 64 years			0.013***		0.013***
			(0.003)		(0.003)
Treated X High Skilled				−0.022	−0.022
				(0.023)	(0.023)
MedSeniority	−0.008***	−0.008**	−0.008***	−0.008***	−0.008**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
HighSeniority	−0.011***	−0.010**	−0.011***	−0.011***	−0.010**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
60 years	0.011***	0.011***	0.011***	0.011***	0.011***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
61 years	0.017***	0.017***	0.019***	0.017***	0.019***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
62 years	0.017***	0.017***	0.016***	0.017***	0.016***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
63 years	0.047***	0.047***	0.048***	0.047***	0.048***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
64 years	0.059***	0.059***	0.056***	0.059***	0.056***
	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)
Female	−0.014***	−0.014***	−0.014***	−0.014***	−0.014***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
High Skilled	−0.011	−0.011	−0.011	−0.007	−0.007
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Year 2009	−0.007**	−0.007**	−0.007**	−0.007**	−0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year 2010	−0.007***	−0.007***	−0.007***	−0.007***	−0.007***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)
Year 2011	−0.000	−0.000	−0.000	−0.000	−0.000
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Year 2012	0.004	0.004	0.004	0.004	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	33,260	33,260	33,260	33,260	33,260

The coefficients depict marginal effects estimated after a probit model of probability of job displacement.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

Table 10 Job displacement effect of subsidy removal: Age-restricted sample

	(1)	(2)	(3)	(4)
Treated	0.012***	0.020***	0.012***	0.020***
	(0.002)	(0.003)	(0.002)	(0.003)
Treated X MedSeniority		−0.011***		−0.011***
		(0.003)		(0.003)
Treated X HighSeniority		−0.014***		−0.014***
		(0.004)		(0.004)
Treated X High Skilled			−0.008	−0.007
			(0.007)	(0.007)
Controls	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Observations	22,017	22,017	22,017	22,017

The coefficients depict marginal effects estimated after a probit model of probability of job displacement. The estimation sample is restricted to those workers aged 59 or 60 at the time the subsidy was eliminated.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

Table 11 Placebo test: Different years of subsidy elimination

	(1) Year 2010	(2) Year 2011
Treated	0.001	0.001
	(0.004)	(0.004)
Controls	Yes	Yes
Year Dummies	Yes	Yes
Observations	34,112	34,112

The coefficients depict marginal effects estimated after a probit model of probability of job displacement. The estimation sample excludes the year 2012.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

Table 12 Cost-benefit analysis of subsidy removal (December, million euros): 60 years old workers

	Without subsidy (observed)	With subsidy (counterfactual)	Change (in millions)
Total Labor Income			
Workers that remain in the firm	98.98	98.98	0.00
Workers that separate from the firm and find a job elsewhere	1.13	1.19	0.06
Direct effect of subsidy removal		1.91	1.91
Total	100.11	102.08	1.97
Social Security Contributions			
Workers that remain in the firm	35.88	35.88	0.00
Workers that separate from the firm and find a job elsewhere	0.41	0.43	0.02
Direct effect of subsidy removal		0.69	0.69
Total	36.29	37.00	0.72
Subsidy Cost	–	12.06	–
Unemployment benefits cost	2.43	1.68	−0.75
Net Income Social Security	33.86	23.27	−10.59

Table 13 Job displacement effect of subsidy removal. Additional specifications

	(1)	(2)	(3)	(4)	(5)
Treated	0.021***	0.025***	0.023***	0.028***	0.023**
	(0.005)	(0.006)	(0.006)	(0.003)	(0.010)
Treated X MedSeniority	−0.004	−0.007	−0.007	−0.016***	−0.007
	(0.006)	(0.008)	(0.008)	(0.003)	(0.008)
Treated X HighSeniority	−0.014*	−0.019**	−0.019**	−0.020***	−0.019*
	(0.007)	(0.008)	(0.008)	(0.004)	(0.010)
Treated X 61 years	−0.003	−0.003	−0.003		−0.001
	(0.005)	(0.004)	(0.005)		(0.008)
Treated X 62 years	0.005	0.007	0.007		0.010
	(0.006)	(0.005)	(0.005)		(0.011)
Treated X 63 years	−0.003	0.004	0.004		0.006
	(0.004)	(0.005)	(0.005)		(0.010)
Treated X 64 years	0.013***	0.035***	0.035***		0.035***
	(0.004)	(0.004)	(0.003)		(0.010)
Treated X High Skilled	−0.012	−0.017	−0.017	−0.010	−0.019*
	(0.010)	(0.012)	(0.012)	(0.006)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	No	Yes	Yes
Linear trend	No	No	Yes	No	No
Observations	42,855	42,855	42,855	22,017	42,086

Note: In Column 1 the coefficients depict marginal effects estimated after a probit model of probability of job displacement. Columns 2 to 5 - OLS estimates; Column 3 replaces year dummies with a linear trend; Column 4 estimates the model only for workers aged 59 and 60 years old. Controls include 2 levels of seniority (medium - between 10 and 17 years in the firm -, and high - 18 or more years in the firm), 5 age dummies, a dummy for gender, and a dummy for high-skilled worker

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Columns 1–4: Standard errors clustered by age and year in parentheses. Column 5: Standard errors clustered by province in parentheses

Table 14 Placebo tests

	(1) 2011	(2) 2010
Treated	0.003	0.000
	(0.004)	(0.005)
Controls	Yes	Yes
Year Dummies	Yes	Yes
Observations	34,112	25,624

Note: OLS estimates of placebo effects of subsidy removal on job displacement in previous years. Controls include 2 levels of seniority (medium - between 10 and 17 years in the firm -, and high - 18 or more years in the firm), 5 age dummies, a dummy for gender, and a dummy for high-skilled worker

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

Table 15 Job displacement effect of subsidy removal. Monthly observations

	(1)	(2)	(3)	(4)	(5)
Treated	0.005**	0.011***	0.002***	0.006**	0.008***
	(0.002)	(0.003)	(0.001)	(0.003)	(0.002)
Treated X MedSeniority		−0.007***			−0.007***
		(0.002)			(0.002)
Treated X HighSeniority		−0.009***			−0.008***
		(0.002)			(0.002)
Treated X 61 years			−0.000		−0.000
			(0.000)		(0.000)
Treated X 62 years			0.003***		0.003***
			(0.000)		(0.000)
Treated X 63 years			0.008***		0.008***
			(0.001)		(0.001)
Treated X 64 years			0.015***		0.015***
			(0.001)		(0.001)
Treated X High Skilled				−0.006**	−0.006**
				(0.003)	(0.003)
Controls	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Month dummies	Yes	Yes	Yes	Yes	Yes
Observations	514,709	514,709	514,709	514,709	514,709

Note: OLS estimates of probability of job displacement in a given month. Controls include 2 levels of seniority (medium - between 10 and 17 years in the firm -, and high - 18 or more years in the firm), 5 age dummies, a dummy for gender, and a dummy for high-skilled worker

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors clustered by age and year in parentheses

Declarations

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of Interest Paulino Font declares that he has no conflict of interest.
Mario Izquierdo declares that he has no conflict of interest.
Sergio Puente declares that he has no conflict of interest.

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