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IZA DP No. 15339

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**Joan Costa-Font**
*London School of Economics, CESIFo and IZA*

**Cristina Vilaplana-Prieto**
*University of Murcia*

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**IZA – Institute of Labor Economics**

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

# ABSTRACT

## Caregiving Subsidies and Spousal Early Retirement Intentions

Balancing caregiving duties and work can be both financially and emotionally burdensome, especially when care is provided to a spouse at home. This paper documents that financial respite for caregivers can influence individuals' early retirement decisions. We examine the effect of a reform extending long-term care (LTC) benefits (in the form of subsidies and supports) in Spain after 2007 on caregiving spouse's early retirement intention. We subsequently examine the effect of austerity spending cuts in 2012 reducing such publicly funded benefits, and we subsequent compare the estimates to the effects of an early retirement reform among private sector workers in 2013. We document evidence of a 10pp reduction in the early retirement intentions after the LTC reform even though the effect is heterogeneous by type of benefit. Consistently, austerity spending cuts in benefits are found to weaken retirement intentions. Our estimates suggest that cuts in caregiving subsidies exert a much stronger effect on early retirement intentions than actual early retirement reforms.

**JEL Classification:** I18, J14

**Keywords:** long-term care, employment, retirement, informal care, caregiving subsidies, home care

**Corresponding author:**
Joan Costa-Font
Department of Health Policy
London School of Economics and Political Science
Houghton Street, WC2A 2AE
United Kingdom

E-mail: j.costa-font@lse.ac.uk

## 1. Introduction

Informal care is the most common form of support to older-aged individuals with caregiving needs. Approximately 13% of individuals over the age of fifty provide care to old age seniors on a weekly basis in OECD countries, 61% of which are women. Informal caregivers are typically adult children, but also partners or spouses who adjust their labour supply and leisure to be able to supply care (Lilly et al., 2007)[1]. However, care provided by the partner or spouse is often defined as 'care by default', because it is considered as an extension of the love and support exchanged over many years, rather than a choice solely driven by the pursuit of a personal utility gain (Arber and Ginn, 1994). However, the supply of care by a spouse can put a strain on the work-life balance (Henz, 2004), which can in turn influence retirement (including early retirement) decisions.

Economic theory typically conceptualises retirement as a planned decision that is commonly influenced by benefits and costs of employment at older age (Becker, 1976). Individuals are expected to face typically a trade-off between a personal preference for higher consumption if employed, and the resulting reduced leisure time, conditioned on health and other household constraints influence on labour supply, and hence intentions to retire. Recent empirical evidence documents that retirement intentions are the strongest predictor of actual retirement age (Nivalanien, 2022). As retirement intentions capture the effect of unobservable effects influencing retirement decisions, retirement plans tend to materialise quite accurately. Adams and Rau (2011) point out that preparing for retirement is a rather multidimensional process involving decisions in several life domains including as finances, location, relationships, and activities. Accordingly,

[1] The opposite reaction, namely, the increase in the labour supply of the healthy spouse to offset the reduction in household income is known as the 'added work effect', though there is very little support in empirical literature backing such explanation (Johnson and Favreault, 2001; Coile, 2004).

household constraints such as, such as being an informal caregiver for a spouse can influence retirement decisions.

Given that labour market participation and caregiving decisions are jointly determined, it is important to understand the effect of caregiving on both labour supply and retirement decisions. However, the effect of employment on care is ambiguous. Whilst some studies estimate a significant and negative relationship between labour market participation and the supply of care (Michaud et al., 2010[2], Coward and Dwyer, 1990; Dwyer and Coward, 1991; Boaz and Muller, 1992; Pavalko and Artis, 1997; Carmichael and Charles, 2003; Berecki-Gisolf et al., 2008; Bolin et al., 2008; Carmichael et al., 2010; Lilly et al., 2010; Nguyen and Connelly, 2014), other studies find no evidence of a significant relationship (Wolf and Soldo, 1994; Stern, 1995; Ettner, 1996, Meng 2009)[3], or even a negative effects (Schneider et al., 2001).

Given that traditional caregivers tend to be close to retirement age, a contribution to this debate lies in examining the effect of caregiving incentives on the exit of the labour market decisions, and more specifically the effect of caregiving on caregiver's early retirement intentions (Dentinger and Clarkberg, 2002; Schils, 2008; Debrand and Sirven, 2009; Meng, 2011; King and Pickard, 2013; Jacobs et al., 2014; Geyer and Korfhage, 2015; Geyer and Korfhage, 2017; Jacobs et al., 2017). This is an important question as early retirement can widen the pension income gap between caregivers and non-caregivers, which in turn puts the sustainability of the pension system at risk (Boeri et al., 2001; General Secretariat of the Council, 2010). However, the evidence available is limited. Kubicek et al. (2010) documents evidence that caregivers between the age of 53 and 67 years old are less likely to retire early. In contrast, women who work and provide

[2] The fact of being an informal co-resident caregiver decreases the future probability of being employed, and at the same time, being employed decreases the future probability of becoming a caregiver.
[3] See Lilly et al. (2007) and Bauer and Sousa-Poza (2015) for a detailed review.

care while performing domestic tasks exhibit a higher probability of early retirement (Van Houtven et al., 2013). This paper attempts to contribute to answering this question.

We examine the effect of the expansion of caregiving subsidies and supports on caregiving spouses' early retirement intentions. More specifically, we exploit the rollout of caregiving subsidies and home care supports resulting from the implementation of the System of Autonomy and Attention to Dependence (SAAD) in Spain on January 1st, 2007. The inception of SAAD encompassed an exogenous source of variation in the availability of both a network of formal care supports, as well as a new monetary subsidy for informal caregivers (caregiving allowance)[4]. Even more importantly, the implementation of SAAD included the governments payment of the social insurance contributions of caregivers who otherwise would not be employed, or who would work part-time. Finally, SAAD was encompassed two additional reforms, namely: (i) the effect of the 2012 austerity cuts that reduced the 2007 SAAD benefits (reducing the caregiving subsidy and supports by an average of 25% and wiping out the caregiver's social insurance contributions), and (ii) the 2013 reform of which disincentivised early retirement among private sector employees (see Appendix C for additional detail).

We contribute to the literature as follows. First, we add to the limited literature on the effect of household constraints on caregiving spouses' early retirement intentions, and more specifically on the effect of the cost of caregiving duties. The introduction of the SAAD related subsidies and supports reduced the costs of caregiving and, at the margin, provided an incentive to expand labour supply, and hence to delay early retirement.

[4] Like in the German system, the Spanish SAAD allows for a choice between economic or in-kind benefits (formal care), unlike the Japanese system which only provides formal care. In contrast to the German system, economic and in-kind benefits cannot be received simultaneously under the SAAD, and regional social services ultimately determine the type of benefit received.

The introduction of SAAD lead to a 10pp reduction in the early retirement intentions, although it declined by 22.1pp among those receiving a caregiving subsidy but increased by 15.6pp among caregivers whose disabled partners/spouse received home care support. Consistently with previous studies, it was more intense for men as compared to women[5].Consistently, 2012 SAAD cuts show a reduction in early retirement intention (17.6pp), and specifically, the 2013 early retirement reform led to a 12.4pp reduction of early retirement among private sector workers (compared to those in the public sector) by 12.4pp. Thus, SAAD exerted a larger effect on retirement intentions that an early retirement reform.

In the following section, we discuss how our paper related to the previous literature. Section 3 explains the institutional setting and the effect of SAAD. Section 4 reports the data and empirical strategy. Section 4 presents the results, and section 5 concludes.

## 2. Caregiving and Retirement

*Early Retirement and caregiving.* The constraints to the supply of care differ when individuals exit the labour market. Consistently, some studies show a lower probability of round-the-clock care among employed men and women compared to retirees (Vlachantoni, 2010). Caregiving increases the probability of retirement among men, and this is especially the case when care is provided to the spouse (Raab, 2017).

Dentinger and Clarkberg (2002) document that the probability of retirement is five times higher for women who care for their spouse or partner compared to those who don't.

[5] These results are consistent with Meng (2011) which documents that the retirement hazard rate of a female caregiver was 74% higher than that of a male caregiver after the introduction of the German LTC insurance. We document similar findings whether we consider the amount of the caregiving subsidy (-33.10% for men and -13.76% for women) or the share of the caregiving subsidy on caregivers' labour income (-29.14% for men and -14.78% for women).

Other research finds that women providing at least 20 hours/week of informal care are 1 to 3 percentage points more likely to retire relative to other women (Jacobs et al, 2017). However, such effects are driven primarily among 'intensive caregivers' (Jacobs et al. 2014), and driven by income effects, which explains that having a child or sick family member requiring care at home, reduces the probability of early retirement (Schils, 2008). However, to date there is limited evidence of an effect of caregiving on the probability for retirement (Debrand and Sirven, 2009).

*Gender differences in caregiving.* A priori, it is not possible to discern whether gender matters for early retirement, as employment can be a source of respite for caregivers too (Mooney et al., 2002; Schneider et al., 2013). However, gender does play a role. Dentinger and Clarkberg (2002) found that men may be less willing to exit the labour market, which in turn delays the decision to retire. This is because compared to men, women are more likely to be the primary caregivers, especially when their spouse needs care (Allen, 1994; Neal et al., 1997; Szinovac and Davey, 2004). Consistently, Schneider et al. (2013) observed that providing care to an older person made labour market exit less likely for female workers. However, in some countries, women may have an incentive to exit the labour market earlier due to lower knock-on effects on their future pension entitlements when statutory pension differs by gender (Carr et al., 2018).

*Health shock and retirement*. Caregiving decisions are commonly influenced by health shocks in the household. Johnson and Favreault (2001) report that the probability of retirement increases (for both men and women) if the partner/spouse is already retired. However, Coile (2004) found evidence of the 'added worker effect' of disability subsidies

among men, that is, disability benefits ameliorate the increase in labour supply in response to a wife's health shock. In contrast, the opposite is found among women[6].

*Care subsidies and supports.* Evidence from long-term care reforms on retirement decisions is limited. So far, most of the evidence has focused on employment effects on Germany and Japan. Geyer and Korfhage (2015) estimate that cash subsidies in Germany reduced the labour participation, while supports exert a small positive effect. Similarly, Geyer and Korfhage (2017) found that the extension of long-term care subsidies and supports did not shift the labour supply of women but had a negative effect on that of men (-19.3 pp). Similarly, Korfhage (2019) reported that cash benefits encourage the provision of informal care and the exit from the labour market of individuals among lower income individuals.

Consistently, evidence from Japan suggests a negative effect of being a caregiver on labour market participation and caregiving supports to increase employment among caregivers (Shimizutani et al., 2008; Sugawara and Nakamura, 2014). Probably, the closest study to ours is Fu et al. (2017), who examined the effect of the implementation of the introduction of LTC insurance in 2000 and the subsequent reform in 2006[7]. However, they document an expansion of male caregiver's labour supply and a reduction of labour market exit among female caregivers. Yet, the effect vanished completely after the reduction of benefits for recipients with mild care needs. However, so far, limited research has been focused on the effect on retirement intentions and behaviour. This is the contribution of this paper.

[6] When husbands started receiving a disability benefit, wives' labour participation decreased by approximately 6%, being this effect persistent up to 5 years (Chen (2012).

[7] These cuts consisted of a reduction of the services provided by 'preventive long-term care' (i.e., elimination of domestic tasks) and decrease of monthly upper limit of subsidy payment for 'preventive long-term care'.

## 3. Institutional Background

This paper examines the effect of the 'Promotion of Personal Autonomy and Care of Dependent People' Bill 39/2006 was passed on 14th December 2006 (we refer to it with the Spanish acronym SAAD corresponding to *Sistema de Autonomía y Atención a la Dependencia*) and implemented on January 1st, 2007, in Spain. The reform was effectively an unexpected expansion of public funding (resulted from a last-minute political agreement of different groups supporting a minority socialist government elected after the 2004 Madrid bombings[8]). This new system universalised the previously means-tested subsidy and allowed access to in-kind LTC benefits (home care, day centres and nursing homes) or economic benefits (caregiving subsidy) purely on a needs-based test. In addition, SAAD exabits a high degree of regional heterogeneity, both in the assessment of caregiving needs and economic status of households[9].

The SAAD classified individuals into one of the three levels of caregiving needs ('moderate', 'severe' or 'major dependency') according to an official ranking scale[10]. An individual's care plan was designed by regional welfare authorities to determine the package of service supports that best matched the applicant's needs, and those of his/her

[8] Spain's LTC reforms arose from a government formed by a Parliament elected three days after the 2004 Madrid bombings (García-Montalvo, 2011). The new minority socialist government began to announce an agreement at the end of 2006 to implement a tax-funded subsidisation of the LTC system. It is therefore plausible to assume that the reform was not expected.

[9] White Book of Dependency (libroblanco.pdf (imserso.es); Page 437) and IMSERSO (2004).

[10] The rating scale evaluates 47 tasks grouped into ten activities (eating and drinking, control of physical needs, bathing and basic personal care, other personal care, dressing and undressing, maintaining one's health, mobility, moving outside home and housework). Each task is assigned a different weight, and there is a different scale for individuals with mental illness or cognitive disability. Additionally, the evaluation considers the degree of supervision required to perform each task. The final score is the sum of the weights of the tasks for which the individual has difficulty times the degree of supervision required. The degree of dependency is determined as the result of the sum: no eligible (less than 25 points), moderate dependent (between 25 and 49 points), severe dependent (between 50 and 74 points) and major dependent (above 74 points). Royal Decree 504/2007, of April 20th that approves the dependency rating scale established by the law 39/2006, of December 14, of promotion of personal autonomy and attention to people in dependency situation.

family which include a choice between access to weekly hours of home care[11] (as well as day and night centres and residential services) and a caregiving subsidy (economic benefit)[12]. Although caregivers and the care receiver can disclose their caregiving intentions, the final decision regarding an individual's care plan is made by the Regional Department of Social Services[13]. It can therefore be considered as a variable that is not controllable by the dependent and the caregiver.

In addition to caregiving supports, a new caregiving subsidy designed to compensate informal caregivers who satisfied the following requirements: (i) some kinship (up to third degree of consanguinity with the person in dependency situation), (ii) co-residence with the dependent, and (iii) having access to suitable housing conditions. Caregiving subsidies included the payment of social insurance (security) contributions which increased the future retirement benefits of caregivers. In this case, different assumptions must be distinguished depending on whether (i) the caregiver was already receiving some retirement or unemployment benefit, in which case he/she could receive the caregiving subsidy, but the payment of social insurance contributions would not be recognized; (ii) whether the caregiver was not working, and was not receiving any kind of a benefits, in which case the caregiver was entitled to some minimum social insurance contribution; (iii) and finally whether the caregiver was actually working, but part time

[11] Home care services are provided by professional caregivers and include services related to household work and services related to personal care. Quality standards are defined and professional services to become home caregivers are accredited by regional authorities. This formal caregiver is hired and paid directly by the social services and not by the family of the dependent person.

[12] Cash is deposited in the care receiver's bank account. However, it is important to note that SAAD is not a model of consumer-directed care, as the Cash and Counselling Demonstration and Evaluation of the US (Brown et al., 2007), because it is tailored to offer a choice of cash or service support, with the final decision taken by regional social services approves.

[13] There were differences in which each region articulated the system of subsidies and supports (in which the forms of access, systems of provision of places and quality criteria were unified), as well as the rules on accreditation of centres and financial participation of the user in the cost of the services (Asociación Estatal de Directores y Gerentes de Servicios Sociales de España, 2009).

in which case Social security would supplement its pension contribution to match the level the amount received pre-part time.

The amount of caregiving subsidies varies significantly by dependency levels, and it ranges from a maximum amount of 390€/month for 'major dependency' level 1 and about 487€/month for 'major dependency' level 2 in 2007. Such benefits increased over time and in 2011, the maximum amount for 'major dependency' level 1 was 417€ and 530€/month for 'major dependency' level 2 but dropped to 387€ and 442€ in 2013. Finally, individuals with mild disability were then classified as level 3 and allocated a caregiving subsidy that ranged between 180€ and 300€ in 201114. Figure 1 summarises the implementation of the SAAD over time (and specifically the progressive incorporation of less severe dependency levels, as well as the amount of caregiving subsidies and home care hours). In addition, the beneficiaries of such benefits were expected to co-pay. depending on their income, but there was a wide regional disparity in the the design of these co-payments (Vilaplana-Prieto, 2011).

**[Insert Figure 1 about here]**

Table A0 in the appendix also compares the amount of the caregiving subsidy (excluding social security contributions) and the monetary value of home care support (number of hours per month according to the level of dependency multiplied by the public price of one hour of home care). For all years and all levels of dependency, the economic value of home care is higher than that of the caregiving subsidy, which rules out a pecuniary incentive as a motivation to choose caregiving subsidies. However, austerity cuts were an immediate reaction to the 2012 Spanish public deficit (8.9 per cent) which led to an implicit bailout of the Spanish economy and the implementation of severe

[14] For a better understanding, they can be compared with minimum wage: 570.60 €/month (2007), 641.40 €/month (2011), 645.30 €/month (2013).

budgetary cuts of SAAD in July 2012 (Royal Decree 20/2012, 13 July 2012 of measures to guarantee budget stability and foster competitiveness)[15]. Importantly, Social Security stopped paying social contributions for informal caregivers. With respect to home care support, the number of caregiving hours was also drastically reduced. For example, home care support decreased from 70-90 hours/month to 56-70 hours/month.

## 4. Data and Empirical Strategy

### *4.1 Data*

We use cross-sectional data from SHARE (Survey of Health, Ageing and Retirement in Europe) corresponding to Wave 1 (2004), Wave 2 (2006/2007), Wave 4 (2011), Wave 5 (2013), Wave 6 (2015) and Wave 7 (2017) [16]. SHARE is the largest pan-European social science study for studying the effects of health, social, economic, and environmental policies over the life-course of people aged 50 or older. It started in 2004, and since then, 380,000 in-depth interviews from 28 European countries and Israel have been conducted[17]. In this paper, we focus on the sample for Spain.

As our sample is designed to contain enough information on both the receipt of LTC benefits and the caregiver's early retirement intentions, the following steps have

[15] SAAD exhibited significant spending cuts, as well as delays in entitlements from July 2012 (Royal Decree 20/2012, 13th July 2012). Specifically, the caregiving subsidy for the lowest need individuals, named as 'moderate dependency' was delayed until 2015, and caregiving subsidies were reduced between 15% and 25% conditional upon the dependency level.

[16] Unfortunately, wave 3 could not be included as it is not comparable with the other waves.

[17] The SHARE data collection has been funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812), FP7 (SHARE-PREP: GA N°211909, SHARE-LEAP: GA N°227822, SHARE M4: GA N°261982, DASISH: GA N°283646) and Horizon 2020 (SHARE-DEV3: GA N°676536, SHARE-COHESION: GA N°870628, SERISS: GA N°654221, SSHOC: GA N°823782) and by DG Employment, Social Affairs & Inclusion. Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGHA_04-064, HHSN271201300071C) and from various national funding sources is gratefully acknowledged (see www.share-project.org).

been followed in the design of the sample. First, from the initial sample containing the six cross-section waves (N=28,814), we selected all married individuals or those with a partner[18] (N=20,699). Second, we selected individuals who were employed (N=3,337), discarding those who were self-employed, since early retirement is not available to them[19]. Third, we selected working individuals aged between 50 and 59 years, restricting the age range to those workers who still did not have the right to early retirement (N=2,541)[20].

Given that the same individual may be interviewed in several waves, it is possible that their relationship with economic activity fluctuates over time (e.g., going through a period of unemployment). For this reason, we have consistently checked which individuals are classified as 'employed' in several waves, but not consecutively, because for them we only know their retirement intentions in the waves in which they are employed. To prevent these observations from distorting the sample, we keep only those individuals who are employed in one or more waves, but consecutively (N=2,499).

*Caregiver identification*. We define an individual as an informal caregiver if he/she provides care in basic activities of daily life to their spouse or partner[21]. Once an

[18] The fact of restricting the analysis to informal caregivers of spouses or partners does not detract from the relevance of the study since it has been found that being married increases the probability of receiving informal care (McCann et al., 2011). In our initial sample, 53.02% of informal caregivers look after his/her partner/spouse.

[19] Self-employed individuals are not entitled to early retirement, and therefore, they do not answer the question of early retirement intention. Only those who at an earlier point in their working career paid contributions as an employee (and for a certain period) are entitled to early retirement. However, the information available in SHARE does not allow us to identify whether self-employed individuals have previously worked as employees and the duration of such a contract. To avoid additional heterogeneity between different types of self-employed, we have chosen not to include them in the sample.

[20] We have not modelled with panel data for two reasons. First, because the sample size would be considerably reduced (1,321 observations). Second, because the number of people receiving benefit (caregiving subsidy or home care) is further reduced (only 86 individuals receive LTC benefits). This is due to the high probability that the caregiving spouse/partner in one wave becomes widowed/partnerless in the next wave.

[21] Two downsides of SHARE data are that first, caregiving intensity is only provided for caregivers outside the household, so we ignore this information for our sample, and second, we do not have information about working conditions. Intensive caregiving has an enormous impact on women's labour force outcomes (Carmichael and Charles, 2003; Heitmueller, 2007; Lilly et al., 2010; Van Houtven et al., 2013).

individual is identified as a caregiver in each wave, we tracked their trajectory in the years before and after to detect changes (from non-caregiver to carer, from carer to non-caregiver). To ensure the stable unit treatment assumption, we define the sample so that all individuals in the treatment group have always been caregivers and all individuals in the control group are always non-caregivers.

In our sample, we identified individuals as caregivers who only provide care for their spouse or partner (N=433). For such individuals, we can identify whether the care receiver receives benefit. We have dropped those individuals who simultaneously looked after their partner/spouse and, other care recipient or those who looked another person different from partner/spouse. The reason being that when the care recipient is different from the partner/spouse, we ignore if the dependent individual receives any kid of long-term care benefits.

The final sample consist of 2,134 observations: 1,701 employed individuals who are not caregivers (in any wave) and 433 employed individuals who are caregivers for their spouse or partner[22](See Table A1 for a description of the survey by wave). Almost 80% of respondents work in the private sector, 20% are caregivers or his/her partner/spouse and for those partner/spouses who receive an LTC benefit, approximately 60% are caregiving subsidies[23].

*Controls.* We consider the following explanatory variables: (i) characteristics of the respondent (age, gender, type of occupation (white collar, blue collar), public-private employee, income from employment, percentage of respondent's employment income

[22] We have verified that there is not any caregiver providing care to a non-disabled spouse/partner and that all disabled individuals receive informal care from his/her spouse/partner.

[23] Geyer and Khorfage (2015) document that 73% of individuals receiving caregiving subsidy out of the total with some LTC benefit. However, their sample includes workers aged 35 to 65 years and is not limited to partner/spouse caregivers but includes any co-resident in a dependency situation.

with respect to total household income, having a retirement plan, number of consultations with doctor/nurse), (ii) characteristics of the partner/spouse (age, gender, level of dependency measured by the Katz's index[24], suffering a mental disorder), (iii) household characteristics (household size, number of children living at home and outside home, household wealth, having a mortgage), (iv) environment characteristics (size of municipality and regional unemployment rate to take into account job opportunities at the regional level).

Table A2 reports the descriptive statistics for the total sample and differentiating between the treatment group and the control group. The treatment group is made up of respondents who are *caregivers* (of their partner/spouse) and whose partners/spouses receive some LTC benefit (caregiving subsidy or home care), while the control group is made up of respondents who are *not caregivers* and whose partners/spouses do not receive any caregiving subsidy or home care support. For the whole sample, 66.82% have expressed their desire to retire as soon as possible, being this percentage slightly higher among caregivers (67.52%) and slightly lower among public sector workers (65.45%). About four fifths are private sector workers and, compared to the control group, the treatment group exhibits a higher share of women (57.94% vs. 42.94%), consultations with doctors/nurses (6.36 vs. 4.81), and a smaller share of people residing in large cities (17.24% vs. 22.43%). Finally, the treatment group exhibits a larger share of people in the first two lower income quartiles (55.15% vs. 50.71%).

### *3.2 The Empirical Strategy*

[24] The dependency degree is approximated using the Katz's Index (Katz, 1983). The Katz Index determines the functional status as a measurement of the ability to perform six daily living activities independently. We have computed this index using the information on daily living activities provided by SHARE.

Our empirical strategy identifies the impact of SAAD benefits on early retirement intentions of the caregiving partner and spouse. In addition, we attempt to answer the following questions: (i) do caregiving subsidies or home care supports, exert similar effects on early retirement intentions? (ii) how did 2012 the austerity cuts alter early retirement intentions? (iii) how do such estimates compare to the 2013 reform that incentivised early retirement among private sector employees?

Although the labour market effects of SAAD may be heterogeneous, our focus is on retirement intention, differentiating between subsidies and home care supports. The effect of each type of subsidies and support is far from trivial. Whilst the receipt of caregiving subsidies may increase retirement intentions if subsidies are perceived as extra incomes, they might decrease retirement intentions, if they encompass additional social insurance contributions which entail an incentive to stay in the labour force. In the latter case, it is possible that spousal caregivers that benefit from home care supports may find it easier to reconcile work and care, and therefore retirement intention may decrease as a result. The cuts in subsidies and supports after 2012 may also exert a significant impact on retirement intentions. The reduction in the subsidy and the suspension of the social insurance contributions may revert the additional incentive to delay retirement intentions, unless earnings are perceived to be indispensable for the subsistence of the household and expand social insurance contributions (which were previously publicly funded). Similarly, the reduction home care supports may increase retirement intentions.

Given that access to early retirement is different for those employed in the public or private sector, we examine the effect of early retirement reform for private sector employees after 1 January 2013, which significantly tightened the eligibility conditions and reduced the amount of pension that could be received. In this context, caregivers working in the private sector will be exposed to both SAAD budget cuts and the tightening

of early retirement incentives. A unique contribution of paper lies in examining the effect size of different reforms on retirement intentions.

The literature examining the effect of informal caregiving on early retirement decisions has faced the potential endogeneity of the informal care variable. Work and life balance might incentivise caregivers to opt for early retirement, but early retirement might, in turn, make more likely to become an informal caregiver. Hence, it seems important to examine a quasi-experimental reform that provides some exogeneous variation in the probability of providing care. In our model, this problem of endogeneity does not seem likely since the two dependent variables examined are defined using early retirement intentions rather than an ex-post retirement decision. We focus on the following question from the SHARE questionnaire: "Thinking about your present job, would you like to retire early from this job?". This question is only addressed to respondents who are working at the time of the survey. In other words, we are not able to capture the early retirement intention of unemployed or inactive individuals. Moreover, as Geyer and Korfhage (2017) state, using quasi-natural experiments or policy changes designed in such a way that individuals cannot select themselves into or out of the measure, helps overcoming a potential endogeneity bias.

Given our sample of employed workers between the age of 50 and 59 years old, we understand that those who respond affirmatively are clearly expressing their early retirement intention. We define the dependent variable "*early retirement*" $ER_{it}$ as a binary variable that takes the value 1 if it answers affirmatively to the previous question and 0 otherwise.

We exploit the introduction of SAAD, distinguishing two periods: (i) short term effects: 2004-2011 (prior to the cuts in the SAAD and the reform of the retirement system) and (ii) long-term effects: 2004-2017 (which includes the two reforms mentioned above).

*Short-term effects (2004-2011)* are captured by the equation below:

$$ER_{it} = \beta_0 + (\beta_1 + \beta_2 LTC_{it})IC_{it} + [\beta_3 + \beta_4 LTC_{it} + (\beta_5 + \beta_6 LTC_{it})IC_{it}]T_t^{7-11} +$$

$$+\beta_7 LTC_{it} + \beta_8 UR_t + X'_{it}\gamma + C_c + T_t + \varepsilon_{it} \;\; ; \;\; LTC_{it} = \{ CA_{it}, HC_{it}\} \qquad (1)$$

$IC_{it}$ takes the value 1 if the interviewee is an informal caregiver of a partner/spouse in a dependency situation; $LTC_{it}$ is a binary variable that refers to long-term care benefits. Since the dependent person cannot receive caregiving subsidy and home care simultaneously, we proceed to define two different binary variables, namely caregiving subsidies ($CA_{it}$) and public home care ($HC_{it}$).

$T_t^{7-11}$ is a binary variable that takes the value 1 in the post-reform period (2007-2011), and 0, otherwise and refers to the period 2007-11, $X'_{it}$ denotes a vector of controls. Controls include the following variables which can explain some alternative explanations for individuals differences in early retirement intentions[25], such as : (i) individual characteristics including age, sex, type of occupation[26], public/private sector employee income from employment, percentage of respondent's employment income as a share of total household income, number of consultations with doctor/nurse, having retirement

[25] Control variables have been selected following previous studies and include gender (van Solinge, 2012), education (Petoska and Earl, 2009), Marital status (Szinovacz and DeViney, 2000), health (Bloom et al., 2005; Davey, 2008), cognitive ability (Parker et al., 2013), income and wealth (Aranki and Macchiarelli, 2013), planning and personal assets (Colie and Gruber, 2007; Whitaker and Bokemeier, 2014), family related variables (Szinovacz et al., 2001; Damman et al., 2015).

[26] The type of occupation (blue collar vs. white-collar) can also influence the retirement decision. Blue-collar workers are more likely to perform tiring or more physically demanding tasks. In principle, this variable could present problems due to the ambiguous relationship between retirement and health status (Chirikos and Nestel, 1991). However, we consider that our dependent variable, referring to the early retirement intention and not to a retirement decision already made, allows us to avoid this problem.

plan[27], (ii) characteristics of the partner/spouse (age, sex, state of dependence approximated by the Katz index, suffering from mental illness), and (iii) household characteristics (number of sons/daughters living at home and outside home, household wealth, household size, having mortgage) and size of municipality. Finally, $UR_t$ refers to the unemployment rate at the regional level (NUTS-2) to account for differences in regional labour markets. Finally, $C_c$ and $T_t$ denote regional fixed effects and year fixed effects, and $\varepsilon_{ict}$ is an error term. We cluster our standard errors by Autonomous Communities to capture heterogeneity in the implementation of the SAAD across regions.

We are interested in identifying (1) whether there exists an 'added worker effect', which would be identified with $\beta_1 < 0$, and (2) whether the introduction of SAAD changed early retirement intentions of caregivers. Specifically, we test whether caregiving subsidies ($\beta_6 < 0$ for the model estimated with $CA_{it}$), or home care ($\beta_6 < 0$ for the model estimated with $HC_{it}$) entailed a change of intention.

*Long-term effects* (2004-2017) are measured as follows:

Next, we examine not only the introduction of the SAAD but its subsequent cuts, as well as a further early retirement reform among private sector workers. For this, we define a binary variable $PR_{it}$ that takes the value 1 if the worker is employed in the private sector and 0 otherwise.

$$ER_{it} = \alpha_0+\alpha_1 LTC_{it} + (\alpha_2 + \alpha_3 LTC_{it})PR_{it} + [\alpha_4 + \alpha_5 LTC_{it} + (\alpha_6 + \alpha_7 LTC_{it})IC_{it}]T_t^{7-11} +$$

[27] The introduction of variables related to health status poses problems due to its potential endogeneity with respect to retirement. Not having good health can be a reason to decide to retire but continuing to work can also lead to a worsening of health status (Kerkhofs et al-, 1999). Additionally, some studies have found that there may be a tendency to exaggerate health problems to justify leaving the labour market. This 'justification bias' is associated above all with the use of subjective health measures (Disney et al., 2009; Jones et al., 2009). To avoid this problem, a health indicator less likely to suffer from self-reported bias is used in this study: the number of consultations with doctor/ nurse in the last year.

$$+[\alpha_8 + \alpha_9 LTC_{it} + (\alpha_{10} + \alpha_{11} LTC_{it})PR_{it} + (\alpha_{12} + \alpha_{13} LTC_{it} + \alpha_{14} PR_{it})IC_{it}]T_t^{13-17}$$

$$+[\alpha_{15} + (\alpha_{16} + \alpha_{17} PR_{it} T_t^{13-17})LTC_{it} + \alpha_{18} PR_{it}]IC_{it} + \alpha_{19} UR_t + X'_{it}\delta + C_c + T_t + \epsilon_{it} \ ;$$

$$LTC_{it} = \{ CA_{it}, HC_{it} \} \quad (2)$$

We are interested in contrasting (i) the long-term 'added work effect' ($\alpha_{15} < 0$), (ii) whether the cuts in SAAD had a significant effect on the early retirement intention, and (iii) if such effects were different between public and private sector workers, given that the reform affected mainly early retirement of private sector workers ($\alpha_{17} \neq 0$ for $CA_{it}$ and/or $HC_{it}$).

*Assumptions of the model:* To identify the effects of SAAD on early retirement intentions, we need to verify that the data fulfil two assumptions: (i) stable unit treatment and (ii) common trend (Lechner, 2011). The *stable unit treatment assumption* states that the treatment should only affect the treatment group. That is, the control group should not be affected in any way by the interaction between members of the population, and the treatment group should not be affected by reforms taking place before the implementation period. As we have mentioned before, we have checked that individuals in the control group are always non-caregivers and individuals in the treatment group are always caregivers.

Given that caregiving subsidies in SAAD can only be received under the assumption of co-residence between caregiver and care receiver and our sample is restricted to marriages (cohabiting partners), it seems highly unlikely that strategic changes could occur in living arrangements to receive a benefit. In any case, in the robustness checks section, we will propose the re-estimation of the model for the subset of households whose composition remains unchanged. In addition, the SAAD is a

consumer-oriented system since, although the family expresses its intentions, it is the regional social services that decides which benefit is granted.

On the other hand, it does not seem likely that decisions regarding early retirement made by the treatment group have enough impact to affect the equilibrium salary and, consequently, the decisions of the control group. When we examine the effect of early retirement reform, the control group consists of civil servants. Although these individuals maintain more advantageous conditions of early retirement, it does not seem plausible that private sector workers (over 50 years of age) consider making some oppositions to become public employees eligible for early retirement.

The *common trend assumption* implies that both the treatment and control groups must be influenced by the same macro-trends. In other words, the potential non-treatment outcomes follow the same trend regardless of the group to which they belong. This assumption can be relaxed if the covariates give rise to different time trends can be identified. In such a case, the common trend assumption must be met conditional on these covariates[28]. Similarly, the *stable unit treatment value assumption* states that the treatment should only affect the treatment group, that is, neither the control group should be affected in any way by the interaction among members of the population, nor should the treatment group be affected by the reform before the implementation period. As the Act of the reform was presented to the parliament on April 26th, 2006, and the legislative process the reform was heavily amended in Parliament, it was practically impossible to anticipate a specific outcome[29]. To further test the plausibility of the common time trend

[28] Under both assumptions, the effect on the treatment group can be estimated using a regression analysis. Therefore, it nets out the biases resulting from the permanent differences between the treatment and control groups, as well as those derived from macro-trends that are not correlated with the change in the LTC policy and early retirement (Imbens and Wooldridge, 2009).

[29] Deadlines for amendments, until 20th June. The Parliament passed the draft bill on 5th October 2006. The draft bill was referred to the Senate on 18th October 2006. Deadline for amendments finished on 6th November 2006. Parliamentary groups registered 3 amendments to reject the bill and 260 amendments to

of the common time trend, we formally tested whether the treated individuals had deviating linear pre-trends by estimating the following specification:

$$ER_{it} = \varphi_0 LTC_{it} \cdot t + \varphi_1 C_c \cdot t + \varphi_2 UR_t + X'_{it}\delta + C_c + T_t + \varepsilon_{it} \quad (3)$$

$$LTC_{it} = \{ CA_{it}, HC_{it} \}$$

For both subsidies and home care, the interaction $\varphi_0 LTC_{it} \cdot t$ is not significant [Results available upon request].

As for estimation method, it is necessary to comment on the estimation of the model for the probability of early retirement. In a nonlinear model, the common trend assumption is only satisfied if there is no group-specific difference in the dependent variable. This implies that the treatment and control groups should start at the same average level of early retirement before treatment (Lechner, 2011). As this assumption is not met with our data, we have opted to estimate a linear model.

*3.3 Robustness checks*

To address potential endogeneity concerns, we proceed to estimate a first stage regression for the probability of being caregiver using as an instrument the number of informal caregivers outside the home. In many cases, the instruments used are based on health indicators of potential care receivers, which could be positively correlated with the demands for care. For example: parent's age (Bolin et al., 2008), parent's health (Bolin et al., 2008; Ciani, 2012; Van Houtven et al., 2013), parent's or parents-in-law living status (Bolin et al., 2008; Van Houtven et al., 2013), number of people who are sick or dependent in the home (Heitmueller, 2007; Ciani, 2012; Meng 2013). Hassink and Van

modify specific aspects of the bill. Parliament passed the Act on 30th November 2006 and was published on the Official State Bulletin on 14th December 2006.

der Berg (2011) cast doubts on this type of instrument since they ignore the fact that some care tasks are "time-bounded" (i.e., eating, going to the toilet, getting in or out of bed), while others can be performed at different times of the day (i.e., bathing) or even moved from one day to another (i.e., shopping).

In this paper, we use the number of caregivers outside the home as an instrument, since help from non-co-residential caregivers could influence the spousal burden of care. An identification concern refers to whether receiving some benefit from the SAAD affects the composition of the household to reinforce the provision of care. For this reason, the models are re-estimated by restricting the sample to households whose composition has not changed throughout the period of analysis.

## 4. Results

### *4.1. Descriptive evidence: differences between treatment and control groups*

Figure 2 displays the behaviour of the treatment and control groups throughout the period of analysis. In the group of spouses/partners who provide informal care and whose spouse/partner receives a public long-term care benefit, we find a decrease in the early retirement intention coinciding with the introduction of the SAAD (2007). In the group of spouses/partners who do not provide informal care we find a smaller decrease. Consistently, we identify a change of trend in 2013 amidst the spending cuts, while the decreasing trend remains for the group of non-caregivers. The decrease in retirement intentions after the introduction of the SAAD is much greater for female caregivers, which is almost reversed in 2013. For male caregivers, the decreasing trend in retirement intention is slightly smoothed after 2013.

Given that the conditions around access to early retirement (which affects both caregivers and non-caregivers) are different between public and private sector workers, Figure 3 shows the evolution of early retirement intention by activity sector. Importantly, in the pre-SAAD period, for the treatment and control group, the early retirement intention is larger for workers in the private sector for men, and in the public sector for women. The implementation of SAAD is associated with a decline of retirement intention for caregivers in both sectors. For men working in the private sector, there was a reduction in retirement in 2013 that was more pronounced among caregivers. In the case of women working in the private sector, we appreciate an increase of retirement intention in 2013, more pronounced among caregivers.

**[Insert Figures 2 and 3 about here]**

Figure 4 shows the density function corresponding to the number of hours worked per week by caregivers and non-caregivers in the pre-reform (2004-2006) and post-reform (2007-2011) periods. The density function of caregivers is considerably flatter than that of non-caregivers and has flattened even more after SAAD implementation, which results from a higher share of workers with reduced working day among caregivers (according to the data in Table A2, only 22.69% of the non-caregivers have a reduced working day compared to 42.25% of the caregivers).

**[Insert Figure 4 about here]**

### *4.2. Extensive margin (short-term).*

Table 1 reports the estimates of the short-term effects of the introduction of SAAD (2004-2011), and we report the estimates using a stepwise approach that incorporates

progressively new explanatory variables[30]. We find that prior to the reform, being a caregiver increases the early retirement intention by 26.9pp (39.84% compared to mean intention). However, we find no effects among individuals that received means-tested caregivers' subsidies before SAAD.

In contrast, the introduction of SAAD lead to a 10pp reduction in the early retirement intention (-11.30% with respect to the mean intention). That is, regardless of the type of LTC benefit, SAAD led to a decrease in the early retirement intention: (1) those who received home care, improved their work life balance (-11.7pp); (2) those who received a caregiving subsidy benefited from a higher amount and the fact that Social Security paid the difference between contributions which was an additional incentive to retirement decisions (-10pp).

**[Insert Table 1 about here]**

Next, we distinguish between employees working full-time and part-time[31]. The results are shown in the upper panel of Table 2 and suggests that before SAAD, caregivers working part-time exhibit a stronger early retirement intention (34.8pp) compared to those working full-time (20.8pp). Similarly, caregivers working part-time who receive a

[30] The model M1 only includes respondent's characteristics (age and gender), year fixed effects, region fixed effects and unemployment rate. M2 includes the same variables as M1 and additional respondent's characteristics (blue/white collar worker, public/private sector worker and number of consultations with doctor/nurse in the last year). M3 also includes household's characteristics (having sons/daughters living at home, having sons/daughters living outside home, household size higher than 2 people). M4 also includes partner/spouse's characteristics (age, gender, Katz's index (grouping levels 0-1, 2, 3, 4-5 and 6) and having mental illness). Finally, M5 includes size of municipality, household wealth, respondent's income from employment, percentage of respondent's employment income with respect to total household income, having a retirement plan and having a mortgage. As CA and HC are mutually exclusive benefits, in order for the control group to include only those individuals who do not receive any benefits, a binary variable for HC is entered in the regressions to analyse the effect of CA and a binary variable for CA is entered in the regressions for HC.

[31] Workers with reduced workday are those who work less than 40 hours/week if they are private sector workers (Article 34 of the Workers' Statute) and less than 37.5 hours/week if they are civil servants (Resolution of February 28, 2019, of the Secretary of State for Public Function, by which instructions are issued on the working hours and hours of the personnel at the service of the General Administration of the State and its public bodies).

caregiving subsidy show a higher early retirement intention (30.5pp). We see that the introduction of SAAD absorbs most of the early retirement intention among caregivers working part-time (-22.8pp), given that the caregiving subsidy alongside the Social Security contributions, compensates the employment income effect. In contrast, caregivers who work full-time exhibit a reduction in the early retirement intention upon benefiting from home care (-14pp).

**[Insert Table 2 about here]**

*4.3. Intensive margin (short-term).*

Given that the effect on the early retirement intention may depend on the amount of caregiving subsidy received (€1,000 per year; 2012), we have re-estimated previous estimates considering this variable and the share of the caregiving subsidy on caregivers' labour income. The amount of the subsidy is expressed in net terms, e.g., net of the co-payment. More specifically, the upper panel of Table 3 reveals that, before SAAD, a higher subsidy amount and a higher income share led to a higher early retirement intention, but the implementation of the SAAD (2007-2011) switched the effect of the caregiving subsidy and turned it negative (-0.352 for the amount subsidy and -0.085 for the ratio of subsidy and caregiver's income).

For a better visualization of these results, Figure 5 plots the predicted probability for the early retirement intention in the pre- and post-reform period (2004-2011) by gender. The figure depicts the amount of the caregiving subsidy (up to 4,000 €/year) and the probability in the pre-reform period. Consistently, for both men and women, the early retirement intention decreased in the post-reform period.

Compared to the average caregiving subsidy for the period 2004-2011 (3,665 €/year; 2012), we find a reduction in the early retirement intention by 33.1% for men (from 0.7601 to 0.5085) and by 13.76% for women (from 0.9189 to 0.7925). Similarly, compared to the ratio between the caregiving subsidy and caregiver's income from employment (0.4174 for the period 2004-2011), the early retirement intention has decreased by 29.14% for men (from 0.7512 to 0.5323) and by 14.78% for women (from 0.9077 to 0.7735). Hence, we find that men experience an extra reduction in the early retirement intention after SAAD.

**[Insert Table 3 and Figure 5 about here]**

*4.4. Extensive margin (long-term)*

Table 4 displays the estimated coefficients for the long-term effects resulting from the introduction of SAAD (2004-2017). Compared to civil servants, *private sector workers show a higher early retirement intention* (12.6pp, a mean 18.8% increase ). However, such a higher intention is moderated by the restrictions on access to early retirement (-5.7pp or a decrease by 45.24% with respect to the positive effect of being private sector employee). In the short term, we find that being a caregiver increases the early retirement intention by 20pp (29.6% average increase). Consistently, the cuts in SAAD around 2012 are found to reduce the early retirement intention (17.6pp or an average 26% reduction), and specifically, the impact of the austerity cuts in SAAD benefits reduced the retirement intention among private sector workers compared to those in the public sector by 12.4pp (an average 18.5% increase).

However, the retirement intention declines by 22.1pp among those receiving a caregiving subsidy (-32.73% with respect to mean value), which almost offsets the

positive effect of being a caregiver, suggesting that the austerity cuts led to powerful added worker effect. In contrast, we find an increase in early retirement intention by 15.6pp (an average 23.2% increase) among caregivers whose disabled partners/spouse received home care support. Hence, a reduction in hours of home care increased the early retirement intention. By the contrary, the reduction in the amount of the caregiving subsidies and the suppression of the contributions paid by Social Security led to an extension of their working life.

**[Insert Table 4 about here]**

As for the period 2004-2017, we estimate the effect of full and part-time work as a mediator in the impact of both reforms. The lower part of the Table 2 reports the results of the estimation of the long-term model differentiating between full-time and part-time employment. We find the following results: (i) the early retirement intention is 18.8pp lower among private part-time workers, but 32.9pp higher among private full-time workers; (ii) the effect of reduction in the early retirement intention that resulted from the early retirement reform was twice as large among part-time workers as compared to full-time workers (-5.9pp vs. -2.5pp); (iii) the impact of the austerity cuts in SAAD also affected more intensively part-time workers (-21.6pp. vs. -13.4pp), especially if they received a caregiving subsidy, due to the suppression of the payment of complementary contributions to Social Security (-32. vs. -18.4pp); (iv) in contrast, the impact of the cuts in SAAD, among private sector workers was more intense among full-time workers (-21.1) than part-time workers (-14pp).

Thus, the SAAD cuts had a much stronger effect on retirement intention than the 2013 reform that changed the conditions for early retirement: 67% and 50% for caregivers with caregiving subsidy or home care, respectively; 54% and 63% higher for part-time or full-time workers, respectively. Therefore, it was a reform of the long-term care system

that was the main cause of the change in the retirement intention trend for private sector workers.

### *4.5. Intensive margin (long-term).*

Next, we have re-estimated the effects of the caregiving subsidy and the ratio between caregiving subsidy and caregiver's employment income (lower part of Table 3). Unlike our previous results, we find that the amount of the caregiving subsidy did not modify the probability of early retirement for the entire sample, although specifically, for private workers alone, it decreased the probability of retirement by 12.7pp.

When we examine the effect of the ratio between the caregiving subsidy and caregiver's employment income, we observe that the impact of austerity cuts led to a higher decrease for private workers (-18.2pp) as compared to the whole set of workers (-11.7pp). This result confirms the greater impact of the cuts in SAAD on private sector workers, and specifically, suggest that it is not benefit amount, but its relevance to the caregiver's budget what affects retirement intentions.

Finally, Figure 6 displays the predicted probability for early retirement in the post-reform period conditioned on the amount of the caregiving subsidy (left figure) and the ratio between caregiving subsidy and caregiver's income from employment (right figure). It is worth noting that in the period 2007-2011 the predicted probabilities for private workers reveal a marked positive slope, while it is almost flat among civil servants. This suggests that private sector workers are much more sensitive to the impact of the caregiving subsidies, and accordingly, adjust their early retirement intentions.

However, in the period 2011-2017, the predicted probabilities for private sector workers changed significantly. Compared to the amount of the caregiving subsidy for the period 2007-2017 (4,279 €/year, 2012), we find a reduction in the predicted probabilities

of early retirement by 9.72% (from 0.7075 to 0.6387), whereas we document no significant effects among civil servants (+ 0.95%; from 0.6608 to 0.6671). When we look at the share of the caregiving subsidy on caregivers' income, we find that compared to the average value for the period 2007-2017 (0.4036), the early retirement intention has decreased by 18.19% for private workers (from 0.7559 to 0.6184), compared to a reduction by 13.79% for civil servants (from 0.7637 to 0.6590).

**[Insert Table 6 about here]**

## 5. Heterogeneity

### *5.1. Short term heterogeneity effects*

Table B1 reports a re-estimation of the short-term model conditioned on different socio-demographic characteristics. Consistently, we find that the receipt of SAAD subsidies and supports in the post-reform period (2007-2011) reduces the early retirement intention, especially among women compared to men (-30.1pp vs. –13.6pp for subsidies (CA); -24.9pp vs. -14.3pp for supports (HC)). Thus, the reduction in retirement intention is 121% higher for women than men when receiving CA and 74% higher when receiving HC [32].

When we carry out a subsample analysis by employment sector, we find that our estimates are driven by blue collar workers. That is, blue-collar workers exhibit a stronger early retirement intention once they become caregivers, but this intention decreases if they benefit from SAAD in the post-reform period (-14.7pp for subsidies (CA); -13.8pp for supports (HC)). In contrast, we find no significant effect for white-collar workers.

[32] We have tested the equality of the estimated coefficient "I*LTC benefit*Post SAAD between men and women. For CA: $\chi^2(1)=0.01$, p-value: 0.9322. For HC: For CA: $\chi^2(1)=1.02$, p-value: 0.3019.

When we examine the heterogeneous effect by partner's mental health or disability, we document that being informal caregiver increases retirement intention by 10-12pp for mental illness and by 61pp in case of Katz's Index >4. However, receiving a LTC benefit in the post-reform period reduces retirement intention by 10pp in case of mental illness or by 16-17pp in case of Katz's Index>4.

Next, we examine the heterogeneity by household wealth. Estimates document that early retirement intention increases among households in the first (lowest) and second quartile, but such effect is smaller among households in the fourth quartile (highest)[33]. On the other hand, being informal caregiver increases the probability of having a retirement plan by around 25-26pp but receiving a LTC benefit in the post-reform period decreases this probability by approximately 60%. Having no mortgage increases the early retirement intention (22-23pp), although after SAAD, this intention is reduced by half.

Finally, when we examine the heterogeneity effects conditioned on the presence of children in the household we find that: (i) having no children increases the early retirement intention by 37.6pp among caregivers, but this intention declines in the post-reform period by 40% (among those receiving CA) and by 36% (among those with HC); (ii) having a co-resident daughter and co-resident son does not have any significant effect on the early retirement intention of the partner/spouse; (iii) the retirement intention decreases by 34.7pp if the caregiver receives CA and there is a co-resident daughter, or by 18.7pp if caregiver receives HC and there is a co-resident son.

*5.2. Long term Heterogeneity effects*

[33] The effect of receiving a caregiving subsidy in the post-reform period decreases this intention by approximately 50% (-33.4pp for CA and -31.6pp for HC) for the first quartile and by 33% for the highest quartile (-16.7pp for CA and -13.3pp for HC).

Table B2 shows the results after re-estimating the long-term model attending to some relevant sociodemographic characteristics. The cuts in subsidies only reduced retirement intentions among women (-28.9pp), although reduction in home supports increased it for both (20.2pp for men and 10.6pp for women). For private workers, we find a reduction in early retirement among those receiving CA (-12.1pp for men, -14.4 for women) or home supports (-9pp for men and -13.6pp for women). These results imply that among private workers, the reduction in early retirement was higher among women (19% for CA and 51% for HC) [34]. Consistently with previous estimates, we find similar effects for blue collar workers (-24.2pp for CA and +26.7pp for HC) and caregivers of highly disabled individuals (+59.9pp for CA and +57.3pp for HC).

When we compare the effect by income groups, we find that austerity cuts have discouraged early retirement among households belonging to the lowest quartiles (-56.6pp for the 1st; -53.4pp for the 2nd) but increased it in the most affluent households who received home care (+51.7pp). Similar effects are found among those individuals that have a retirement plan (-25.1pp for CA and +25.9pp for HC) or a mortgage (-20.9pp for CA and +25.1pp for HC). In contrast when we examine the effects by family composition, we find that the 2012 SAAD austerity cuts reduced retirement intentions among caregivers with no children receiving CA (-13.3pp) or HC with at least one co-resident daughter and son (-93.8pp). However, retirement intentions increased for those receiving CA with no co-resident daughters (+81pp) or HC without children (+31.8pp).

Next, we compare the relative magnitude of the impact of the reform of the retirement system for private sector workers compared to the SAAD cuts. This relative effect was 38% for men (-0.121 with respect to 0.313), and double, that is, 76% for

[34] We have tested the equality of the estimated coefficient "I*LTC benefit*Post SAAD between men and women. For CA: $\chi^2(1)=1.58$, p-value: 0.2083. For HC: For CA: $\chi^2(1)=0.43$, p-value: 0.5117.

women (-0.144 with respect to -0.189). Additionally, this relative effect amounted to 68% for caregivers with mortgage, 47% among lower income quartile caregivers receiving CA, 37% for caregivers with CA without children and 21% for caregivers caring for a severe dependent. This result points to a specific household profile with more difficulties to make ends meet and where the caregiving subsidy was 'welcomed' as a supplementary household income (potentially shared with adult children).

## 6. Robustness checks

### *6.1. Treatment effect heterogeneity*

De Chaisemartin and D'Haultfoeuille (2019) show that in a two-way fixed effects design the estimated effect is a weighted average of treatment effects in each group and time period, with weights that depend on group size and treatment variance. When the treatment effect is not constant over time and across groups, the estimated effect is biased. To overcome this issue, they propose a new estimator corresponding to the average treatment effect of all group-time cells whose treatment status changes between two consecutive time periods.

The estimator by de Chaisemartin and D'Haultfoeuille's relies on two assumptions. The first one, which is a generalization of the traditional common trend, requires that the mean outcome of groups having the same treatment status in wave t−1 would have the same evolution between wave t − 1 and wave t, in the absence of treatment. In our case, it implies that if no benefit had been awarded a given year, retirement intention would have evolved in the same way in the treatment and control observations which were not treated in the preceding wave. The second assumption requires that, for each year, if one individual enters the treatment, then at least there is

one observation that remains untreated. The first assumption is not testable, but it is weaker than the traditional common trend assumption. The second assumption is easy to check and holds as long as there is a sufficient number of benefits awarded each year. As a robustness check we have used the Chaisemartin and D'Haultfoeuille's estimator and the number of estimates with a negative weight. We find that only 0.61% of our estimates display a negative weight (the sum of the weights is −0.00019), which implies a very limited importance to the overall weighted average.

*5.3. Stable household composition*.

An additional robustness test, we have re-estimated the the short and long-term models for the subsample of households whose composition has not changed. In the previous estimates, the set of explanatory variables included whether more than two people lived in the household, as well as the number of co-resident and non-co-resident sons and daughters. Now, we attempt to disentangle the effect of SAAD from other confounding effects related to living arrangements[35]. The downside is a reduced sample size, given that households must have been interviewed several times and not exhibit changes in its composition across different waves. The final sample for the short-term model consists of 230 observations (28.9% compared to the initial sample) and 837 observations for the long-term model (39.2% compared to the initial sample). Nevertheless, the results reported in the Table B3 are in line with those of Tables 1 and 4, both in magnitude and significance, consistent with prior estimates.

*5.4 Endogeneity of informal caregiving*

[35] For example: the fact that one child stops living with the parents, and, at the same time, the mother/father is granted a LTC benefit, or conversely, the fact that a child moves to the parents' coinciding with a reduction in the amount of home care hours received due to budgetary cuts.

Testing whether the exclusion condition is satisfied is not possible, since the error term is unobservable, and must be conducted in a purely conjectural way, understanding the underlying economic of the question (Roberts and Whited, 2012). To assess the effect of violations to the exclusion restriction we use the approach of van Kippersluis and Rietveld (2018), who extend the 'plausibly exogenous' method developed by Conley et al. (2012) in providing guidance on which prior to use in sensitivity checks. As van Kippersluis and Rietveld (2018) note, if there exists a sub-group of the sample for whom the first stage is zero, then the reduced form for this group can be used to back out a plausible estimate for the estimated coefficients of the instruments, instead of choosing arbitrary prior values. In our case, the sub-sample of individuals without children, qualifies for estimating the direct effect of the instrumental variables on the dependent variable. Running the regression of the instrument, on the dependent variable, we find no significant effect, which makes our assumption more trustworthy. [Results available upon request]

Table B4 shows the results of the first-stage regression for the probability of being informal caregiver using as instrument the number of non-coresident informal caregivers. For the five different specifications, we find a positive association between supply of care and receiving help from other non-coresident caregivers, and that each additional non-co-resident informal caregiver increases the probability of spouse/partner providing informal by 4.4pp. In our specifications the errors are also clustered by region. Therefore, the test for endogeneity is not done using the traditional Hausman or Durbin-Wu-Hausman approaches but instead uses a variation of the Durbin-Wu-Hausman test that is robust to

heteroskedastic and clustered errors (Cameron and Trivedi (2010) discuss the robust test (page 190) as the "robustified" Durbin-Wu-Hausman test)[36].

Similarly, we use the Kleibergen Paap F-statistic to test for weak instruments, since we cannot formally test for weak instruments when errors are heterskedastic, serially correlated, or clustered (Pflueger and Wang, 2015). Given that F-statistics may be high even under weak instruments, setting the confidence level to 5%, we compare the effective F test to the critical values under different values of $\tau$ (i.e., fraction of a "worst case scenario" situation in which the instruments are completely uninformative and first- and second-stage errors are perfectly correlated)[37]. The test rejects the null for a weak instrument threshold of $\tau = 5\%$. These results show that the instrument is reasonably strong under all specifications.

5.*5. Domestic care employment.*

Finally, in this section we propose an additional mechanism which could explain our estimates: the effect of SAAD in hiring of domestic caregivers. If caregivers allocate part of the caregiving subsidies to hire a domestic carer (although this would be a misuse of the benefit), it might allow them to continue in the labour force and delay their retirement. To test this, the short and long-term model are re-estimated using a binary variable that takes the value 1 if the household has hired a housekeeper/housekeeper, and 0 otherwise. The results are shown on Table B5.

[36] The robustified Durbin-Wu-Hausman tests indicate that the exogeneity hypothesis cannot be rejected. This result is in line with other studies (Ciani, 2012; Meng, 2012; Van Houtven et al., 2013; Nguyen and Connelly, 2014) that have also found no significant evidence of endogeneity in the decision to be an informal caregiver.

[37] The Nagar bias is the approximate asymptotic bias under weak instruments. The Montiel-Pflueger F-statistics allow us to test whether the Nagar bias exceeds a certain fraction of the "worst case" benchmark (Olea and Pflueger, 2013; Pflueger and Wang, 2015).

In the short-term, we find that the probability of employing a domestic carer increases by 11.7pp when the caregiver receives a caregiving subsidy, but we find no significant effect when the home care supports are received. In the long-term, the 2012 budgetary cuts in the SAAD have led to a decrease in the probability of employing a domestic carer upon receiving a caregiving subsidy but suggest an increase after receiving home care supports (-6.0pp for CA; +6.1pp for home supports). Hence, these results suggest evidence of substitution between informal and formal caregiving, which might be offset by the role of domestic care employment.

## 7. Conclusion

In this paper we have examined the effect of changes in the costs of caregiving, resulting from the introduction of subsidies and supports, on early retirement intentions of caregiving spouses. We draw on quasi-experimental evidence from the introduction of a new long-term care legislation (SAAD) that reduced the costs of caregiving in 2007, its subsequent reduction amidst austerity cuts in 2012, and we compare it to a reform that changed the requirements for accessing early retirement among private sector workers in 2013.

Our estimates suggest that caregivers are likely to intend to stay in the labour force after the introduction of either a caregiving subsidy including social insurance contributions, or home care supports. That is, we find that caregiving subsidies and supports ameliorate the effect of caregiving duties (Coile, 2012), and decrease retirement intention by 32.73%. In contrast, Geyer and Korfhage (2015) found that cash subsidies in Germany decreased labour market participation, due to the effect of part-time workers who benefited from supplemental social insurance contributions. On the other hand, Fu et al. (2017) observed that the LTC reform in Japan expanded labour supply among men, and contracted it for women (Fu et al., 2017). Against such backdrop, we find a reduction

in retirement intentions for both men and women even though the effects size is larger among women, especially after the introduction of caregiving subsidies.

Consistently, we find that the reduction of SAAD subsidies and the early retirement reform reduced early retirement intentions, by 17.6pp (an average 26%) and 12.4pp (or an average 18.5%) respectively. Thus, our estimates suggest that the extension of caregiving subsidies and supports exerts a stronger effect on retirement intentions than the reform on early retirement. These results are explained by either the introduction (contraction) of caregiving subsidy alongside (introduction and elimination of) social insurance contributions and the number of hours of home support. Both influence the caregiver's financial status and affect and their balance of work and care.

Our estimates carry important policy implications for the wider evaluation of caregiving supports and subsidies. More specifically, suggest that although the original purpose of caregiving subsidies and supports is typically to offer respite to informal caregivers, they exert important spillover effects on labour market decisions of caregivers, and more specifically in reducing early retirement intention, which are likely to influence actual retirement. These effects sizes are economically significant, and large in magnitude.

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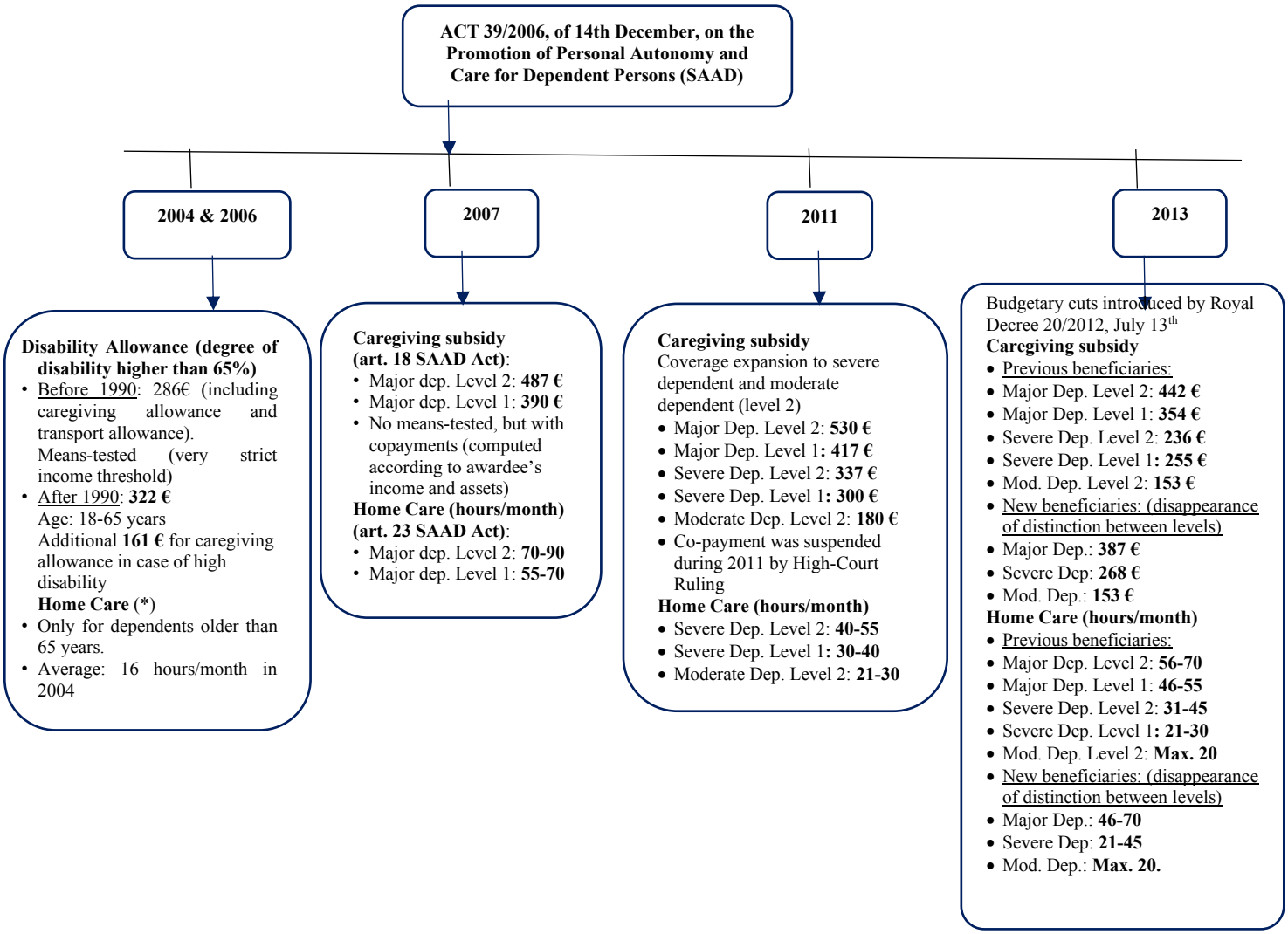
# Figures and Tables

**Figure 1. Long-term care benefits in Spain per SHARE wave. Implementation of the SAAD.**

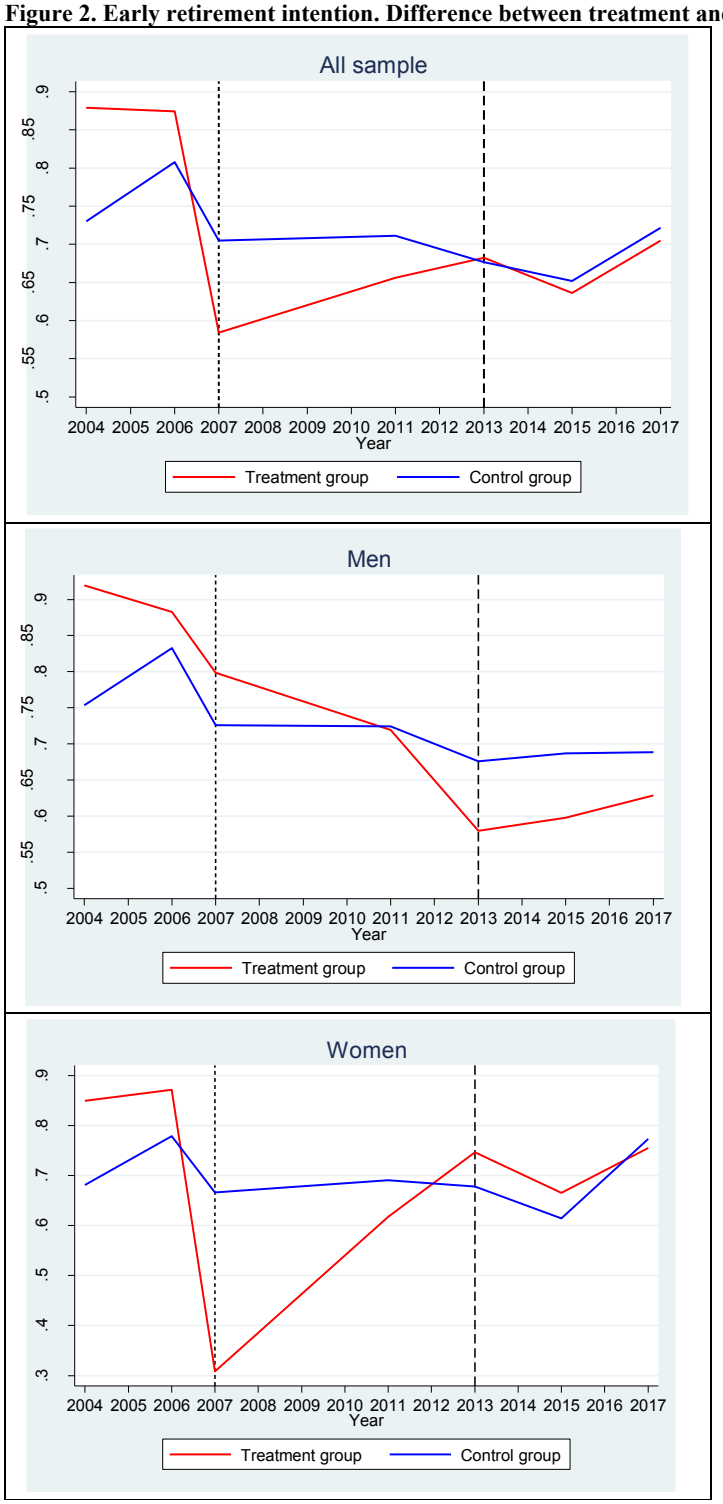



Wave field time overview: Wave 1: April-December 2004; Wave 2: October-December 2006 and January-October 2007; Wave 4: January-November 2011; Wave 5: February-October 2013.

For a better understanding of the amount of caregiver allowance and disability allowance, they can be compared with minimum wage: 460.50 €/month (2004), 540.90 €/month (2006), 570.60 €/month (2007), 641.40 €/month (2011), 645.30 €/month (2013) (nominal euros).

(*) Las personas mayores en España. IMSERSO (2004).

**Figure 2. Early retirement intention. Difference between treatment and control group**

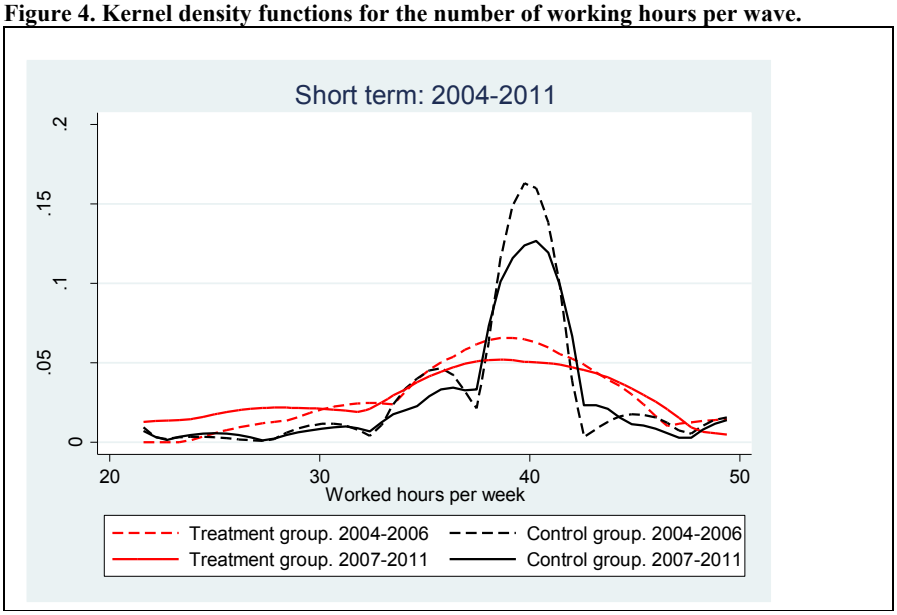



Note: Blue line represents the control group, that is, spouses/partners who do not provide informal care and are working in public or private sector at the time of the survey.
Red line represents the treatment group, that is, spouses/partners who provide informal care to their respective spouse/partner and whose spouse/partner receives a public long-term care benefit.
Black dotted vertical line represents the implementation of the System of Autonomy and Attention to Dependent People (SAAD).
Black dashed vertical line represents the first SHARE wave that gathers the effect of budgetary cuts of SAAD and restrictions in access to early retirement for workers in the private sector.

**Figure 3. Early retirement intention. Difference between workers in the private and public sector**

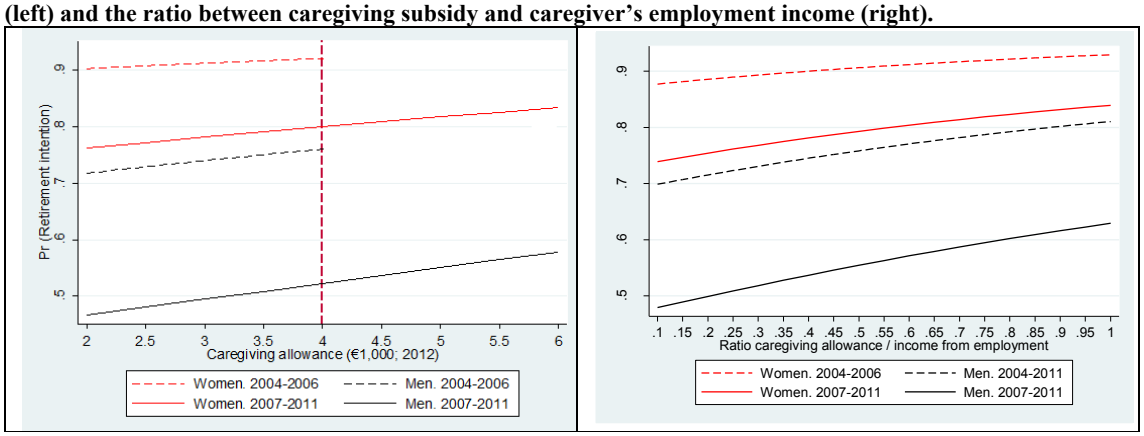

Note: Red straight line represents workers in the public sector who are caregivers of spouse/partner and whose partner/spouse receives a public LTC benefit.
Red dashed line represents workers in the private sector who are caregivers of spouse/partner and whose partner/spouse receives a public LTC benefit.
Blue straight line represents workers in the public sector who are not caregivers of spouse/partner and whose partner/spouse does not receive a public LTC benefit.
Blue dashed line represents workers in the private sector who are not caregivers of spouse/partner and whose partner/spouse does not receive a public LTC benefit.
Black dotted vertical line represents the implementation of the System of Autonomy and Attention to Dependent People (SAAD).
Black dashed vertical line represents the first SHARE wave that gathers the effect of budgetary cuts of SAAD and restrictions in access to early retirement for workers in the private sector

**Figure 4. Kernel density functions for the number of working hours per wave.**



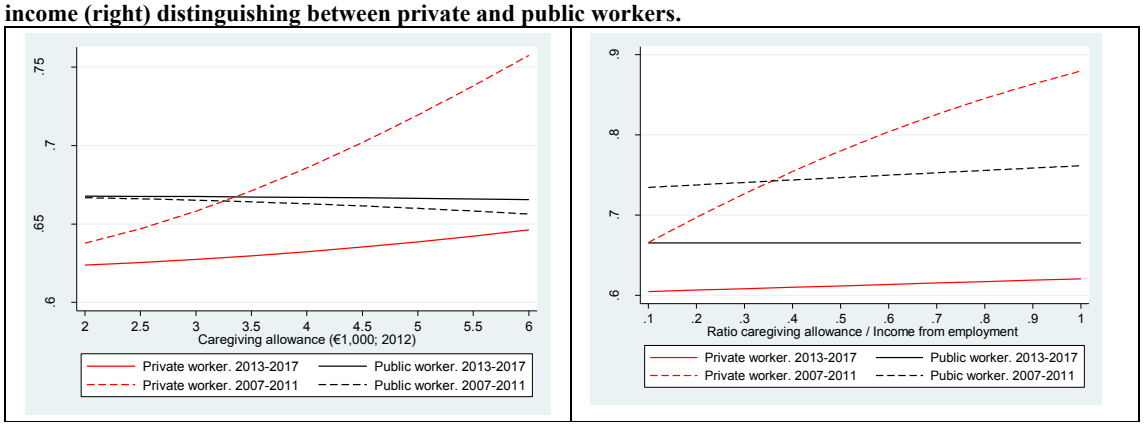

Red dashed line represents the density functions of working hours per week for caregivers before the implementation of the SAAD (2004-2006).
Red straight line represents the density functions of working hours per week for caregivers after the implementation of the SAAD (2007-2011).
Black dashed line represents the density functions of working hours per week for non-caregivers before the implementation of the SAAD (2004-2006).
Black straight line represents the density functions of working hours per week for non-caregivers after the implementation of the SAAD (2007-2011).

**Figure 5. Effect of the implementation of the SAAD: 2004-2011. Effect of the amount of caregiving subsidy (left) and the ratio between caregiving subsidy and caregiver's employment income (right).**




Note: Predicted probability of early retirement obtained after estimating the short-term model (2004-2011) using the specification M5. Caregiving subsidy in the pre-reform period was lower than 4,000 euros/year. That's why predicted probabilities have not been computed for higher amounts of the caregiving subsidy in the pre-reform period.
Red dashed line represents the predicted probability of retirement intention for women before the implementation of the SAAD (2004-2006).
Red straight line represents the predicted probability of retirement intention for women after the implementation of the SAAD (2007-2011).
Black dashed line represents the predicted probability of retirement intention for men before the implementation of the SAAD (2004-2006).
Black straight line represents the predicted probability of retirement intention for men after the implementation of the SAAD (2007-2011).
In the left figure, the x-axis represents the amount of the caregiving subsidy (€1,000, 2012). In the right figure, the x-axis represents the ratio of the caregiving subsidy with respect to caregiver's income from employment.

**Figure 6. Effect of budgetary cuts in SAAD and early retirement reforms for private workers: 2007-2017. Effect of the amount of caregiving subsidy (left) and the ratio between caregiving subsidy and caregiver's employment income (right) distinguishing between private and public workers.**




Note: Predicted probability of early retirement obtained after estimating the short-term model (2007-2017) using the specification M5. In the left figure, the x-axis represents the amount of the caregiving subsidy (€1,000, 2012). In the right figure, the x-axis represents the ratio of the caregiving subsidy with respect to caregiver's income from employment.
Red dashed line represents the predicted probability of early retirement intention for caregivers who are private workers in the period 2007-2011 (after the implementation of the SAAD, but before the budgetary cuts and the early retirement reform).
Red straight line represents the predicted probability of early retirement intention for caregivers who are private workers in the period 2013-2017 (after budgetary cuts and early retirement reform).
Black dashed line represents the predicted probability of early retirement intention for caregivers who are public workers in the period 2007-2011 (after the implementation of the SAAD, but before the budgetary cuts and the early retirement reform).
Black straight line represents the predicted probability of early retirement intention for caregivers who are public workers in the period 2013-2017 (after budgetary cuts and early retirement reform).

**Table 1. Effect of the implementation of the SAAD on the early retirement intention . Short-term: 2004-2011**

| | M1 | M2 | M3 | M4 | M5 |
|---|---|---|---|---|---|
| **Any LTC benefit** | | | | | |
| Informal care (IC) | 0.281*** | 0.290*** | 0.283*** | 0.283*** | 0.269*** |
| | (0.079) | (0.079) | (0.090) | (0.089) | (0.090) |
| IC*LTC benefit | 0.236** | 0.231** | 0.249** | 0.133 | 0.070 |
| | (0.102) | (0.102) | (0.118) | (0.129) | (0.131) |
| IC*LTC benefit*Post SAAD | -0.143*** | -0.134*** | -0.141*** | -0.138*** | -0.113*** |
| | (0.039) | (0.039) | (0.046) | (0.048) | (0.050) |
| Constant | 0.910*** | 0.879*** | 1.403*** | 1.193*** | 1.010*** |
| | (0.210) | (0.215) | (0.257) | (0.272) | (0.287) |
| N | 796 | 796 | 796 | 796 | 796 |
| R2 | 0.259 | 0.265 | 0.294 | 0.314 | 0.335 |
| F | 5.260 | 3.528 | 3.514 | 2.886 | 2.681 |
| p | 0.000 | 0.002 | 0.001 | 0.002 | 0.001 |
| **Caregiving Subsidy** | | | | | |
| Informal care (IC) | 0.335*** | 0.340*** | 0.333*** | 0.327*** | 0.331*** |
| | (0.083) | (0.083) | (0.092) | (0.092) | (0.084) |
| IC*LTC benefit | 0.278** | 0.270** | 0.259** | 0.219 | 0.157 |
| | (0.107) | (0.108) | (0.122) | (0.134) | (0.136) |
| IC*LTC benefit*Post SAAD | -0.120*** | -0.123*** | -0.115*** | -0.106*** | -0.100*** |
| | (0.038) | (0.039) | (0.046) | (0.048) | (0.050) |
| Constant | 0.904*** | 0.876*** | 1.407*** | 1.196*** | 1.026*** |
| | (0.210) | (0.215) | (0.257) | (0.272) | (0.287) |
| N | 796 | 796 | 796 | 796 | 796 |
| R2 | 0.386 | 0.391 | 0.428 | 0.449 | 0.470 |
| F | 4.977 | 3.328 | 3.739 | 2.995 | 2.742 |
| p | 0.001 | 0.003 | 0.000 | 0.001 | 0.001 |
| **Home Care Supports** | | | | | |
| Informal care (IC) | 0.278*** | 0.285*** | 0.281*** | 0.269*** | 0.268*** |
| | (0.094) | (0.094) | (0.093) | (0.092) | (0.089) |
| IC*LTC benefit | 0.245* | 0.242* | 0.174 | -0.019 | -0.091 |
| | (0.124) | (0.124) | (0.143) | (0.159) | (0.160) |
| IC*LTC benefit*Post SAAD | -0.134*** | -0.125*** | -0.124*** | -0.120*** | -0.117*** |
| | (0.038) | (0.038) | (0.035) | (0.037) | (0.030) |
| Constant | 0.807*** | 0.783*** | 1.334*** | 1.158*** | 0.990*** |
| | (0.209) | (0.215) | (0.258) | (0.273) | (0.288) |
| N | 796 | 796 | 796 | 796 | 796 |
| R2 | 0.382 | 0.387 | 0.413 | 0.438 | 0.463 |
| F | 4.466 | 3.041 | 2.911 | 2.617 | 2.531 |
| p | 0.002 | 0.005 | 0.005 | 0.005 | 0.003 |

Note: M1 includes age and gender of caregiver, regional unemployment rate, year fixed effects and region fixed effects. M2 includes the same explanatory variables than M1 and also professional situation (blue collar/white collar), activity sector (public/private) and number of consultations with doctor/nurse in the last year. M3 also includes household characteristics (having sons/daughters, son/daughters living at home, son/daughters living outside home, household size higher than 2). M4 also includes characteristics of the partner/spouse (age, gender, Katz's index, mental illness). M5 also includes size of municipality, household wealth, respondent's income from employment, percentage of respondent's employment income with respect to total household income, having a retirement plan, having a mortgage. As CA and HC are mutually exclusive, in regressions for CA we include a dummy variable for those receiving HC and in regressions for HC we include a dummy variable for those receiving CA. Standard errors clustered by Autonomous Communities. ***, ** and * denote statistical significance at the 1%, 5% and 10% level.

**Table 2. Effects of SAAD on early retirement in the short term (2004-2011) and long-term (2004-2017) distinguishing between part-time and full-time workers**

| | LTC benefits | | Caregiving subsidy | | Home care | |
|---|---|---|---|---|---|---|
| | **Part-time** | **Full-time** | **Part-time** | **Full-time** | **Part-time** | **Full-time** |
| **Short term: 2004-2011** | | | | | | |
| Informal care (IC) | 0.348*** | 0.208** | 0.400*** | 0.186*** | 0.320*** | 0.252** |
| | (0.145) | (0.108) | (0.145) | (0.012) | (0.094) | (0.091) |
| IC*LTC benefit | 0.305*** | 0.117 | 0.386*** | 0.117 | 0.112 | 0.034 |
| | (0.149) | (0.189) | (0.160) | (0.189) | (0.174) | (0.269) |
| IC*LTC benefit*Post SAAD | -0.228*** | -0.105*** | -0.227*** | -0.002 | 0.013 | -0.140*** |
| | (0.050) | (0.026) | (0.050) | (0.068) | (0.067) | (0.028) |
| Constant | 1.427*** | 0.633** | 1.427*** | 0.612** | 1.235*** | 0.591* |
| | (0.487) | (0.339) | (0.487) | (0.337) | (0.503) | (0.337) |
| N | 276 | 520 | 276 | 520 | 276 | 520 |
| R2 | 0.060 | 0.046 | 0.060 | 0.048 | 0.040 | 0.047 |
| F | 3.018 | 4.815 | 3.018 | 5.019 | 4.903 | 4.850 |
| p | 0.020 | 0.001 | 0.020 | 0.001 | 0.000 | 0.001 |
| Test coef(IC; part-time)=coef(IC; full-time) | Chi21=5.39 | | Chi21=7.14 | | Chi21=6.09 | |
| p | 0.000 | | 0.000 | | 0.000 | |
| Test coef(IC*LTC benefit; part-time)=coef(IC*LTC benefit; full-time) | Chi21=6.95 | | Chi21=78.85 | | Chi21=8.01 | |
| p | 0.000 | | 0.000 | | 0.000 | |
| Test coef(IC*LTC benefit*Post; part-time)=coef(IC*LTC benefit*Post; full-time) | Chi21=5.22 | | Chi21=4.67 | | Chi21=9.51 | |
| p | 0.000 | | 0.000 | | 0.000 | |
| | **LTC benefits** | | **Caregiving subsidy** | | **Home care** | |
| | **Part-time** | **Full-time** | **Part-time** | **Full-time** | **Part-time** | **Full-time** |
| **Long-term: 2004-2017** | | | | | | |
| Informal care (IC) | 0.284*** | 0.199*** | 0.283*** | 0.169*** | 0.256*** | 0.133*** |
| | (0.036) | (0.052) | (0.037) | (0.053) | (0.089) | (0.059) |
| Private sector | -0.188*** | 0.329*** | -0.184*** | 0.270*** | -0.187 | 0.291*** |
| | (0.028) | (0.055) | (0.023) | (0.049) | (0.103) | (0.030) |
| Private sector* Post (2013-17) | -0.059*** | -0.025*** | -0.066*** | -0.023*** | -0.051*** | -0.029*** |
| | (0.019) | (0.009) | (0.012) | (0.014) | (0.010) | (0.014) |
| IC*LTC benefit *Post (2013-17) | -0.216*** | -0.134*** | -0.320*** | -0.184*** | -0.143*** | -0.175*** |
| | (0.064) | (0.046) | (0.075) | (0.047) | (0.034) | (0.040) |
| IC*LTC *Private sector* Post (2013-17) | -0.140*** | -0.219*** | -0.143*** | -0.219*** | -0.153*** | -0.220*** |
| | (0.064) | (0.083) | (0.064) | (0.083) | (0.064) | (0.083) |
| Constant | 0.851 | 0.448 | 0.841 | 0.433 | 0.799 | 0.427 |
| | (0.291) | (0.208) | (0.293) | (0.208) | (0.291) | (0.207) |
| N | 685 | 1.449 | 685 | 1.449 | 685 | 1.449 |
| R2 | 0.017 | 0.022 | 0.015 | 0.020 | 0.013 | 0.021 |
| F | 6.194 | 4.874 | 5.836 | 4.346 | 5.582 | 4.776 |
| p | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 |
| Test coef(IC; Partime)=coef(IC(full-time) | Chi21=4.78 | | Chi21=4.98 | | Chi21=4.93 | |
| p | 0.000 | | 0.000 | | 0.000 | |
| Test coef(Private; part-time)=coef(Private; full-time) | Chi21=6.01 | | Chi21=6.51 | | Chi21=6.65 | |
| p | 0.000 | | 0.000 | | 0.000 | |
| Test coef(Private*Post; part-time)=coef(Private*Post; full-time) | Chi21=4.77 | | Chi21=4.84 | | Chi21=4.80 | |
| p | 0.000 | | 0.000 | | 0.000 | |
| Test coef(IC*LTC benefit*Post; Partime)=coef(IC*LTC benefit*Post; full-time) | Chi21=6.30 | | Chi21=665 | | Chi21=5.99 | |
| p | 0.000 | | 0.000 | | 0.000 | |
| Test coef(IC*LTC benefit*Private*Post; part-time)=coef(IC*LTC benefit*Private*Post; full-time) | Chi21=6.91 | | Chi21=8.04 | | Chi21=6.93 | |
| p | 0.000 | | 0.000 | | 0.000 | |

Note: All regressions have been performed using M5 specification. As CA and HC are mutually exclusive benefits, in order for the control group to include only those individuals who do not receive any benefits, a binary variable for HC is entered in the regressions to analyse the effect of CA and a binary variable for CA is entered in the regressions for HC. Standard errors clustered by Autonomous Communities. ***, ** and * denote statistical significance at the 1%, 5% and 10% level.

**Table 3. Effects of SAAD on early retirement in the short term (2004-2011) and long-term (2004-2017) using as explanatory variables the "amount of caregiving subsidy (CA)" and the "ratio between caregiving subsidy with respect to caregiver's income".**

| | M1 | M2 | M3 | M4 | M5 |
|---|---|---|---|---|---|
| **Amount of caregiving subsidy. 2004-2011** | | | | | |
| Informal care (IC) | 0.319*** | 0.322*** | 0.278*** | 0.252*** | 0.255*** |
| | (0.055) | (0.055) | (0.056) | (0.053) | (0.049) |
| IC*Amount CA | 0.210*** | 0.212*** | 0.216*** | 0.212*** | 0.213*** |
| | (0.048) | (0.048) | (0.047) | (0.043) | (0.039) |
| IC*Amount CA*Post SAAD | -0.378*** | -0.367*** | -0.370*** | -0.379*** | -0.352*** |
| | (0.037) | (0.038) | (0.044) | (0.046) | (0.048) |
| Constant | 0.848*** | 0.820*** | 1.235*** | 0.751*** | 0.667*** |
| | (0.209) | (0.214) | (0.284) | (0.300) | (0.313) |
| N | 796 | 796 | 796 | 796 | 796 |
| R2 | 0.034 | 0.038 | 0.061 | 0.080 | 0.094 |
| F | 5.555 | 3.620 | 3.274 | 2.817 | 2.548 |
| p | 0.000 | 0.001 | 0.001 | 0.002 | 0.002 |
| Test for coef(IC) - coef(IC*Amount CA*Post SAAD)=0 | 5.952 | 6.175 | 6.265 | 6.416 | 6.598 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **Ratio CA and caregiver's income. 2004-2011** | | | | | |
| Informal care (IC) | 0.318*** | 0.317*** | 0.274*** | 0.241*** | 0.238*** |
| | (0.027) | (0.027) | 0.028) | 0.023) | 0.025) |
| IC*Amount CA | 0.199*** | 0.197*** | 0.218*** | 0.220*** | 0.230*** |
| | (0.028) | (0.028) | (0.056) | (0.023) | (0.097) |
| IC*Amount CA*Post SAAD | -0.114*** | -0.113*** | -0.104*** | -0.098** | -0.085* |
| | (0.049) | (0.049) | (0.043) | (0.047) | (0.048) |
| Constant | 0.820*** | 0.191 | 0.124 | -0.258 | -0.345 |
| | (0.136) | (0.170) | (0.251) | (0.281) | (0.287) |
| N | 796 | 796 | 796 | 796 | 796 |
| R2 | 0.014 | 0.025 | 0.034 | 0.044 | 0.048 |
| F | 4.090 | 4.601 | 3.023 | 2.671 | 2.336 |
| p | 0.001 | 0.000 | 0.001 | 0.001 | 0.003 |
| Test for coef(IC) - coef(IC*Amount CA*Post SAAD)=0 | 5.139 | 6.431 | 6.628 | 7.450 | 7.498 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **Amount of caregiving subsidy. 2004-2017** | | | | | |
| Informal care (IC) | 0.200*** | 0.204*** | 0.210*** | 0.200*** | 0.196*** |
| | (0.035) | (0.035) | (0.037) | (0.030) | (0.033) |
| IC*Amount of CA *Post (2013-17) | 0.128*** | 0.124*** | 0.203** | 0.206** | 0.119 |
| | (0.058) | (0.058) | (0.106) | (0.108) | (0.111) |
| IC*Amount of CA *Private sector* Post (2013-17) | -0.141*** | -0.128*** | -0.128*** | -0.129*** | -0.127*** |
| | (0.039) | (0.040) | (0.046) | (0.046) | (0.048) |
| Constant | 0.833 | 0.840 | 0.891 | 0.751 | 0.661 |
| | (0.224) | (0.231) | (0.298) | (0.300) | (0.313) |
| N | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 |
| R2 | 0.036 | 0.040 | 0.063 | 0.079 | 0.094 |
| F | 4.903 | 3.244 | 2.849 | 2.775 | 2.532 |
| p | 0.001 | 0.003 | 0.004 | 0.002 | 0.002 |
| Test for coef(IC) - coef(IC*Amount CA*Post SAAD)=0 | 4.842 | 5.153 | 5.775 | 6.115 | 6.280 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| **Ratio CA and caregiver's income. 2004-2017** | | | | | |
| Informal care (IC) | 0.199*** | 0.199*** | 0.199*** | 0.189*** | 0.190*** |
| | (0.034) | (0.034) | (0.036) | (0.038) | (0.039) |
| IC*Amount of CA *Post (2013-17) | -0.124*** | -0.125*** | -0.122*** | -0.119*** | -0.117*** |
| | (0.042) | (0.043) | 0.046) | (0.047) | (0.048) |
| IC*Amount of CA *Private sector* Post (2013-17) | -0.213*** | -0.212*** | -0.212*** | -0.193*** | -0.182*** |
| | (0.036) | (0.036) | (0.037) | (0.030) | (0.031) |
| Constant | 0.827*** | 0.215 | -0.149 | -0.261 | -0.350 |
| | (0.149) | (0.186) | (0.280) | (0.281) | (0.287) |
| N | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 |
| R2 | 0.015 | 0.024 | 0.037 | 0.043 | 0.048 |
| F | 3.600 | 3.586 | 2.791 | 2.657 | 2.326 |
| p | 0.002 | 0.000 | 0.002 | 0.001 | 0.003 |
| Test for coef(IC) - coef(IC*Amount CA*Post SAAD)=0 | 4.955 | 5.282 | 5.455 | 5.673 | 5.967 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Note: M1 includes age and gender of caregiver, year fixed effects and region fixed effects. M2 includes the same explanatory variables than M1 and also professional situation, activity sector and doctor consultations. M3 also includes household characteristics (having sons/daughters, son/daughters living at home, son/daughters living outside home, household size higher than 2). M4 also includes age and gender of the care receiver, Katz's index and having mental illness. M5 also includes size of municipality, household wealth, income from employment, retirement plan, income from other household members and having mortgage. As CA and HC are mutually exclusive, in regressions for CA we include a dummy variable for those receiving HC. Standard errors clustered by Autonomous Communities

**Table 4. Effect of austerity cuts in SAAD and early retirement reform for private workers. Long-term: 2004-2017.**

| | M1 | M2 | M3 | M4 | M5 |
|---|---|---|---|---|---|
| **Any LTC benefit** | | | | | |
| Informal care (IC) | 0.225*** | 0.227*** | 0.212** | 0.204** | 0.200*** |
| | (0.079) | (0.079) | (0.090) | (0.088) | (0.086) |
| Private sector | 0.108*** | 0.112*** | 0.136*** | 0.124*** | 0.126*** |
| | (0.025) | (0.025) | (0.027) | (0.031) | (0.031) |
| Private sector* Post (2013-17) | -0.050*** | -0.049*** | -0.051*** | -0.053*** | -0.057*** |
| | (0.016) | (0.017) | (0.015) | (0.019) | (0.019) |
| IC*LTC benefit *Post (2013-17) | 0.195*** | 0.187*** | 0.176*** | 0.176*** | 0.176*** |
| | (0.056) | (0.055) | (0.057) | (0.048) | (0.049) |
| IC*LTC *Private sector* Post (2013-17) | -0.136*** | -0.134*** | -0.116*** | -0.119*** | -0.124*** |
| | (0.035) | (0.035) | (0.042) | (0.044) | (0.045) |
| Constant | 0.833 | 0.197 | 0.252 | -0.013 | -0.091 |
| | (0.135) | (0.169) | (0.239) | (0.271) | (0.277) |
| N | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 |
| R2 | 0.355 | 0.370 | 0.378 | 0.391 | 0.400 |
| F | 3.125 | 4.255 | 2.632 | 2.446 | 2.283 |
| p | 0.015 | 0.000 | 0.006 | 0.006 | 0.005 |
| **Caregiving Subsidy** | | | | | |
| Informal care (IC) | 0.243****** | 0.245 | 0.253*** | 0.252*** | 0.248*** |
| | (0.082) | (0.082) | (0.092) | (0.082) | (0.083) |
| Private sector | 0.109*** | 0.113*** | 0.136*** | 0.124*** | 0.127*** |
| | (0.033) | (0.025) | (0.027) | (0.031) | (0.031) |
| Private sector* Post (2013-17) | -0.051*** | -0.050*** | -0.051*** | -0.053*** | -0.057*** |
| | (0.016) | (0.017) | (0.015) | (0.019) | (0.019) |
| IC*LTC benefit *Post (2013-17) | -0.243*** | -0.247*** | -0.253*** | -0.226*** | -0.221*** |
| | (0.090) | (0.090) | (0.080) | (0.079) | (0.080) |
| IC*LTC *Private sector* Post (2013-17) | -0.133*** | -0.131*** | -0.122*** | -0.126*** | -0.132*** |
| | (0.035) | (0.035) | (0.041) | (0.044) | (0.044) |
| Constant | 0.224 | 0.190 | 0.259 | -0.006 | -0.080 |
| | (0.135) | (0.168) | (0.239) | (0.271) | (0.277) |
| N | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 |
| R2 | 0.354 | 0.369 | 0.379 | 0.392 | 0.400 |
| F | 3.474 | 4.543 | 2.967 | 2.668 | 2.443 |
| p | 0.012 | 0.000 | 0.003 | 0.003 | 0.003 |
| **Home Care** | | | | | |
| Informal care (IC) | 0.128*** | 0.133*** | 0.141*** | 0.138*** | 0.141 |
| | (0.057) | (0.056) | (0.052) | (0.050) | (0.050) |
| Private sector | 0.107*** | 0.111*** | 0.116*** | 0.116*** | 0.119*** |
| | (0.025) | (0.025) | (0.027) | (0.031) | (0.031) |
| Private sector* Post (2013-17) | -0.049*** | -0.048*** | -0.052*** | -0.057*** | -0.059*** |
| | (0.016) | (0.017) | (0.015) | (0.019) | (0.019) |
| IC*LTC benefit *Post (2013-17) | 0.170*** | 0.170*** | 0.156*** | 0.159*** | 0.156*** |
| | (0.047) | (0.047) | (0.039) | (0.035) | (0.036) |
| IC*LTC *Private sector* Post (2013-17) | -0.128*** | -0.125*** | -0.114*** | -0.104*** | -0.104*** |
| | (0.034) | (0.034) | (0.041) | (0.043) | (0.044) |
| Constant | 0.296** | 0.272** | 0.235 | -0.231 | -0.216 |
| | (0.134) | (0.138) | (0.139) | (0.131) | (0.138) |
| N | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 |
| R2 | 0.354 | 0.369 | 0.374 | 0.388 | 0.396 |
| F | 3.296 | 4.427 | 2.427 | 2.431 | 2.220 |
| p | 0.016 | 0.000 | 0.014 | 0.007 | 0.008 |

Note: M1 includes age and gender of caregiver, year fixed effects and region fixed effects. M2 includes the same explanatory variables than M1 and also professional situation, activity sector and doctor consultations. M3 also includes household characteristics (having sons/daughters, son/daughters living at home, son/daughters living outside home, household size higher than 2). M4 also includes age and gender of the care receiver, Katz's index and having mental illness. M5 also includes size of municipality, household wealth, income from employment, retirement plan, income from other household members and having mortgage. As CA and HC are mutually exclusive, in regressions for CA we include a dummy variable for those receiving HC and in regressions for HC we include a dummy variable for those receiving CA. Standard errors clustered by Autonomous Communities

**Appendix A**

**Table A0. Comparison of caregiving subsidy and economic value of home care**

| | 2007 | | |
|---|---|---|---|
| | Caregiving subsidy (€/month) | Home care | |
| | | Hours per month | Economic value (€/month) |
| Major dependency. Level 2 | 487 | 70-90 | 889.70-1,143.90 |
| Major dependency. Level 1 | 390 | 55-70 | 699.05-889.70 |
| | **2011** | | |
| Major dependency. Level 2 | 530 | 70-90 | 956.20-1,229.40 |
| Major dependency. Level 1 | 417 | 55-70 | 751.30-956.20 |
| Severe dependency. Level 2 | 337 | 40-55 | 546.40-751.30 |
| Severe dependency. Level 1 | 300 | 30-40 | 409.80-546.40 |
| Moderate dependency. Level 2 | 180 | 21-30 | 286.86-409.80 |
| | **2013** | | |
| Major dependency | 387 | 46-70 | 653.20-994 |
| Severe dependency | 268 | 21-45 | 298.20-639 |
| Moderate dependency | 153 | Max. 20 | 284 |
| | **2015** | | |
| Major dependency | 387 | 46-70 | 628.36-956.20 |
| Severe dependency | 268 | 21-45 | 286.86-614.70 |
| Moderate dependency | 153 | Max. 20 | 273.20 |
| | **2017** | | |
| Major dependency | 387 | 46-70 | 689.54-1,049,30 |
| Severe dependency | 268 | 21-45 | 314.79-674.55 |
| Moderate dependency | 153 | Max. 20 | Max. 299.80 |

Source: own work using "Las personas mayores en España" (2008, 2012, 2014, 2016) and "Servicios sociales para personas mayores en España 2018". Wave field time overview: Wave 1: April-December 2004; Wave 2: October-December 2006 and January-October 2007; Wave 4: January-November 2011; Wave 5: February-October 2013.
For a better understanding of the amount of caregiving subsidy and disability subsidy, they can be compared with minimum wage: 460.50 €/month (2004), 540.90 €/month (2006), 570.60 €/month (2007), 641.40 €/month (2011), 645.30 €/month (2013) (nominal euros). Home care public Price: 12.71 €/hour (2007); 13.66 €/hour (2011); 14.20 €/hour (2013); 13.66 €/hour (2015); 14.99 €/hour (2017).

**Table A1. Description of the sample (Spanish respondents who are married or cohabiting at the time of the survey and working in the public or private sector).**

| | Total sample | Working in | | | Dependent spouse/partner receives public LTC benefits | | | Spouse/partner is caregiver | |
|---|---|---|---|---|---|---|---|---|---|
| | | Public sector | Private sector | % workers in private sector | Caregiving subsidy (CA) | Home care | % receiving CA | Total | % with respect sample size |
| Wave 1 | 235 | 40 | 195 | 82.98 | 23 | 20 | 53.49 | 44 | 18.72 |
| Wave 2 | 221 | 48 | 173 | 78.28 | 42 | 32 | 56.76 | 80 | 36.20 |
| Wave 4 | 340 | 58 | 282 | 82.94 | 49 | 28 | 63.64 | 73 | 21.47 |
| Wave 5 | 794 | 179 | 615 | 77.46 | 33 | 24 | 57.89 | 95 | 11.96 |
| Wave 6 | 285 | 56 | 229 | 80.35 | 36 | 21 | 63.16 | 73 | 25.61 |
| Wave 7 | 259 | 54 | 205 | 79.15 | 30 | 20 | 60.00 | 68 | 26.25 |
| Total | 2,134 | 435 | 1,699 | 79.62 | 213 | 145 | 59.50 | 433 | 20.29 |

Source: Own work using SHARE (waves, 1, 2, 4, 5, 6 and 7).

**Table A2. Descriptive statistics. 2004-2017**

| | Total | Non caregivers | | | Caregivers |
|---|---|---|---|---|---|
| | | Total | Private sector | Public sector | |
| **Respondent characteristics** | | | | | |
| Early retirement intention | 66.82 | 66.70 | 67.04 | 65.45 | 67.52 |
| Man | 54.82 | 57.06 | 60.36 | 44.99 | 42.06 |
| Woman | 45.18 | 42.94 | 39.64 | 55.01 | 57.94 |
| Age | 58.36 | 58.33 | 58.36 | 58.22 | 58.56 |
| | (4.65) | (4.65) | (4.70) | (4.46) | (4.65) |
| Working in | | | | | |
| Private sector | 79.62 | 79.37 | 100.00 | 0.00 | 80.57 |
| Public sector | 20.38 | 20.63 | 0.00 | 100.00 | 19.43 |
| Working hours per week | 37.70 | 37.95 | 38.41 | 36.27 | 33.03 |
| Reduced workday | 23.34 | 22.69 | 24.57 | 15.57 | 42.25 |
| Professional situation | | | | | |
| Blue collar | 79.76 | 79.57 | 85.59 | 57.54 | 80.85 |
| White collar | 20.24 | 20.43 | 14.41 | 42.46 | 19.15 |
| Consultation with doctor last year | 82.61 | 82.66 | 81.02 | 88.66 | 82.27 |

| | | | | | |
|---|---|---|---|---|---|
| Number of consultations | 5.04 | 4.81 | 4.65 | 5.35 | 6.36 |
| | (7.35) | (7.15) | (6.93) | (7.84) | (8.29) |
| **Care receiver characteristics** | | | | | |
| Man | 58.67 | - | - | - | 58.67 |
| Women | 41.33 | - | - | - | 41.33 |
| Age | 59.50 | - | - | - | 59.50 |
| | (5.19) | - | - | - | (5.19) |
| Receives LTC benefit | | - | - | - | |
| Caregiving subsidy | 16.78 | - | - | - | 82.68 |
| Public home care | 9.98 | - | - | - | 49.19 |
| Mental illness | 6.79 | - | - | - | 33.49 |
| Katz's Index | | | | | |
| 0 | 79.71 | 100.00 | 100.00 | 100.00 | 0.00 |
| 1 | 10.97 | 0.00 | 0.00 | 0.00 | 54.08 |
| 2 | 2.32 | 0.00 | 0.00 | 0.00 | 11.43 |
| 3 | 1.73 | 0.00 | 0.00 | 0.00 | 8.54 |
| 4 | 1.15 | 0.00 | 0.00 | 0.00 | 5.68 |
| 5 | 1.73 | 0.00 | 0.00 | 0.00 | 8.54 |
| 6 | 2.38 | 0.00 | 0.00 | 0.00 | 11.73 |
| Caregivers outside home | 45.01 | - | - | - | 45.01 |
| Number of caregivers outside home | 2.04 | - | - | - | 2.04 |
| | (0.41) | - | - | - | (0.41) |
| Caregiving subsidy €/year | 4,279.21 | - | - | - | 4,279.21 |
| | (1,227.44) | - | - | - | (1,227.44) |
| Ratio between caregiving subsidy and caregiver's income from employment | 40.36 | - | - | - | 40.36 |
| | (3.23) | - | - | - | (3.23) |
| **Household characteristics** | | | | | |
| Size of municipality | | | | | |
| Big city | 21.65 | 22.43 | 21.60 | 25.50 | 17.24 |
| Outskirts of big city | 8.57 | 8.83 | 8.83 | 8.84 | 7.11 |
| Large city | 23.50 | 22.79 | 23.04 | 21.89 | 27.56 |
| Small town | 36.79 | 36.17 | 36.99 | 33.19 | 40.30 |
| Rural area or village | 9.49 | 9.78 | 9.55 | 10.58 | 7.79 |
| Has household employee/housekeeper | 4.19 | 2.38 | 4.18 | 1.84 | 29.48 |
| Has children | 93.79 | 93.24 | 93.43 | 92.55 | 96.97 |
| Number of children | 2.23 | 2.22 | 2.23 | 2.18 | 2.30 |
| | (0.95) | (0.94) | (0.98) | (0.81) | (0.98) |
| Has sons | 33.94 | 33.95 | 33.73 | 34.77 | 33.84 |
| Number of sons | 1.59 | 1.62 | 1.65 | 1.49 | 1.51 |
| | (0.87) | (0.87) | (0.91) | (0.69) | (0.84) |
| Has daughters | 30.80 | 30.43 | 30.58 | 29.87 | 32.94 |
| Number of daughters | 1.62 | 1.59 | 1.62 | 1.53 | 1.68 |
| | (0.84) | (0.83) | (0.83) | (0.85) | (0.88) |
| Has co-resident sons | 17.07 | 17.81 | 18.52 | 15.20 | 12.87 |
| Number of co-residents sons | (1.42) | (1.41) | (1.42) | (1.37) | (1.47) |
| | 0.63) | 0.59) | 0.60) | 0.56) | 0.90) |
| Has co-resident daughters | 12.89 | 12.82 | 13.30 | 11.07 | 13.30 |
| Number of co-resident daughters | 1.40 | 1.38 | 1.39 | 1.35 | 1.54 |
| | (0.68) | (0.64) | (0.66) | (0.59) | (0.86) |
| Has non co-resident sons | 23.53 | 23.18 | 22.96 | 24.02 | 25.48 |
| Number of non co-residente sons | 1.51 | 1.52 | 1.53 | 1.46 | 1.44 |
| | (0.82) | (0.83) | (0.86) | (0.72) | (0.76) |
| Has non co-resident daughters | 22.64 | 22.20 | 22.33 | 21.71 | 25.20 |
| Number of non co-resident daughters | 1.55 | 1.54 | 1.55 | 1.53 | 1.59 |
| | (0.82) | (0.81) | (0.80) | (0.85) | (0.87) |
| Other co-resident members not children | 71.05 | 69.59 | 66.71 | 80.12 | 79.43 |
| Number of other co-resident members | 1.59 | 1.58 | 1.57 | 1.64 | 1.66 |
| | (0.77) | (0.72) | (0.73) | (0.68) | (0.98) |
| Mortgage | 9.18 | 8.75 | 9.41 | 6.41 | 11.63 |
| Retirement plan | 3.69 | 3.57 | 2.67 | 6.90 | 4.33 |
| Adjusted wealth €1000. 2012 | 211.71 | 212.25 | 203.85 | 243.59 | 208.62 |
| | (272.21) | (275.87) | (262.14) | (320.59) | (250.43) |
| Adjusted wealth quartile | | | | | |
| First lowest | 26.03 | 24.80 | 27.25 | 16.04 | 33.16 |
| Second | 25.33 | 25.91 | 26.62 | 23.34 | 21.99 |
| Third | 25.61 | 26.46 | 25.98 | 28.26 | 20.75 |
| Fourth highest | 23.03 | 22.83 | 20.15 | 32.37 | 24.10 |
| Income from employment caregiver €1000. 2012 | 14.85 | 15.07 | 14.12 | 18.46 | 13.61 |
| | (10.65) | (10.67) | (10.22) | (11.54) | (10.48) |
| Income from employment caregiver quartile | | | | | |
| First lowest | 18.41 | 17.89 | 19.29 | 12.83 | 21.37 |
| Second | 19.00 | 17.72 | 18.60 | 14.55 | 26.41 |
| Third | 25.23 | 25.35 | 26.54 | 21.06 | 24.50 |
| Fourth highest | 37.37 | 39.04 | 35.57 | 51.56 | 27.72 |
| Income from other household members €1000. 2012 | 15.03 | 14.58 | 13.25 | 19.25 | 17.51 |
| | (15.56) | (15.57) | (14.63) | (17.76) | (15.30) |
| Ratio income from employment caregiver with respect to total household income | 58.11 | 58.09 | 58.95 | 55.03 | 46.76 |
| | (30.14) | (29.76) | (30.73) | (25.86) | (27.16) |
| N | 2,134 | 1,701 | 1.350 | 351 | 433 |

Adjusted wealth: real wealth (€1000. 2012) divided by the square root of the number of household members.

Income from employment (caregiver): includes only income from paid work (€1000. 2012).
Income from other household members: difference between total household income and income from employment of the caregiver.
The dependency degree is approximated using Katz's Index (Katz, 1983). The Katz Index determines functional status as a measurement of the ability to perform six daily living activities independently. We have computed this index using the information on daily living activities provided by SHARE. The Katz's Index considers six different activities of daily living. The value 0 indicates that the individual performs all activities independently, whereas the value 6 indicates that the individual needs help for all activities.

# Appendix B

**Table B1. Heterogeneity results. Estimation of the difference-in-difference model for the implementation of the SAAD Short term: 2004-2011.**

| | LTC benefit = Caregiving subsidy | | | | LTC benefit = Home Care | | | |
|---|---|---|---|---|---|---|---|---|
| | Caregiver: Man | Caregiver: Women | Caregiver: Blue-collar | Caregiver: White-collar | Caregiver: Man | Caregiver: Women | Caregiver: Blue-collar | Caregiver: White-collar |
| Informal care ( IC) | -0.103 | 0.354*** | 0.231*** | -0.614** | -0.213 | 0.310*** | 0.223*** | -0.614*** |
| | (0.138) | (0.103) | (0.086) | (0.295) | (0.128) | (0.133) | (0.098) | (0.293) |
| IC*LTC benefit | 0.087 | 0.354*** | 0.256*** | 0.387 | 0.137 | 0.317* | 0.252*** | 0.199 |
| | (0.172) | (0.134) | (0.111) | (0.334) | (0.174) | (0.169) | (0.129) | (0.341) |
| IC*LTC benefit*Post SAAD | -0.136*** | -0.301*** | -0.147*** | -0.030 | -0.143*** | -0.249*** | -0.138*** | -0.024 |
| | (0.049) | (0.042) | (0.041) | (0.105) | (0.049) | (0.050) | (0.041) | (0.104) |
| Constant | 0.935*** | 0.603*** | 0.603*** | 1.943*** | 0.910*** | 0.417 | 0.524*** | 1.876*** |
| | (0.273) | (0.297) | (0.226) | (0.422) | (0.273) | (0.296) | (0.226) | (0.421) |
| N | 436 | 360 | 634 | 162 | 436 | 360 | 634 | 162 |
| R2 | 0.349 | 0.377 | 0.360 | 0.414 | 0.354 | 0.361 | 0.356 | 0.424 |
| F | 1.071 | 13.558 | 5.708 | 12.857 | 3.437 | 0.952 | 5.084 | 13.604 |
| p | 0.000 | 0.000 | 0.003 | 0.000 | 0.041 | 0.000 | 0.005 | 0.000 |
| | Care receiver | | | | Care receiver | | | |
| | Mental illness | No mental illness | Katz's Index>4 | Katz's Index<=4 | Mental illness | No mental illness | Katz's Index>4 | Katz's Index<=4 |
| Informal care ( IC) | 0.120*** | 0.543*** | 0.617*** | -0.185 | 0.096*** | 0.368 | 0.612*** | -0.248** |
| | (0.033) | (0.207) | (0.131) | (0.120) | (0.014) | (0.276) | (0.149) | (0.124) |
| IC*LTC benefit | 0.114 | -0.060 | 0.957*** | 0.159 | 0.078 | 0.229 | 0.936*** | 0.136 |
| | (0.092) | (0.089) | (0.259) | (0.174) | (0.105) | (0.192) | (0.266) | (0.196) |
| IC*LTC benefit*Post SAAD | -0.108*** | 0.268 | -0.174*** | -0.071 | -0.103*** | -0.092 | -0.164*** | -0.074 |
| | (0.033) | (0.184) | (0.062) | (0.066) | (0.033) | (0.066) | (0.062) | (0.066) |
| Constant | 0.888*** | -5.708*** | 1.370*** | 0.627** | 0.860*** | -5.205*** | 1.349*** | 0.566 |
| | (0.173) | (0.462) | (0.313) | (0.320) | (0.173) | (0.287) | (0.313) | (0.316) |
| N | 199 | 597 | 505 | 291 | 199 | 597 | 505 | 291 |
| R2 | 0.457 | 0.558 | 0.501 | 0.475 | 0.456 | 0.781 | 0.495 | 0.481 |
| F | 16.502 | 15.876 | 15.863 | 12.094 | 11.960 | 13.784 | 19.102 | 16.880 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | Household wealth quartil | | | | Household wealth quartil | | | |
| | 1st lowest | 2nd | 3rd | 4thhighest | 1st lowest | 2nd | 3rd | 4thhighest |
| Informal care ( IC) | 0.733*** | 0.316*** | -0.270 | -0.503*** | -0.593*** | -0.016 | -0.270 | -0.390*** |
| | (0.178) | (0.102) | (0.214) | (0.146) | (0.220) | (0.153) | (0.214) | (0.100) |
| IC*LTC benefit | 0.003 | 0.801*** | 0.167 | 0.488*** | 0.216 | 0.700*** | 0.053 | 0.274 |
| | (0.192) | (0.211) | (0.251) | (0.183) | (0.224) | (0.251) | (0.280) | (0.215) |
| IC*LTC benefit*Post SAAD | -0.334*** | -0.157 | -0.060 | -0.167*** | -0.316*** | -0.066 | -0.060 | -0.133*** |
| | (0.072) | (0.075) | (0.080) | (0.078) | (0.072) | (0.073) | (0.080) | (0.059) |
| Constant | 0.789** | 0.978*** | -0.456 | 1.329*** | 0.909*** | 0.852*** | -0.438 | 1.219*** |
| | (0.360) | (0.334) | (0.413) | (0.357) | (0.358) | (0.337) | (0.412) | (0.360) |
| N | 218 | 185 | 189 | 204 | 218 | 185 | 189 | 204 |
| R2 | 0.341 | 0.146 | 0.365 | 0.404 | 0.342 | 0.117 | 0.368 | 0.383 |
| F | 13.417 | 8.753 | 11.275 | 3.335 | 13.531 | 6.068 | 15.293 | 17.383 |
| p | 0.000 | 0.000 | 0.000 | 0.039 | 0.000 | 0.002 | 0.000 | 0.000 |
| | Retirement Plan | | Mortgage over main house | | Retirement Plan | | Mortgage over main house | |
| | Yes | No | Yes | No | Yes | No | Yes | No |
| Informal care ( IC) | 0.265*** | -0.041 | -0.877*** | 0.238*** | 0.253*** | -0.091 | -0.877*** | 0.221*** |
| | (0.085) | (0.325) | (0.292) | (0.087) | (0.095) | (0.198) | (0.292) | (0.099) |
| IC*LTC benefit | 0.284*** | -0.036 | 0.816*** | 0.241*** | 0.238** | 0.228** | 0.816*** | 0.196 |
| | (0.111) | (0.352) | (0.332) | (0.112) | (0.128) | (0.118) | (0.332) | (0.133) |
| IC*LTC benefit*Post SAAD | -0.159*** | -0.300*** | -0.101*** | -0.145*** | -0.147*** | -0.298*** | -0.101 | -0.134*** |
| | (0.041) | (0.118) | (0.031) | (0.040) | (0.040) | (0.123) | (0.123) | (0.040) |
| Constant | 0.869*** | 3.018*** | -0.217 | 0.891*** | 0.786*** | 3.052*** | -0.217*** | 0.809*** |
| | (0.219) | (0.480) | (0.478) | (0.219) | (0.219) | (0.476) | (0.478) | (0.219) |
| N | 714 | 82 | 78 | 718 | 714 | 82 | 78 | 718 |
| R2 | 0.362 | 0.284 | (0.421 | 0.357 | 0.358 | 0.283 | 0.421 | 0.354 |
| F | 7.051 | 8.734 | 1.159 | 5.854 | 6.164 | 17.088 | 1.159 | 5.074 |
| p | 0.001 | 0.000 | 0.540 | 0.002 | 0.002 | 0.000 | 0.540 | 0.005 |
| | Children | | | | Children | | | |
| | No children | At least one daughter corresident no son corresident | At least one son corresident no daughter corresident | At least one daughter and one son corresident | No children | At least one daughter corresident no son corresident | At least one son corresident no daughter corresident | At least one daughter and one son corresident |
| Informal care ( IC) | 0.376*** | -0.351 | -0.867*** | -0.208 | 0.378** | -0.361 | 0.265 | -0.069 |
| | (0.106) | (0.234) | (0.390) | (0.216) | (0.115) | (0.230) | (0.184) | (0.453) |
| IC*LTC benefit | 0.448*** | 0.191 | 0.985*** | -0.502 | 0.399** | -0.254 | -0.112 | -0.695 |
| | (0.136) | (0.296) | (0.405) | (0.410) | (0.151) | (0.345) | (0.123) | (0.489) |
| IC*LTC benefit*Post SAAD | -0.151*** | -0.347** | -0.165 | -0.141 | -0.137*** | -0.212 | -0.187*** | -0.118 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (0.053) | (0.143) | (0.098) | (0.132) | (0.053) | (0.138) | (0.070) | (0.130) |
| Constant | 0.785*** | 1.014** | 1.087*** | 0.659 | 0.689*** | 1.143*** | 1.277*** | 0.422 |
| | (0.268) | (0.500) | (0.438) | (0.491) | (0.269) | (0.500) | (0.436) | (0.494) |
| N | 346 | 108 | 106 | 70 | 346 | 108 | 106 | 70 |
| R2 | 0.251 | 0.120 | 0.277 | 0.124 | 0.247 | 0.158 | 0.271 | 0.114 |
| F | 3.993 | 14.932 | 15.342 | 15.979 | 3.416 | 16.356 | 11.816 | 15.561 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.033 | 0.000 | 0.000 | 0.000 |

All regressions have been performed using M5 specification. As CA and HC are mutually exclusive benefits, in order for the control group to include only those individuals who do not receive any benefits, a binary variable for HC is entered in the regressions to analyse the effect of CA and a binary variable for CA is entered in the regressions for HC. Robust standard errors. ***, ** and * denote statistical significance at the 1%, 5% and 10% level.

**Table B2. Heterogeneity results. Estimation of the difference-in-difference model for budgetary cuts and early retirement reform for private workers long-term: 2004-2017.**

| | LTC benefit = Caregiving subsidy | | | | LTC benefit = Home Care | | | |
|---|---|---|---|---|---|---|---|---|
| | Caregiver: Man | Caregiver: Women | Caregiver: Blue-collar | Caregiver: White-collar | Caregiver: Man | Caregiver: Women | Caregiver: Blue-collar | Caregiver: White-collar |
| Informal care ( IC) | 0.080 | 0.314*** | 0.736*** | 0.202*** | 0.194 | 0.268*** | 0.789*** | 0.195*** |
| | (0.137) | (0.103) | (0.223) | (0.085) | (0.128) | (0.089) | (0.193) | (0.060) |
| IC*LTC benefit *Post 2013-17 | -0.013 | -0.289*** | -0.242*** | 0.612*** | 0.202*** | 0.106*** | 0.267*** | 0.640*** |
| | (0.060) | (0.093) | (0.094) | (0.298) | (0.050) | (0.045) | (0.108) | (0.300) |
| IC*LTC *Priv. sector* Post 2013-17 | -0.121*** | -0.144*** | -0.136*** | -0.061 | -0.090*** | -0.136*** | -0.129*** | -0.063 |
| | (0.044) | (0.057) | (0.037) | (0.098) | (0.044) | (0.055) | (0.037) | (0.098) |
| Constant | 1.132*** | 0.362** | 0.694*** | 0.839*** | 1.132*** | 0.305 | 0.665*** | 0.866*** |
| | (0.188) | (0.188) | (0.152) | (0.266) | (0.188) | (0.186) | (0.151) | (0.265) |
| N | 1,143 | 991 | 1,647 | 487 | 1,143 | 991 | 1,647 | 487 |
| R2 | 0.448 | 0.458 | 0.451 | 0.458 | 0.451 | 0.454 | 0.451 | 0.457 |
| F | 12.642 | 9.621 | 8.508 | 11.397 | 13.811 | 11.145 | 8.281 | 8.030 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | Care receiver | | | | Care receiver | | | |
| | Mental illness | No mental illness | Katz's Index>4 | Katz's Index<=4 | Mental illness | No mental illness | Katz's Index>4 | Katz's Index<=4 |
| Informal care ( IC) | 0.107*** | 0.053 | 0.469*** | -0.106 | 0.086*** | 0.081 | 0.444*** | -0.205 |
| | (0.042) | (0.207) | (0.164) | (0.113) | (0.032) | (0.223) | (0.164) | (0.120) |
| IC*LTC benefit *Post 2013-17 | 0.099 | -0.116 | -0.599*** | 0.064 | 0.099 | -0.159 | 0.573*** | 0.247 |
| | (0.078) | (0.117) | (0.172) | (0.124) | (0.088) | (0.134) | (0.174) | (0.133) |
| IC*LTC *Priv. sector* Post 2013-17 | -0.085 | 0.121 | -0.129*** | -0.087 | -0.082*** | 0.111 | -0.125*** | -0.104** |
| | (0.031) | (0.114) | (0.055) | (0.060) | (0.030) | (0.148) | (0.055) | (0.059) |
| Constant | 1.042*** | -2.443*** | 0.635*** | 0.600*** | 1.032*** | -2.544*** | 0.621*** | 0.631*** |
| | (0.110) | (0.422) | (0.231) | (0.204) | (0.110) | (0.416) | (0.231) | (0.201) |
| N | 534 | 1,600 | 629 | 1,505 | 534 | 1,600 | 629 | 1,505 |
| R2 | 0.327 | 0.311 | 0.342 | 0.334 | 0.327 | 0.309 | 0.340 | 0.337 |
| F | 18.585 | 16.770 | 13.236 | 12.539 | 14.378 | 9.285 | 9.294 | 10.253 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | Household wealth quartile | | | | Household wealth quartile | | | |
| | 1st lowest | 2nd | 3rd | 4thhighest | 1st lowest | 2nd | 3rd | 4thhighest |
| Informal care ( IC) | 0.569*** | 0.113*** | -0.269 | -0.459*** | -0.023 | -0.353 | -0.268 | -0.382*** |
| | (0.178) | (0.040) | (0.215) | (0.147) | (0.149) | (0.211) | (0.215) | (0.145) |
| IC*LTC benefit *Post 2013-17 | -0.566*** | -0.534*** | 0.219 | -0.144 | 0.075 | 0.365 | 0.203 | 0.517*** |
| | (0.159) | (0.191) | (0.227) | (0.148) | (0.166) | (0.223) | (0.231) | (0.183) |
| IC*LTC *Priv. sector* Post 2013-17 | -0.268*** | -0.182*** | -0.083 | -0.065 | -0.249*** | -0.150*** | -0.084 | -0.089 |
| | (0.068) | (0.072) | (0.074) | (0.067) | (0.068) | (0.070) | (0.074) | (0.066) |
| Constant | 0.219 | 0.543** | 0.922*** | 1.438*** | 0.249 | 0.525** | 0.931*** | 1.312*** |
| | (0.247) | (0.252) | (0.272) | (0.241) | (0.244) | (0.252) | (0.272) | (0.240) |
| N | 524 | 509 | 521 | 579 | 524 | 509 | 521 | 579 |
| R2 | 0.344 | 0.364 | 0.328 | 0.346 | 0.343 | 0.358 | 0.328 | 0.341 |
| F | 12.846 | 13.969 | 12.561 | 13.719 | 12.720 | 9.122 | 9.116 | 9.087 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | Retirement Plan | | Mortgage over main house | | Retirement Plan | | Mortgage over main house | |
| | Yes | No | Yes | No | Yes | No | Yes | No |
| Informal care ( IC) | 0.232*** | 0.051 | 0.213*** | -0.454 | 0.220*** | -0.043 | 0.207*** | -0.456 |
| | (0.084) | (0.330) | (0.087) | (0.239) | (0.095) | (0.165) | (0.081) | (0.240) |
| IC*LTC benefit *Post 2013-17 | -0.251*** | -0.123 | -0.209*** | 0.495** | 0.259*** | -0.279* | 0.251*** | 0.409 |
| | (0.093) | (0.342) | (0.095) | (0.260) | (0.104) | (0.144) | (0.108) | (0.261) |
| IC*LTC *Priv. sector* Post 2013-17 | -0.135*** | 0.199 | -0.142*** | -0.082 | -0.128*** | 0.189 | -0.130*** | -0.075 |
| | (0.037) | (0.146) | (0.030) | (0.108) | (0.036) | (0.140) | (0.030) | (0.108) |
| Constant | 0.740*** | 3.514*** | 0.728*** | 0.280 | 0.710*** | 3.586 | 0.703*** | 0.241 |
| | (0.142) | (0.467) | (0.142) | (0.370) | (0.142) | (0.465) | (0.141) | (0.371) |
| N | 1,888 | 246 | 1,941 | 193 | 1,888 | 246 | 1,941 | 193 |
| R2 | 0.450 | 0.182 | 0.450 | 0.474 | 0.450 | 0.178 | 0.450 | 0.474 |
| F | 3.556 | 4.431 | 3.372 | 7.387 | 3.374 | 5.724 | 3.358 | 7.343 |
| p | 0.027 | 0.021 | 0.033 | 0.000 | 0.033 | 0.011 | 0.034 | 0.000 |
| | Children | | | | Children | | | |

| | No children | At least one daughter coresident no son coresident | At least one son coresident no daughter coresident | At least one daughter and one son coresident | No children | At least one daughter coresident no son coresident | At least one son coresident no daughter coresident | At least one daughter and one son coresident |
|---|---|---|---|---|---|---|---|---|
| Informal care ( IC) | 0.363*** | -0.407 | -0.748** | -0.160 | -0.369*** | -0.409 | 0.283 | 0.274 |
| | (0.106) | (0.228) | (0.372) | (0.207) | (0.115) | (0.226) | (0.174) | (0.373) |
| IC*LTC benefit *Post 2013-17 | -0.354*** | 0.162 | 0.810*** | -0.395 | 0.381*** | -0.065 | 0.170 | -0.938** |
| | (0.116) | (0.267) | (0.386) | (0.401) | (0.126) | (0.280) | (0.172) | (0.454) |
| IC*LTC *Priv. sector* Post 2013-17 | -0.133*** | -0.326*** | -0.071 | -0.257*** | -0.126*** | -0.336*** | -0.082 | -0.228*** |
| | (0.049) | (0.126) | (0.086) | (0.112) | (0.048) | (0.123) | (0.085) | (0.109) |
| Constant | 0.703*** | 2.393*** | 1.148*** | 1.186*** | 0.671*** | 2.410*** | 1.285*** | 0.874* |
| | (0.173) | (0.470) | (0.375) | (0.486) | (0.172) | (0.468) | (0.374) | (0.485) |
| N | 1,231 | 105 | 221 | 99 | 1,231 | 105 | 221 | 99 |
| R2 | 0.222 | 0.103 | 0.229 | 0.300 | 0.221 | 0.116 | 0.232 | 0.275 |
| F | 7.874 | 6.748 | 9.709 | 8.483 | 10.700 | 10.591 | 7.280 | 7.913 |
| p | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

All regressions have been performed using M5 specification. As CA and HC are mutually exclusive benefits, in order for the control group to include only those individuals who do not receive any benefits, a binary variable for HC is entered in the regressions to analyse the effect of CA and a binary variable for CA is entered in the regressions for HC. Standard errors clustered by Autonomous Communities. ***, ** and * denote statistical significance at the 1%, 5% and 10% level.

**Table B3. Estimation of the difference-in-difference model for the implementation of the SAAD (2004-2011) and the difference-in-difference model for budgetary cuts and early retirement reform for private workers (2004-2017). Restricted to households which composition has not change throughout the period of analysis**

| | Effect of the implementation of SAAD, 2004-2011 | | | | Effect of budgetary cuts in SAAD and early retirement reform for private workers, 2004-2107 | | |
|---|---|---|---|---|---|---|---|
| | M3 | M4 | M5 | | M3 | M4 | M5 |
| **Any LTC benefit** | | | | **Any LTC benefit** | | | |
| Informal care (IC) | 0.275*** | 0.285*** | 0.286*** | Informal care (IC) | 0.202 | 0.190 | 0.199 |
| | (0.110) | (0.111) | (0.131) | | (0.057) | (0.049) | (0.050) |
| IC*LTC benefit | 0.103 | 0.092 | 0.078 | IC*LTC benefit *Post 2013-17 | -0.193 | -0.191 | -0.180 |
| | (0.092) | (0.093) | (0.052) | | (0.057) | (0.058) | (0.056) |
| IC*LTC benefit*Post SAAD | -0.118** | -0.120 | -0.118** | IC*LTC *Priv. sector* Post 2013-17 | -0.127 | -0.122 | -0.125 |
| | (0.055) | (0.057) | (0.057) | | (0.033) | (0.034) | (0.038) |
| Constant | 1.003*** | 0.884*** | 2.040*** | Constant | 0.607 | 0.470 | 1.318 |
| | (0.360) | (0.367) | (0.431) | | (0.231) | (0.252) | (0.329) |
| N | 230 | 230 | 230 | N | 837 | 837 | 837 |
| R2 | 0.271 | 0.281 | 0.317 | R2 | 0.233 | 0.237 | 0.269 |
| F | 10.235 | 11.809 | 9.547 | F | 7.829 | 9.283 | 10.174 |
| p | 0.000 | 0.000 | 0.000 | p | 0.000 | 0.000 | 0.000 |
| **Caregiving Subsidy** | | | | **Caregiving Subsidy** | | | |
| Informal care (IC) | 0.323*** | 0.329*** | 0.341*** | Informal care (IC) | 0.234 | 0.243 | 0.248 |
| | (0.116) | (0.117) | (0.135) | | (0.100) | (0.100) | (0.100) |
| IC*LTC benefit | 0.215 | 0.201 | 0.173 | IC*LTC benefit *Post 2013-17 | -0.224 | -0.219 | -0.215 |
| | (0.181) | (0.182) | (0.222) | | (0.106) | (0.107) | (0.106) |
| IC*LTC benefit*Post SAAD | -0.117** | -0.113** | -0.106** | IC*LTC *Priv. sector* Post 2013-17 | -0.122 | -0.124 | -0.126 |
| | (0.053) | (0.055) | (0.056) | | (0.032) | (0.033) | (0.033) |
| Constant | 0.981*** | 0.863*** | 2.025*** | Constant | 0.606 | 0.463 | 1.307 |
| | (0.361) | (0.368) | (0.430) | | (0.231) | (0.252) | (0.329) |
| N | 230 | 230 | 230 | N | 837 | 837 | 837 |
| R2 | 0.396 | 0.407 | 0.456 | R2 | 0.358 | 0.363 | 0.398 |
| F | 5.971 | 7.305 | 7.598 | F | 8.041 | 11.632 | 10.346 |
| p | 0.000 | 0.000 | 0.000 | p | 0.000 | 0.000 | 0.000 |
| **Home Care** | | | | **Home Care** | | | |
| Informal care (IC) | 0.269*** | 0.264*** | 0.254*** | Informal care (IC) | 0.151*** | 0.151*** | 0.149*** |
| | (0.108) | (0.109) | (0.108) | | (0.047) | (0.048) | (0.044) |
| IC*LTC benefit | 0.101 | 0.101 | 0.089 | IC*LTC benefit *Post 2013-17 | 0.154*** | 0.150*** | 0.145*** |
| | (0.061) | (0.064) | (0.053) | | (0.048) | (0.048) | (0.047) |
| IC*LTC benefit*Post SAAD | -0.115** | -0.114** | -0.111** | IC*LTC *Priv. sector* Post 2013-17 | -0.115*** | -0.111*** | -0.100*** |
| | (0.046) | (0.048) | (0.048) | | (0.031) | (0.032) | (0.035) |
| Constant | 0.775** | 0.672** | 1.818*** | Constant | 0.550** | 0.403 | 1.237*** |
| | (0.360) | (0.367) | (0.434) | | (0.231) | (0.251) | (0.329) |
| N | 230 | 230 | 230 | N | 837 | 837 | 837 |
| R2 | 0.273 | 0.281 | 0.300 | R2 | 0.232 | 0.237 | 0.260 |
| F | 8.165 | 9.525 | 9.181 | F | 6.192 | 7.339 | 7.725 |
| p | 0.000 | 0.000 | 0.000 | p | 0.000 | 0.000 | 0.000 |

M3 includes respondent's characteristics (age, gender, professional situation, activity sector, consultations with doctor/nurse), household characteristics (having sons/daughters, son/daughters living at home, son/daughters living outside home, household size higher than 2), regional unemployment rate, year fixed effects and region fixed effects M4 also includes characteristics of the partner/spouse (age, gender, Katz's index, mental illness). M5 also includes size of municipality, household wealth, respondent's income from employment, percentage of respondent's employment income with respect to total household income, having a retirement plan, having a mortgage. As CA and HC are mutually exclusive benefits, in order for the control group to include only those individuals who do not receive any benefits, a binary variable for HC is entered in the regressions to analyse the effect of CA and a binary variable

for CA is entered in the regressions for HC. Standard errors clustered by Autonomous Communities. ***, ** and * denote statistical significance at the 1%, 5% and 10% level.

**Table B4. First-stage regression. Probability of being informal caregiver**

| | FS1 | FS2 | FS3 | FS4 | FS5 |
|---|---|---|---|---|---|
| Number of informal caregivers outside home | 0.046*** | 0.045*** | 0.045*** | 0.045*** | 0.044*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| N | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 |
| R2 | 0.109 | 0.121 | 0.127 | 0.137 | 0.144 |
| Endogeneity tests | | | | | |
| Robustified Durbin - Wu-Hausman | 0.5595 | 0.590 | 0.590 | 0.589 | 0.589 |
| F-statistic | 37.642 | 37.190 | 37.102 | 36.893 | 37.026 |
| Montiel Olea-Pflueger robust weak instrument test | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Critical values (%worst case base: $\tau$=20%) | | | 15.062 | | |
| Critical values (%worst case base: $\tau$=10%) | | | 23.109 | | |
| Critical values (%worst case base: $\tau$=5%) | | | 30.612 | | |

FS1 (first-stage regression) includes year fixed effects and region fixed effects. FS2 includes the same explanatory variables than FS1 and also professional situation, activity sector and doctor consultations. FS3 also includes household characteristics (having sons/daughters, son/daughters living at home, son/daughters living outside home, household size higher than 2). FS4 also includes age and gender of the partner/spouse, Katz's index and having mental illness. FS5 also includes size of municipality, household wealth, income from employment, retirement plan, income from other household members and having mortgage. Effective F statistics and critical values shown are for the Montiel Olea-Pflueger robust weak instrument test with confidence level of $\alpha$=5% and obtained with the weakivtest command in Stata (Pflueger and Wang, 2015). Standard errors clustered by Autonomous Communities

**Table B5. Effect of the SAAD over the probability of having housekeeper/household employee**

| | Effect of the implementation of SAAD, 2004-2011 | | | | Effect of budgetary cuts in SAAD and early retirement reform for private workers, 2004-2107 | | |
|---|---|---|---|---|---|---|---|
| | M3 | M4 | M5 | | M3 | M4 | M5 |
| **Any LTC benefit** | | | | **Any LTC benefit** | | | |
| Informal care (IC) | 0.001 | -0.001 | 0.001 | Informal care (IC) | 0.005 | -0.004 | 0.003 |
| | (0.011) | (0.013) | (0.013) | | (0.015) | (0.021) | (0.025) |
| IC*LTC benefit | -0.001 | -0.003 | -0.002 | IC*LTC benefit *Post 2013-17 | -0.031*** | -0.031*** | -0.032*** |
| | (0.005) | (0.006) | (0.006) | | (0.015) | (0.015) | (0.016) |
| IC*LTC benefit*Post SAAD | 0.061*** | 0.076*** | 0.073*** | IC*LTC *Priv. sector* Post 2013-17 | 0.277 | -0.251 | 0.302 |
| | (0.014) | (0.017) | (0.017) | | (0.351) | (0.343) | (0.331) |
| Constant | -0.036 | -0.046 | -0.041 | Constant | 0.115 | 0.160 | 0.163 |
| | (0.039) | (0.046) | (0.049) | | (0.325) | (0.371) | (0.307) |
| N | 796 | 796 | 796 | N | 2,134 | 2,134 | 2,134 |
| R2 | 0.068 | 0.088 | 0.090 | R2 | 0.059 | 0.044 | 0.053 |
| F | 3.892 | 3.199 | 2.436 | F | 4.346 | 4.193 | 5.505 |
| p | 0.000 | 0.000 | 0.003 | p | 0.000 | 0.000 | 0.000 |
| **Caregiving Subsidy** | | | | **Caregiving Subsidy** | | | |
| Informal care (IC) | -0.001 | -0.002 | -0.001 | Informal care (IC) | -0.003 | -0.005 | -0.007 |
| | (0.013) | (0.016) | (0.017) | | (0.015) | (0.020) | (0.028) |
| IC*LTC benefit | -0.002 | -0.002 | -0.001 | IC*LTC benefit *Post 2013-17 | -0.054*** | -0.058*** | -0.060*** |
| | (0.005) | (0.006) | (0.006) | | (0.012) | (0.010) | (0.018) |
| IC*LTC benefit*Post SAAD | 0.102*** | 0.121*** | 0.117*** | IC*LTC *Priv. sector* Post 2013-17 | 0.225 | 0.230 | 0.264 |
| | (0.017) | (0.021) | (0.022) | | (0.234) | (0.226) | (0.229) |
| Constant | -0.038 | -0.045 | -0.039 | Constant | 1.131 | 0.989 | 0.989 |
| | (0.039) | (0.045) | (0.048) | | (0.691) | (0.602) | (0.716) |
| N | 796 | 796 | 796 | N | 2,134 | 2,134 | 2,134 |
| R2 | 0.108 | 0.129 | 0.132 | R2 | 0.039 | 0.050 | 0.051 |
| F | 6.956 | 5.270 | 3.900 | F | 3.023 | 2.817 | 3.827 |
| p | 0.000 | 0.000 | 0.000 | p | 0.000 | 0.000 | 0.003 |
| **Home Care** | | | | **Home Care** | | | |
| Informal care (IC) | -0.001 | -0.002 | 0.000 | Informal care (IC) | -0.001 | -0.002 | -0.001 |
| | (0.011) | (0.013) | (0.014) | | (0.010) | (0.010) | (0.025) |
| IC*LTC benefit | -0.005 | -0.006 | -0.009 | IC*LTC benefit *Post 2013-17 | 0.070*** | 0.064*** | 0.061*** |
| | (0.015) | (0.018) | (0.019) | | (0.018) | (0.017) | (0.017) |
| IC*LTC benefit*Post SAAD | 0.005 | 0.005 | 0.006 | IC*LTC *Priv. sector* Post 2013-17 | -0.116 | -0.133 | -0.099 |
| | (0.006) | (0.006) | (0.007) | | (0.093) | (0.134) | (0.066) |
| Constant | -0.046 | -0.046 | -0.047 | Constant | -0.237 | 0.236 | 0.219 |
| | (0.041) | (0.047) | (0.050) | | (0.292) | (0.290) | (0.276) |
| N | 796 | 796 | 796 | N | 2,134 | 2,134 | 2,134 |
| R2 | 0.011 | 0.020 | 0.025 | R2 | 0.444 | 0.444 | 0.454 |
| F | 0.495 | 0.614 | 0.588 | F | 3.930 | 3.953 | 5.368 |
| p | 1.844 | 1.752 | 1.864 | p | 0.000 | 0.000 | 0.000 |

M3 includes respondent's characteristics (age, gender, professional situation, activity sector, consultations with doctor/nurse), household characteristics (having sons/daughters, son/daughters living at home, son/daughters living outside home, household size higher than 2), regional unemployment rate, year fixed effects and region fixed effects M4 also includes characteristics of the partner/spouse (age, gender, Katz's index, mental illness). M5 also includes size of municipality, household wealth, respondent's income from employment, percentage of respondent's employment income with respect to total household income, having a retirement plan, having a mortgage. As CA and HC are mutually exclusive benefits, in order for the control group to include only those individuals

who do not receive any benefits, a binary variable for HC is entered in the regressions to analyse the effect of CA and a binary variable for CA is entered in the regressions for HC. Standard errors clustered by Autonomous Communities. ***, ** and * denote statistical significance at the 1%, 5% and 10% level.

## Appendix C. Early retirement in Spain

In 2011, the real average retirement age of Spaniards was 63.47 years. That is, one in two people who retired did so before legal retirement age. Early retirement has been a mechanism that was implemented to a certain extent in the Spanish Social Security system in 2002[38], instituting a demanding access system that was nonetheless acceptable for a significant part of workers. Employees are entitled to early retirement at age 60 for public employees and 61 years for private sector employees under the condition that they had a minimum of 30 contributions. The social security system penalized—and still penalizes after the 2011-2013 reform, to which we will refer later—access to early retirement with significant discounts. These discounts were based on the principle of reducing the amount of the pension based on the years and/or fractions of the year that the worker anticipated his retirement, so that the consolidated discounts in the amount of the pension could be extended from a minimum of 6% to a maximum of 7.5% of the pension for each year or fraction of the year in advance.

Throughout the two consecutive reforms, between 2011 and 2013, early retirement for private sector workers was restricted, creating a double access route: by company restructuring or by the will of the worker. However, early retirement conditions for public sector workers have not changed.

It was possible to access retirement through company restructuring as long as age was lower, by a maximum of four years, than the age that, in each case, was applicable for the person to legally access retirement. Furthermore, the accreditation of an effective contribution period increased from 30 to 33 years of contribution. The pre-reform discounts were maintained so that for each year in advance, the pension was reduced between 6% and 7.5%.

One of the greatest novelties of the 2011-2013 pension reform is the figure of early retirement by the will of the interested party that allows anticipating the retirement age up to a maximum of two years, taking as reference the ordinary retirement age. This is a burdensome novelty for the worker, considering that, in this case, the discounts per year in advance oscillate between 6.5% and 8%. That is more onerous than those foreseen prior to the reform and those established for the early retirement due to termination of employment contract. In addition, the law requires proof of a contribution of 35 years, two more than those required for

[38] Law 35/2002, of July 12, on measures to establish a gradual and flexible retirement system.

early retirement due to restructuring, and five more than those required in the early retirement regime prior to the 2011-2013 reform. Finally, it is required that to access "voluntary" early retirement, a comfortable amount of retirement pension is achieved. Following the literal wording of the law, it will be necessary that, after calculating the pension, the amount "*must be higher than the amount of the minimum pension that would correspond to the interested party due to his/her family situation at the age of 65*". Otherwise, the worker could not access the early retirement pension and should wait 65 years of age or the age that is in accordance with the applicable transitional rule.

In any case, the reforms of 2011-2013 have served to limit the scope of strictly private early retirement on the social security system. In the regime applicable to early retirement prior to the 2011 reform, access to early retirement from the age of 61 was expressly and exceptionally allowed. Therefore, it was tolerated to anticipate retirement for up to four years.

Although Law 27/2011 was approved in August 2011, we consider that these reforms have not affected the responses provided in wave 4 (interviews conducted between February and October 2011) for the following reasons. Firstly, because the processing of the law did not have an easy parliamentary process: Congress faced three amendments to the totality and more than 400 to the article, while Senate also presented three other amendments to the totality and 262 amendments to the articles. Secondly, it was approved that the entry into force of the law was not immediate, but that it was applicable from January 1st, 2013.