The Best is Yet to Come: The Impact of Retirement on Prosocial Behaviour

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Abstract

Other-regarding preferences and prosocial behaviour vary across people and countries. Systematic differences are often related to fundamental personal characteristics such as gender and cultural background, but for a given person, preferences are traditionally assumed to be stable (Stigler and Becker, 1977). To what extent do important lifestyle changes affect preferences, such as prosociality? In this paper we show that retirement leads to more altruistic behaviour, and this change is not just attributable to external factors, e.g. lower need for virtue-signalling or more time, but seems to be caused by a change in preferences. To measure the impact of retirement we use a novel combination of representative cross-sectional and longitudinal individual-level survey data from 22 European countries, and a complementary incentivised field experiment on a large representative sample of individuals. The effect on volunteering is strong in the survey data, and using the field experiment we identify a change in preferences as a probable cause. Given the ageing of the population these are policy-relevant findings. The welfare gain driven by increased prosociality, through increased volunteering and transfers, should be considered in retirement age reforms.

Keywords: Retirement; Prosocial behaviour; Volunteering; Charity
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1 Introduction

Retirees are often portrayed as carefree, kindly people in literature and film. Is there any substance to this portrayal - are retirees actually more prosocial? And if they are, does the increase in prosociality stem just from the wisdom that accompanies old age, or is there something special about retirement that makes people more altruistic? Given that retirees have more time, is their altruism related to spending of it helping others, or are they also more willing to sacrifice their income to support strangers and/or relatives? Does retirement cause a change in other-regarding preferences, and if yes what does this mean for the stability of preferences in general?

To answer these questions, we use a unique combination of two types of data. The first one is survey data covering individuals from a large number of European countries: SHARE (longitudinal) and EU-SILC (cross-sectional). Variation in the Early Retirement Age legislation across countries, years and genders is used to identify the causal effect of retirement on various prosocial behaviour indicators. We use volunteering as a proxy for altruism and indeed find that retirees volunteer more. To identify whether the change in behaviour is really attributable to changes in preferences, we use a second type of data: we set up an incentivised experiment on a relatively large sample of retirees to identify the degree of pure altruism in the observed behavioural change, compared to other potential mechanisms such as changes in time and budget constraints, as well as the social circle.

Our paper is the first to provide evidence on the impact of retirement on prosocial behaviour, as the latter is captured by participation in volunteering activities and contributions to charity. To our knowledge, this is the first study that measures volunteering activity in the subjects rather than relies on self-reported measures. Also, this is one of a handful experimental studies with retirees, especially involving real effort, with several methodological innovations being necessary given the age and special characteristics of the participants.

More generally, our results contribute to the literature on the stability of preferences and wider personality traits. There is a growing literature on the stability of risk preferences, across contexts (e.g. Anderson & Mellor, 2009) and over time (Andersen *et al.*, 2008, and Schildberg-Hörisch, 2018, for a survey). There is also some evidence regarding the response of risk preferences to shocks (Hetschko & Preuss, 2020). Further afield, there is some evidence on the stability of strategic sophistication (Georganas *et al.*, 2015).

The stability of social preferences has been less investigated. Evidence exists on the stability across contexts (e.g. Wang *et al.*, 2020), robustness to induced group identity (Chen & Li, 2009). Closer to our work, (Gilligan *et al.*, 2014) measure how social behaviour responds to heavily traumatic experiences, i.e. war. There is no evidence, to our knowledge, regarding the response to a non-violent, anticipated shock, that most of the population worldwide will necessarily experience in their lifetime, such as retirement. Note here that in the case of many countries in our sample, and especially Greece in the experimental sample, the retirement shock can be treated as exogenous. Either people were forced to retire at the official retirement age by the pension system, or the financial incentives were such that not retiring was a clearly suboptimal option. Our contribution is then to show that a mostly exogenous, relatively mild shock to people's lifestyles,

that happens habitually to most people in the developed world and increasingly the developing, leads to measurable differences in their social behaviour and preferences.

1.1 Pro-social behaviour over age and employment status

There is no previous evidence on how transition to retirement affects prosocial behaviour. The economics literature is focused on labour market effects of volunteering using working-age samples.[2] Retirement is a major event that typically occurs later in life and for age-related reasons, and it is associated with important changes in lifestyle, consumption, activity, health and wellbeing (Battistin *et al.*, 2009; Coe and Zamarro, 2011; Fitzpatrick and Moore, 2018).

Withdrawing from the labour market and entering retirement is challenging. Individuals switch from a working-life structure to one in which they identify themselves as retirees (Van Solinge and Henken, 2008). Despite this transition being totally anticipated, individuals still face challenges to adjust regardless of their pre-retirement working conditions (Centre for Ageing Better, 2018). Mutchler *et al.* (2003) stretch out two competing theories on how prosocial behaviour might be linked to transitions from paid work to retirement. The first theory predicts a negative relationship, arguing that work and volunteering are complements. Individuals will use some sort of prosocial behaviour as a signalling device in the labour market, and as a means to accumulate human capital and develop career-promoting networks (Menchik and Weisbrod, 1987). As individuals switch from paid employment to retirement, social networks shrink and productive opportunities decline, therefore their motivation to engage in prosocial activities diminishes (Mutchler *et al.*, 2003).

The second theory argues for a substitution effect. It predicts a positive relationship that allows individuals to maintain their desired level of wellbeing. This substitution could be seen as a response to their increased time availability, the role of occupational loss, and the identity disruption caused by labour market disengagement. Using descriptive evidence, Sherman and Shavit (2012) argued that changes from employment to retirement positively affect the likelihood to involve in volunteering activities. The authors discussed how the standard life-cycle hypothesis can be modified to predict the positive impact on volunteering for people who retire. While working, total consumption is the sum of all material goods plus the immaterial product of work *per se*, i.e. the subjective gains associated with -paid or unpaid- work. Under this assumption, total consumption will fall if the supply of unpaid working hours is zero post-retirement. As individuals smooth out their total consumption over time, they are incentivised to start engaging in some sort of prosocial behaviour, e.g. participate in voluntary activities, or increase their supply of unpaid labour relative to their pre-retirement level.[3] Mutchler *et al.* (2003) used data from Americans'

[2] Sauer (2015) used data for women aged 25-55 years old from the Panel Study of Income Dynamics (PSID) and estimated that an extra year of volunteering increases full-time and part-time wage offers by 2.6% and 8.5%, respectively, and lifetime earnings by 16.7%. Cozzi *et al.* (2017) demonstrated that volunteer experience is related with higher earnings for both genders. Through a field experiment, volunteering has also been shown to increase the probability of getting hired (Baert and Vujic, 2017).

[3] Erlinghagen (2010) reported that the effect of retirement on volunteering is exaggerated and mostly determined by the decision to continue offering voluntary work that was already taken up before retirement. However, the study pooled data from two distant waves (2001 and 2005) of the German Socio-Economic Panel, that did not allow for a direct test of this mechanism. Moreover, it did not evaluate the effect of retirement on voluntary activity, but rather reported regression coefficients -unconditional on time effects- of retirement status on binary variables indicating whether someone started or ceased volunteering between waves.

Changing Lives (ACL) survey respondents aged 55-74 years old, to demonstrate increased volunteering activity for part-timers, those not working and those who stopped working between interviews, relative to full-time employees. They suggested that this positive effect operates through formal, rather than informal, volunteering. The insensitivity of informal volunteering to work status was attributed to its obligatory nature and reductions in requests for help or support due to shrinking social networks once retired.

On the other hand, generativity was shown to increase interest in volunteering among later adulthood individuals, whilst community service motivation was significantly associated with individuals' interest in volunteering among all life stages, and social networking motivation was unique among the early and middle adulthood groups (Yamashita *et al.*, 2019). Therefore, it is still not quite clear whether a potentially positive relationship between retirement and volunteering is due to increased time availability or enhanced prosocial preferences.

Individual behaviour is also affected by attitudes and behaviour within own social networks (Manski, 1993). Hence, peer influences from social and family networks can also affect volunteering behaviour. Friends and family members who volunteer could stimulate individual volunteering behaviour by the value of transmission, as it should be frequently encountered by their family members, friends and contacts (Goethem *et al.*, 2014). Additionally, retirement exerts intra-household externalities on expenditure, home production and health behaviour (Moreau and Stancanelli, 2015; Muller and Shaikh, 2018; Stancanelli and Van Soest, 2012). Therefore, transitions to retirement could cause spillover effects on prosocial behaviour within the household.

Finally, prosocial behaviour post-retirement can be driven by previous experience and activity. This point has been raised by Erlinghagen (2010) who argued that the effect of retirement on volunteering is rather exaggerated and it is own previous experience that determines prosocial behaviour after leaving the labour market.

We are primarily interested in identifying the role of the pure altruistic component among these other factors. The literature on human altruism is very large. We have clear evidence that individuals often engage in prosocial behaviour -those promoting others' well-being (for organizations see Brief & Motowildo, 1986, for individuals Rabin, 1993, and Fehr & Schmidt, 1999, for a general survey see Cooper & Kagel, 2016) - even when they are costly to themselves, e.g. volunteering, helping others, participating in political organisations, voting, donating to charities, etc. (Bénabou & Tirole, 2006). Age is a factor that partially explains variation in prosocial behaviour; price incentives, personality traits, social pressure, institutions, gender, and education are some others (e.g. Brañas-Garza *et al.*, 2018; Dohmen *et al.*, 2008; Kettner and Waichman, 2016). The economics and psychology literature point to positive links between prosocial behaviour and age: motivational shifts to more emotional goals (Carstensen and Charles, 1998), empathy and prosocial behaviour (Sze et al., 2012), both probability and amount of charity donations (Bellemare *et al.*, 2008; Carpenter *et al.* 2008; List, 2004) as well as hours volunteered (Katz and Rosenberg, 2005).[4] In this study we explicitly ask: does retirement make you a nicer person – and why?

[4] The empirical part considered several indicators of prosocial behaviour, i.e. volunteering, providing care, active citizenship. The terms volunteering and prosocial behaviour are being used interchangeably throughout the paper.

1.2 Economic significance of post-retirement volunteering

Our findings improve our understanding of the behaviour, and time and effort allocation decisions of a growing part of the European population that exit the labour market in later life, i.e. retirees. Transitions to retirement become more frequent with population ageing. In Europe, working-age population is decreasing and the old-age dependency ratio, i.e. people over 65 years old relative to working-age ones, will rise from 29.6% in 2016 to 51.2% in 2070. Moreover, life expectancy at retirement will increase by over five years by 2070 (European Commission, 2018).[5] Hence, behaviour, time allocation decisions and productive capacity of retirees are central in policy-making (Centre for Ageing Better, 2018; Mutchler, 2003). Lastly, this study contributes towards the wider agenda of understanding what drives prosocial preferences in general, highlighting heterogeneity in prosocial motivations driven by age and employment status.

Understanding the link between retirement and prosocial behaviour is important for two reasons. Firstly, for the accurate welfare analysis of retirement-related policies. Despite the fact that economists often attach an explicit zero wage to the supply of volunteer labour -or unpaid work in general-, the implications for the economy are considerable (Menchik and Weisbrod, 1987). Therefore, volunteering -even later in life- can substantially contribute to the economy. In the UK, for example, volunteer work represents about 3.7% of the total labour supply in the country.[6,7] Moreover, the 7% drop observed in dedicated volunteer time during 2012-2015 was associated with a loss exceeding £1 million. They also estimated that one hour of volunteering per week is worth £750.4 per year, and that unpaid work for this type of activity has the second highest value after childcare, and ranks before other unpaid activities, e.g. housework, adult care, transport, laundry and cooking. As the figures sketched out above refer to volunteering alone, the total contribution coming from all types of prosocial behaviour in an economy is higher, although difficult to be precisely quantified. As both the share of retirees and their life expectancy will keep growing, getting them involved in prosocial activities will enhance their role in reducing social costs and increasing welfare, let alone the positive effects that volunteering has been shown to have on own wellbeing. Apart from volunteering, the increased prosociality of retirees could mean higher transfers to their offspring and children. This means that retirement policies have obvious distributional effects, but also possibly effects on consumption patterns.

Secondly, for the practical reasons of addressing a potentially excess demand for volunteering opportunities by retirees, and harnessing the associated welfare loss. In the 2015-16 Community

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[5] Consequently, labour force participation among those 20-64 years old in the EU will increase from 77.5% in 2016 to 80.7% in 2070 (European Commission, 2018). As a response, many countries encourage new forms of working in later life, e.g. partial-retirement, bridge jobs and un-retirement (Centre for Better Ageing, 2018). Wahrendorf *et al.* (2017) presented evidence about paid employment beyond the age of 65 becoming more common across Europe.

[6] The UK is used as an example due to data availability. The ONS analysis used data from the UK Household Satellite Accounts. More information can be found here:
www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/articles/billionpoundlossinvolunteeringeffort/2017-03-16

[7] The Office for National Statistics (ONS) reported that 1.93 billion hours of volunteer work were supplied in the UK during 2015. According to the UK Labour Force Survey (LFS), the total number of actual weekly hours worked in 2015 was 1,004 million, or equivalently 52.2 billion hours over the year. Hence, volunteer work represented about 3.7% of the total labour supply in the country.
www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/timeseries/ybus/lms

Life Survey (CLS), 51% of their 65-74 years old respondents participated in voluntary activities at least once a month, compared to 42% and 30% for the 50-64 and 25-34 age groups, respectively. Moreover, according to the ONS analysis, those above 65 years old reported 13.4 minutes of formal volunteering per day, on average, while those aged 25-34 reported a daily average of only 6 minutes.

The remainder of the paper is structured as follows: Section 2 presents the data sources and the construction of the main variables used in the analysis. Section 3 outlines the adopted identification strategy, including the experimental design. Section 4 presents and discusses the results, while Section 5 discusss the mechanisms behind the results. Section 6 concludes.

2 Data

2.1 Survey data

The International Labour Organisation (ILO) defines volunteering as "any unpaid, non-compulsory activity to produce goods or provide services for others; that is for economic units outside the volunteer's household or family". In our main survey dataset (SHARE) individuals were asked whether they did any voluntary or charity work during the last year. SHARE is a cross-national longitudinal survey collecting information on demographics, health, and socio-economic status for individuals aged over 50 years old, which makes it an excellent fit for studying the effects of transitions into retirement. In waves 4, 5, 6 and 7 the information about respondents' voluntary activity last year was collected. Following individuals over time allows to control for unobserved heterogeneity and for dynamics in prosocial behaviour.

We supplement this longitudinal data on prosocial behaviour in the target age group with the cross-sectional European Union Statistics on Income and Living Conditions (EU-SILC) data which benefits from measuring a range of pro-social activity indicators. In the 2015 and 2016 waves, they provided information on prosocial activity, i.e. volunteering (formal and informal; 2015 sample), provision of care to others (inside and outside the household; 2016 sample) and active citizenship (2015 sample). Full details are provided in Appendix A1.

2.2 Experiment data

To isolate other mechanisms driving volunteering from an increase in prosocial preference, our design also incorporates a telephone field experiment, which involved a separate subject pool. In the experiment, subjects answered a questionnaire similar to the EU-SILC and SHARE ones, which included questions about volunteering. Subjects then took part in an incentivised experiment with real in-kind and monetary donation outcomes. We describe the experiment in detail in the mechanism section below. Using social media announcements, word of mouth and local pharmacies we specified the target age to be 15 years around retirement, and randomised contacts between waves. The data collection took place over 3 waves, 4 days each: 30 April - 3 May, 14-17 May, and 24-27 September 2020 (i.e. during, straight after and a while after the COVID-19 lockdown in Greece). A total of 255 individuals aged 38-84 years old participated.[8]

[8] Response rate was 63% in the first wave (150 contacted, 94 participated), 70% in the second wave (150 contacted, 105 participated), and 60% in the third wave (93 contacted, 56 participated).

The first set of measurements we take are identical to those in EU-SILC and SHARE data, which enable to compare self-reported volunteering between surveyed individuals and our experiment participants. Specifically, we ask participants about self-reported volunteering (and reasons for not volunteering), time spent helping family, general social and cultural activity, health, and the standard socio-economic indicators such as age, gender, education, labour status etc. The second, fully incentive-compatible, set of measurements is explained in detail in the experiment set-up section below.

3 Estimation Strategy

The objective is to identify the causal link between retirement status and prosocial behaviour. Retirement is endogenous as individuals can opt to retire earlier or later in their lives depending on their health, wealth, time preferences, and institutions regulating the retirement eligibility criteria applying to their case. A natural experiment randomly assigning individuals to groups of retirees and non-retirees would be ideal in providing a causal answer to this empirical question. However, such experiments are not feasible and simple regression methods are likely to result in biased and inconsistent estimates regarding the effect of retirement on prosocial behaviour. Instead, a fuzzy regression discontinuity (RD) design is adopted. Endogeneity concerns are addressed by exploiting discontinuous jumps of the retirement probability at the year, country, and gender-specific ERA thresholds that apply to each surveyed individual.

To isolate the role of change in prosocial preferences from other factors, we designed an experiment that involves subjects making incentive-compatible choices about in-kind and monetary contribution to charities. Crucially, these contributions are free of any social capital, social network and other components discussed above as alternative drivers of volunteering.

3.1 Forcing variable: retirement eligibility

Retirement eligibility is at the heart of European welfare systems. The calculated distance between an individual's age[9] and the official early retirement age (ERA) in their country will be used as the forcing variable in the econometric design.[10] Over time, countries have implemented a series of pension reforms, including ERA increases. Hence, ERA is an important institutional threshold determining who can exit from the labour market and start claiming pensions. Moreover, it is associated with major changes in behaviour, health and lifestyle (Fitzpatrick and Moore, 2018). Using individual responses regarding own current activity status, a binary variable is constructed to indicate retirees, versus non-unemployed labour market active individuals, i.e. excluding those in military or community service, studying, disabled or performing domestic tasks.

[9] Age is crucial because it predicts the treatment status; i.e. the retirement probability increases with age. Information about the timing of the interview and the timing of birth is also available; i.e. quarter and month in the EU-SILC and the SHARE data, respectively. Hence, we calculate the respondent's age at the time of the interview.

[10] Similar to other studies, e.g. Muller and Shaikh (2018), information on early retirement eligibility age was collected from the Social Security Programs Throughout The World Survey (SSPTWS) which is available from the U.S. Social Security Administration (2016), as well as from OECD Pensions At A Glance reports (e.g. OECD, 2017).

In our sample of European countries, ERA is more frequently set after 60 years old. However, there is variation over time, across countries and by gender. For example, ERA in Austria in 2015 was 64 years and 59 years for men and women, respectively, while in 2016 both thresholds were increased by one year. In other countries, e.g. Denmark and Czech Republic, ERAs remained unchanged (see table A1 in the appendix).

3.2 Fuzzy Regression Discontinuity Design

The implementation of an RD design relies upon information of a policy rule that determines whether an individual is potentially treated. In this context, retirement status is partially determined by whether someone's age, the forcing variable, crosses a known cutoff point *c*, which is the early retirement eligibility age that applies to each individual given their country, survey year and gender. The validity of the RD design relies on the fact that individuals cannot manipulate the forcing variable around *c*, and therefore they are considered to be randomly classified as treated and non-treated (Lee and Lemieux, 2010).

In the European context, crossing the institutional cutoff point does not imply compulsory retirement. Instead, there is imperfect compliance because the discontinuity in the retirement probability is lower than 1 as someone crosses their ERA. This calls for a fuzzy RD design where age can only partially determine retirement status. Therefore, a Two-Stage Least Squares (2SLS) framework is applied in order to instrument individual retirement status using the predicted discontinuity in the probability of retirement after crossing the ERA. The following system of parametric equations is estimated:

$$y_{ic} = \beta_o + \beta_1 D_{ic} + \beta_2 \widetilde{age}_{ic} + \beta_3 \widetilde{age}_{ic} D_{ic} + X_{ic} + \mu_c + \varepsilon_{ic} \quad (1)$$

$$D_{ic} = b_o + b_1 \widetilde{age}_{ic} + b_2 I_{ic} + X_{ic} + \mu_c + v_{ic} \quad (2)$$

In this framework, y_{ic} is the prosocial behaviour indicator for individual *i* in country *c*, and *D* indicates the individual retirement status. The forcing variable is centred at the country, survey year and gender-specific ERA, i.e. $\widetilde{age}_{ic} = (age_{ic} - c_c)$. Retirement is instrumented using binary indicators on whether the *i*-th individual has crossed the ERA threshold, i.e. $I_{ic} = 1[\widetilde{age}_{ic} \geq 0]$. All models include a set (X_{ic}) of pre-determined characteristics such as gender, education, and ethnicity. A set of country fixed effects, μ_c, is also included to account for time-invariant differences across countries, e.g. in the institutional framework or culture. Models also control for time fixed effects to adjust for common time trends.[11] Finally, ε_{ic} and v_{ic} are idiosyncratic disturbance terms. In the cases where Equation (1) is estimated using longitudinal rather than cross-sectional data, models control for individual fixed effects and, in some cases, lagged own and partner's prosocial indicators.

[11] The EU-SILC data are cross-sectional. However, when using those data, a set of quarter-of-survey fixed effects is included. Year fixed effects are included in models estimated using the SHARE data.

Under Equation (1), the impact of retirement on prosocial behaviour is given by β_1. Equation (2) is the first-stage regression indicating how retirement probability changes at the cutoff, i.e. b_2. Linear interaction terms between the forcing variable and the instrument are also included as additional instruments, i.e. $\widetilde{age}_{ic}I_{ic}$, in order to allow for different slopes at both sides of the cutoff point. In this case, additional first-stage regressions are estimated for the interaction terms. Models using higher-order polynomials of the forcing variable are also estimated, although their use is avoided in RD designs due to poor performance, especially when samples are not sufficiently large around the cutoff (Gelman and Imbens, 2019).

Given this framework, the estimated β_1 coefficient in Equation (1) is interpreted as the Local Average Treatment Effect (LATE) of retirement on prosocial behaviour. In other words, it is the average treatment for the compliers, i.e. for those individuals who exit labour market and retire once they cross the ERA threshold.

3.3 Mechanism

Prosocial behaviour can be driven by a variety of factors, as discussed in the Introduction. This behaviour change may be caused by people accommodating their existing preference in their new lifestyle. A retiree, for example, may be volunteering more to compensate for the social interaction previously consumed at work. Alternatively, the same observed behaviour can be driven by a change of preferences upon retirement. We first take advantage of the data on partner's activity in the SHARE sample. We thus examine the effect of social network by controlling for intensity of a partner's volunteering in the longitudinal model. We also test for retirement spillover effects on prosocial behaviour within the household by controlling for partner's retirement. Furthermore, we use the longitudinal nature of the SHARE data to check for the role of own past volunteering experience in current behaviour (see Appendix 2 for the details).

In the experiment, we fully eliminate the effect of social and strategic components which allows us to isolate the role of change in purely pro-social preference. Conceptually, we consider three types of consumption goods. This is similar to Sherman and Shavit (2012) who in their study of volunteering motivations divide consumption goods into material and immaterial. In our framework, we further distinguish between two types of immaterial goods: altruistic and other. The other category comprises all previously discussed motivations not driven by changes in prosocial preferences, such as social interaction and signalling of social capital. In the experiment, we eliminate the possibility of consuming the *immaterial-other* good from the in-kind and monetary donations. This leaves the *material* good and *immaterial-altruistic* good as the only consumption options.

3.3.1 Incentivised elicitation of the mechanism

Along with the measurements identical to those in the EU-SILC and SHARE data, we develop a second set of fully incentive-compatible measurements. These involve participants' choices about (i) in-kind and (ii) monetary donations they can make to real charities. The set of recipients for each task's earnings covers all possible consumption options: (a) keep it for themselves; (b)

give it to relative/friend; (c) donate to Church of Greece; (d) donate to environmental charity; (e) donate to refugees charity; and (f) donate to cancer charity.[12]

The first measurement is a real effort task designed to gauge participants' preference for volunteering in an incentive-compatible way. Participants were given a simple, but time-consuming, task which allowed them to earn up to €5. First, they had to indicate a recipient from the list above for their task-related earnings. Those who have a preference for donating their time to charity in real life are expected to be more willing to volunteer their time (and labour) towards a charity recipient in our experiment. Crucially, this measurement isolates the purely altruistic preference for time donation from alternative explanations involving non-monetary utility gains from the time spent volunteering. Under the assumption that the design of the real effort task (described below) provides the pure disutility of time use, we rule out the potential complementary utility gained, e.g. a social aspect of volunteering.

The second incentivised measurement is a lottery draw in which participants had a 1/100 chance of winning €200. Before the outcome of the draw was announced to them, they were required to state their preferred allocation of their (potential) earnings to options (a)-(e) from the above list of recipients. Any combination was allowed as long as it added up to €200.[13] This measure is designed to gauge the broader prosocial inclinations that do not depend on time availability. Conversely, if increased volunteering was due to greater time availability, we would expect the monetary donations for a given level of in-kind donations to remain the same post-retirement. Full instructions are available in the Supplementary Materials.

We use the experimental measurements to test the following hypotheses:

H1: A post-retirement increase in volunteering activity in our experimental sample is observable and comparable to the survey-based evidence.

H2: A post-retirement increase in volunteering is driven by lower cost of time, while prosocial preferences remain stable. In this case, a retired person would provide -on average- the same or lower monetary donation than a non-retired person regardless on the in-kind donation.

H2Alt: A post-retirement increase in volunteering is driven by increased prosocial preferences after retirement. In this case, we should see the retirement predicting larger monetary donations, independently of the in-kind donations.

In short, we (i) test if retirement (and retirement eligibility) predicts greater self-reported volunteering in the experimental sample and (ii), if retirement predicts greater monetary donations, which are our measurement of prosociality.

3.3.2 Experiment Design

We created a number of novel experiment design solutions to ensure the inclusivity of the sample, and the credibility of the incentivised measures. Both are crucial for the external validity of the results. Specifically, we expected some retired participants to be less tech-savvy and less

[12] In the cases of (d), (e) and (f) participants could nominate the charity of their choice.

[13] They could also provide contact details for friends, relatives and charities they wished to donate to. The required contact details did not impose privacy concerns or made the decision too exacting. Participants could indicate contact details if they won.

willing to travel, compared to the average subject pool of a study reliant on a real-effort task. Additionally, COVID-19 quarantine measures came into place, which eliminated the option of administering a face-to-face study.

It is not surprising that experiments involving elder and, in particular, retired people are very rare. To our knowledge, there is only one controlled laboratory experiment involving retirees in their late sixties. Sutter and Kocher (2007) use a lab setting to study the relationship between age and trust. Their sample of 64 retirees was recruited from athletic courses for retired persons at the local Department of Sports and from an adult education institution, which organizes seminars on various topics and for various age groups14. Our experiment is the first to administer a controlled experiment administered to a sample of over 250 retirees and persons of close-to-retirement age.

We believe that the combination of methods we developed, i.e. telephone interview, adaptation of real-effort task and adaptation of a credible random number draw to be administered over the phone, can be successfully used in the future to reach people often under-sampled in research, mostly due to age and other relevant demographics.

Real Effort Task

We selected the real effort task that satisfied the following criteria that ensured the representativeness of the sample: (i) skill-independent; (ii) free of intrinsic value (to avoid unobserved heterogeneity in enjoyment, sense of purpose, etc.); (iii) suitable for elder people; and (iv) easy to administer over the phone, rather than online or in the lab. Whilst most of the existing real effort tasks satisfy requirements (i) and (ii), requirements (iii) and (iv) were specific to both our research question and the data collection timing. We wanted to minimise the exclusion from our sample based on technology (for example, online participation requires a certain level of internet proficiency) or willingness to travel (for lab participation). To address this challenge, we designed a novel real-effort task that was administered over the phone.

The real-effort task involved counting the number of vowels in common words of the local language, i.e. in Greek. Subjects could earn up to €5 by completing up to seven sets of tasks, four vowel counts in each. To ensure equal time and effort cost, we pre-recorded audio clips of the research assistant pronouncing the words, with gaps in-between for the subject to provide the answer. The participants first learned the nature of the task and then they could choose one recipient of their real-effort task's earnings. Then, they listened to the audio clips and reported the vowel counts. Participants were free to stop the task at any stage and move on to the next section of the study. See Supplementary Materials for the instructions and screenshots of the tasks.

Lottery-over-phone

Designing how to credibly administer the lottery over the phone was non-trivial. The interviewer would ask the participant to find any banknote in their wallet and read out the digits of the serial number, apart from the last two. The last two digits were the lottery number. The interviewer would then generate a random number and tell it to the participant. The participant

[14] Similarly, Holm and Nystedt (2005) administered a mail-based semi-experimental trust game with participants of 20 and 70 years old, using a public database in Sweden. Charness and Villeval (2009) explore cooperation and competition in a sample involving 39 elder (over 50 years old) employed people.

knew that they would win the lottery if the last two digits of the serial number on their banknote (unknown to the interviewer at that point) were the same as the random number the interviewer had just given to them (Appendix Figure A6).

Addressing demand effects

Being observed (by the experimenter or by other subjects) creates an additional cost of not complying with social norms, and can thus change the subject's behaviour (Georganas *et al.*, 2015). This is particularly problematic if studying charitable giving. Della Vigna *et al.* (2012) estimated the social pressure cost of refusing to donate to lie between $1.40-$3.80, depending on the charity type. Consistent with this, in the pilot of this study we observed most of the subjects donating the endowment of €5 to charity. We address this concern in two ways, (i) using a high-stakes lottery instead of a small certain endowment, (ii) adding a more socially ambiguous option of donating winnings to a family member or a friend.

The main function of the higher stakes lottery is to mitigate the "peanuts effect", i.e. people's tendency to underweight small gains (Prelec & Loewenstein, 1991; Green & Myerson, 2004; Weber & Chapman, 2005). Research shows that people prefer a gamble over a certainty equivalent when the latter is a small gain. Conversely, most people have a higher valuation of a 10% chance to win $1 than of getting $.10 for sure. Higher stakes reduce the (unusually) high giving in Dictator Games, as long as the increase is substantial. For example, there is no effect from a difference between $5 and $10, but there is from $1.22 to $122 (see meta-study by Larney *et al.*, 2019).

We also consider the potential effect of introducing uncertainty on pro-social contributions. There is some evidence that more risk-averse people make more inequality-averse choices in the Dictator game (Van Koten *et al.*, 2013). We do not worry about this too much since we are looking at the difference between retirees and non-retirees exposed to the same incentives.

The list of possible recipients of participant's earnings is designed to cover all possible consumption options. The option "give to relative or friend" is special in terms of both effect and interpretation. We hope that participants who want to keep earnings for themselves but are affected by social pressure (e.g. observability of their choices by the interviewer or the experimenter) would use this as a less-salient selfish option. Notice, however, that introducing this option comes with a tradeoff of more ambiguous interpretation of the monetary donations. Giving money to a relative in need has prosocial motivation underpinning it, whilst giving money to a family member to then derive private benefit from it does not. Hence, we focus on money kept to self as the main measure of prosociality in the analysis.

4 Results

4.1 Descriptive statistics

The survey data samples have been restricted to include individuals within a 10-year window around their country, survey year and gender -specific ERAs. This time window is used throughout the empirical analysis. Based on this sample restriction there are 121,182 individuals in the SHARE

sample, and 58.2% of them is retired. Overall, 19.6% of the SHARE sample reported some voluntary work. Retirees appear to be more involved in voluntary work than non-retirees and the difference is statistically significant. For a more disaggregated information on prosocial behaviour, statistics on variables from the EU-SILC sample are provided. After applying the same sample restriction, 87,768 individuals are left in the sample with 47.1% of them being retired.[15] In the EU-SILC sample, 27.3% and 23.8% of the individuals report offering informal and formal voluntary work, respectively. Although higher, volunteering incidence among EU-SILC participants is comparable to the SHARE one.

Regarding informal voluntary work, EU-SILC retirees seem to be more involved in a statistically significant way. The incidence of formal volunteering and care provision to other people within the household is more balanced between retirees and non-retirees. Non-retirees are more likely to provide care to non-household members and be more active citizens.

The experimental data sample is fairly balanced in terms of labour market status. Retirees are less likely to offer formal volunteering than non-retirees but the difference is not significant; the difference is negligible when considering informal volunteering (for the full details see Table A1 in the Appendix).

4.2 Results overview

The endogenous decision to retire is modelled as a function of whether an individual's age has crossed the legislated ERA threshold that applies in their case, as discussed in the identification strategy section. In this way, the discontinuous jump of the retirement probability at institutionally set age thresholds will allow the identification of the impact of retirement on prosocial behaviour indicators. Our first set of 2SLS and FE-2SLS results includes evidence of both survey samples that are quite comparable and indicate that there is a positive relationship between retirement and prosocial behaviour. The relationship is robust to sensitivity tests regarding own past prosocial activity, partner's volunteering activity and partner's retirement. Retirement positively affects the probability of volunteering, by around 10%, and the relationship is marginally stronger when considering formal volunteering.

The positive link between retirement and prosociality is also confirmed with the experimental data. Our second set of results demonstrates that retirees have higher prosociality in monetary donations along with the in-kind ones, captured by volunteering. This points towards the mechanism of increased prosocial preference post-retirement, rather than a mechanism related to increased time availability or preference for the same amount of labour.

4.3 First stage results and RD validity checks

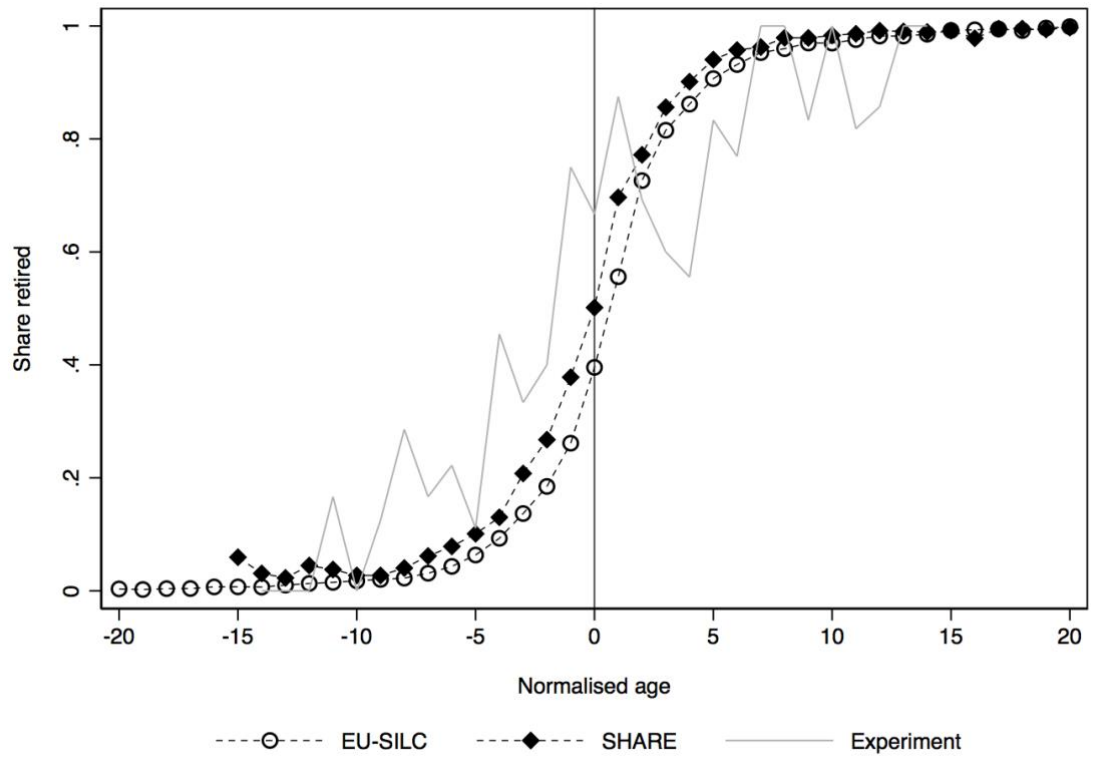
Because retirement status is endogenous it is instrumented with the ERA indicator. This variable must be relevant and valid in order to be a suitable instrument. Throughout European

[15] To further check that individuals identified as retirees have actually withdrawn from the labour force, the variable recording whether someone worked at least one hour during the week before the interview. In the EU-SILC sample 93.7% of retirees reported no hours of work last week. In a similar question 85.9% of the SHARE retirees sample reported no hours of paid work during last 4 weeks. Excluding those retirees reporting paid hours of work from the estimation samples does not affect the results.

countries, ERAs are exogenously set by the governments, hence validity cannot be formally tested. Therefore, ERAs are assumed to be linked to prosocial behaviour only through transitions to retirement. For the instrument to be relevant, a strong first-stage relationship between the endogenous variable and the instrument is required, i.e. the probability of being retired must be strongly predicted by the ERA indicator, I_{ic}.

Figure 1 scatters the shares of retired individuals across the ERA-normalised age (specific to year, country and gender) using: (a) EU-SILC (waves 2015 and 2016); (b) SHARE (waves 4-7); and (c) our experiment data. SHARE means lie slightly above the EU-SILC ones, because SHARE surveys individuals older than 50 years old and closer to their retirement age. The experiment data also follow these patterns, although in a bit noisy way due to a considerably smaller sample size.[16] The graph confirms that there is no perfect treatment compliance as some individuals retire before they reach their ERA while others stay in the labour market even after having crossed it. However, the share of retirees increases disproportionately at the eligibility age cutoff, providing reassurance about the instrument strength.

Figure 1. Share of retirees by age.



Source: EU-SILC; SHARE; experiment. Notes: EU-SILC waves: 2015, 2016; SHARE waves: 4, 5, 6, 7; Experiment waves: all. Means are weighted by the survey (EU-SILC and SHARE) weights where relevant. Age is normalised by the country, survey year and gender-specific ERA of each individual.

[16] The similarity between the experiment and the survey data lines is more evident if the EU-SILC and SHARE samples are restricted to only participants from Greece. Results available upon request.

Panel A in Table 2 displays first-stage results from Equation (2) using the EU-SILC sample to support this claim. The probability of retirement increases by 28% when a local constant age function is specified (column 1). Using a linear age function at both sides of the ERA cutoff (column 2) suggests that the discontinuity in retirement probability is 31% higher for those having crossed their ERA. Discontinuities are also significant when quadratic and cubic age functions are specified at both sides of the cutoff. In all cases, the instrument relevance condition is satisfied. The retirement eligibility indicator strongly predicts retirement status, it is always statistically significant at the 1%, and the first-stage *F*-statistics of excluded instruments are sufficiently high. We get similar results using the SHARE sample, in Panels B and C.

The identifying assumption in an RD design is that individuals cannot manipulate the forcing variable around the cutoff age. Therefore, all observable characteristics should be balanced around the cutoff and individuals below it should be a valid control group for those above it, i.e. the treatment is considered to be as good as random (Lee and Lemieux, 2010). Examination of the forcing variable density around the cutoff can validate that local assignment could be considered as random. Appendix Figure A3.1 displays a normalised age histogram within a time window of -/+ 10 years around ERA. The forcing variable is smooth around the cutoff age providing no evidence of forcing variable manipulation.[17]

4.4 Impact of retirement on prosocial behaviour

After establishing the existence of a strong first-stage relationship between retirement status and early retirement eligibility, we examine the impact of retirement on prosocial behaviour indicators. First, we make use of the detailed volunteering measurements of EU-SILC data to test the impact of retirement on the incidence of formal voluntary work, informal voluntary work and the overall voluntary work indicator (constructed using the formal and informal volunteering variables).

The 2SLS results suggest a positive and significant relationship (Table 2, Panel A). Retirement increases the probability of engaging into voluntary work by approximately 8% based on the local linear specification in column 2.[18] Distinguishing between informal and formal voluntary activity does not uncover any notable differentiation regarding the impact of retirement. Retirement increases the probability of informal voluntary work by 6%-8%, depending on how the forcing variable is specified. The incidence of formal voluntary work post-retirement increases by about 7%. Although not reported here, active citizenship is not affected by retirement status. The same holds when considering provision of care to other people inside and outside the household. Providing care to household members only, is associated with a positive although not significant coefficient. Hence, these results are not provided here but are available upon request.

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[17] We also test if predetermined individual characteristics, i.e. gender, nationality and education, are locally balanced around the cutoff. Individuals around the cutoff should not be systematically different if the treatment is locally randomised. We obtained some 2SLS retirement estimates using predetermined covariates as outcomes, and focusing on a short time-window around the cutoff age. All parameters were not statistically significant indicating that treated and control individuals are balanced in terms of observables. Results are available upon request.

[18] The result remains positive when second order polynomials of the forcing variable are used, however it is less precisely estimated. Using higher-degree polynomials of the forcing variable returns much noisier estimates. Hence, models with local linear age functions will be used as the preferred specifications.

After establishing the effect of retirement across the range volunteering measurements, we turn to SHARE data, re-estimating Equation (1) in order to see whether the impact of retirement on voluntary activity is comparable between databases. (Panels B-C in Table 2). The SHARE sample is considerably larger than the EU-SILC one, and covers the period 2013-2017. The results of retirement on voluntary work are remarkably similar to those obtained using the EU-SILC sample.[19] Retirement increases the probability of voluntary work by about 9% (columns 1-3), depending on the age function specification. Moreover, because SHARE is a longitudinal survey, Panel C reports parameter estimates conditional on individual fixed effects. These should capture any unobserved time-invariant heterogeneity correlated to both volunteering activity and retirement status. The FE-2SLS results confirm the positive relationship between retirement and voluntary work, suggesting that retirement increases the probability of voluntary work by 10%-13%, depending on the local age function specification.[20] Models also control for individual characteristics, time of survey, country fixed effects, and for individual fixed effects (Panel C). Regressions are weighted using the relevant survey weights and they are estimated over a 10-year time window around the cutoff age.[21]

Table 2. Retirement and prosocial behaviour: Evidence from survey data.

	[1]	[2]	[3]	[4]
	Panel A: 2SLS estimates; EU-SILC sample			
Retired (outcome: voluntary work)	.097** (.039)	.079** (.035)	.081 (.092)	.322 (.409)
Retired (outcome: informal voluntary work)	.088** (.034)	.061** (.030)	.067 (.081)	.121 (.348)
Retired (outcome: formal voluntary work)	.073** (.035)	.071** (.031)	.079 (.081)	.251 (.346)
First-stage: Age>ERA	.281*** (.010)	.311*** (.009)	.167*** (.011)	.132*** (.013)
First stage: F-statistic	847.83	1547.04	1431.96	1154.28
Observations	85,695	85,695	85,695	85,695
Local age function	Constant	Linear	Quadratic	Cubic

[19] The lists of countries covered by the two surveys overlap to a great extent. The EU-SILC estimation sample covers 22 countries and the SHARE one covers 19 countries (observations for Norway, Ireland and The Netherlands are not available). When the EU-SILC sample is forced to cover the countries covered by the SHARE one, the estimation sample reduces from 85,695 observations to 79,331 observations but the results remain practically the same. The retirement coefficient is .087 and the standard error is .037 (compared to the result in Table 3, panel A, column 2). A full list of the countries included in both samples is provided in the Appendix.

[20] All the baseline estimates are robust to the exclusion of retirees reporting hours of work in the last week (EU-SILC sample) or the last month (SHARE sample). More specifically, using the same bandwidth and a local linear age function, the 2SLS retirement coefficient is .076 (standard error = .036) in the EU-SILC sample. In the SHARE sample, the respective FE-2SLS parameter is .122 (standard error = .041).

[21] Individual survey weights have been adjusted based on the distance of each individual's age from the ERA threshold, so that individuals closer to it (from either side) are attached to a greater weight. However, results are robust to alternative weighting schemes.

Individual characteristics	Yes	Yes	Yes	Yes
Survey quarter fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
	Panel B: 2SLS estimates; SHARE sample			
Retired (outcome: voluntary activity)	.087*** (.023)	.086*** (.024)	.092* (.048)	.114 (.113)
First stage: Age>ERA	.349*** (.008)	.338*** (.009)	.253*** (.010)	.229*** (.011)
First stage: F-statistic	1,705.33	1,025.08	1,823.05	1,409.93
Observations	121,182	121,182	121,182	121,182
Local age function	Constant	Linear	Quadratic	Cubic
Individual characteristics	Yes	Yes	Yes	Yes
Individual fixed effects	No	No	No	No
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
	Panel C: FE-2SLS estimates; SHARE sample			
Retired (outcome: voluntary activity)	.100*** (.035)	.105*** (.035)	.127** (.060)	.135 (.117)
First stage: Age>ERA	.225*** (.009)	.227*** (.009)	.182*** (.010)	.170*** (.010)
First stage: F-statistic	609.59	304.81	404.82	314.19
Local age function	Constant	Linear	Quadratic	Cubic
Observations	98,840	98,840	98,840	98,840
Individual characteristics	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Source: EU-SILC; SHARE. Notes: Results are weighted using survey weights. Robust standard errors in parentheses. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

In sum, the results obtained from all sources of data using instrumental variables methods provide strong evidence to the claim that retirement increases the probability of volunteering, either formally or informally. A series of robustness and sensitivity tests confirms the validity of this finding (see Appendix A3.4).

5 Mechanisms

5.1 Survey data

To examine whether the impact of retirement varies with observable characteristics, we split the samples accordingly. The baseline effect of retirement holds at 8%-10% greater volunteering probability when several characteristics and fixed effects are controlled for. However, this probability increase varies with a number of factors. The relationship is stronger for females, tertiary educated, people with good self-reported health status and those not limited in their activities by health-related issues. There is no evidence that retirement impacts on other types of prosocial behaviour such as assistance or care to people outside the household, or active citizenship (Appendix Table A3.1).

The impact of retirement is higher for people whose partners are also volunteers. For those whose partners volunteered in the same year, retirement increases the chance of own volunteering by 30% (Appendix Table A3.2). Also, the impact of retirement is higher for those who volunteered in the past. Controlling for dynamics, columns 3-4, confirms that previous volunteering experience is a very strong predictor of current activity (Appendix Table A3.3). However, including a lagged dependent variable leaves the retirement status coefficient unaffected, compared to the static specification. Hence, this indicates an autonomous impact of retirement on the probability of offering volunteering work.

5.2 Experiment

After providing baseline evidence and robustness using the survey data, we turn to the experiment to investigate the source of the retirement effect. Is it pure altruism or a lower cost of time?

As descriptives go, the sample is fairly gender balanced (111 males, 142 females) and the mean (median) age was 62.2 (63) years old. The majority (75%) completed the study over a phone interview, the rest opted into receiving a link over email and completing online. To preview the main result, in Figure 2 we present the unconditional mean amount that subjects kept for themselves, by group. Retirement indeed seems to have an effect, that is different (actually, opposite) to the raw effect of age. In the rest of this section, we seek to establish the effect econometrically.

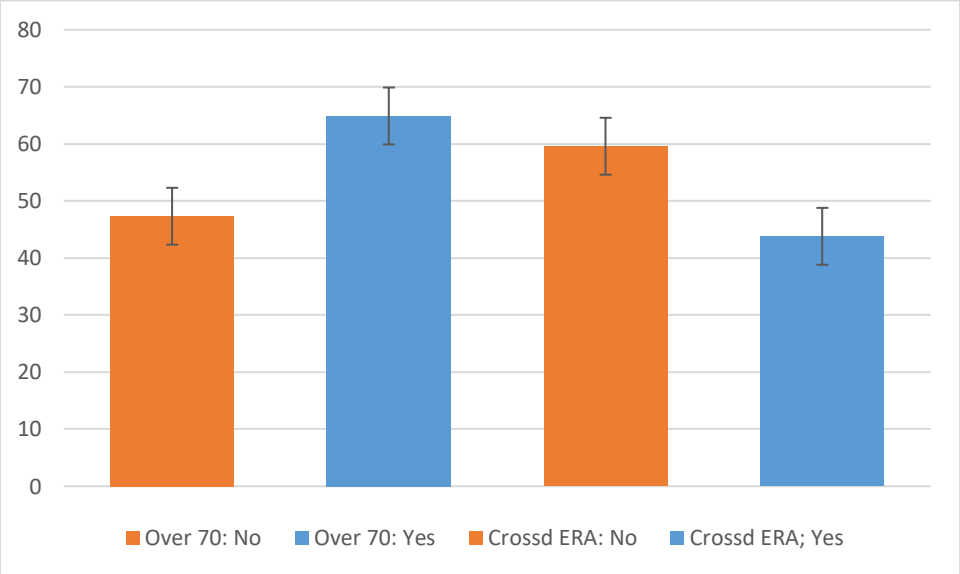


Figure 2. Mean money kept-to self (+/- standard error).

5.2.1 **Self-reported volunteering**

First, we use the experiment data to replicate the survey-based evidence. About 27% (25%) reported having participated in formal (informal) volunteering in the past year. This is comparable with the EU-SILC sample, where 27.3% (23.8%) of respondents offer informal (formal) voluntary work. However, a limitation here is that the ERA threshold does not vary. Experiment participants come from a single country (Greece) and the threshold remained unchanged (at 62 years old) during data collection. In the absence of exogenous variation in eligibility thresholds that would allow to predict individual retirement status, we estimate the following model using OLS:

$$y_i = a_1 Post62_i + a_2 \widetilde{age}_i + u_i \quad (3)$$

where *y* indicates whether participant *i* volunteers or not, *Post62* equals to 1 if the participant is older than 62 years old and 0 otherwise and $\widetilde{age}$ is a local linear age function. In this framework, the coefficient a_1 gives the change in the probability of volunteering at the age of 62, and it is interpreted as the Intent-To-Treat (ITT) effect of early retirement eligibility on volunteering.[22]

Table 3 confirms the survey-based evidence of crossing the ERA threshold being associated with an increased probability to volunteer. We find that being past the early retirement threshold increases the probability of having engaged in volunteering by over 20%. Moreover, consistently with the survey data results, the effect is driven by an increase in formal volunteering, estimated at 22-26% depending on specification -- while retirees behave similarly to working individuals with respect to informal volunteering.

Table 3. Retirement and prosocial behaviour: Evidence from experiment data.

	Total sample	Excluding early retired	Excluding early retired & -/+ 15 years around ERA
	[1]	[2]	[3]
Crossed ERA (outcome: voluntary work)	.222*** (.081)	.231** (.089)	.238** (.092)
Crossed ERA (outcome: formal voluntary work)	.227*** (.076)	.259*** (.084)	.265*** (.088)
Crossed ERA (outcome: informal voluntary work)	.084 (.073)	.097 (.078)	.098 (.081)
Observations	255	224	214
Local age function	Linear	Linear	Linear

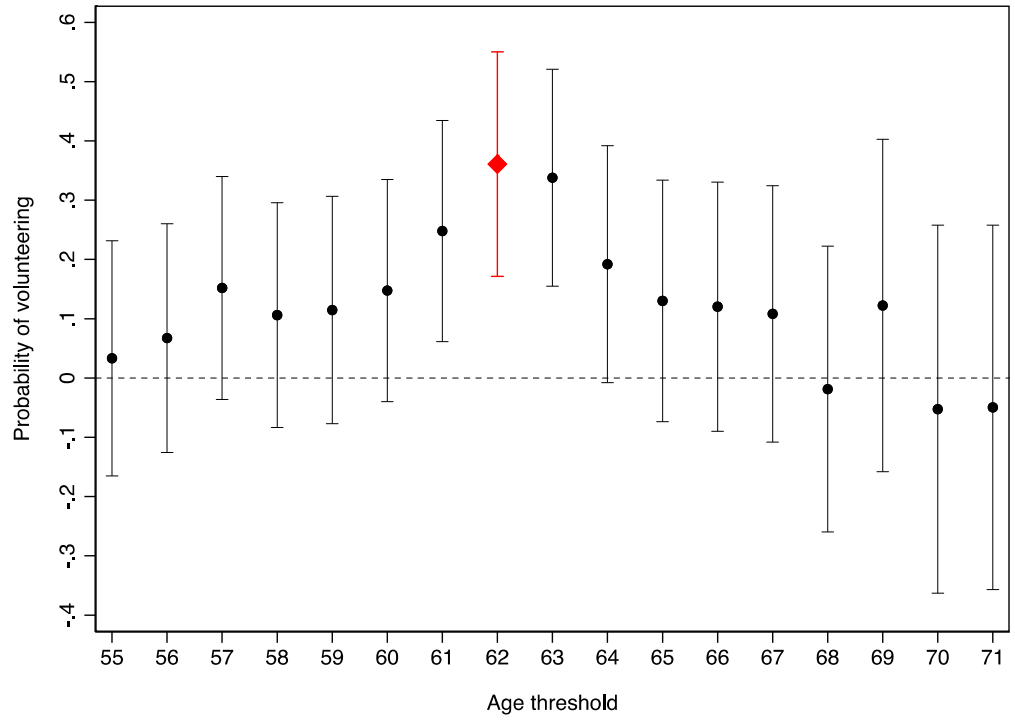
[22] Several studies use age-based thresholds to uncover the intent-to-treat impact of policies on various outcomes. Fitzpatrick and Moore (2018) adopted a similar framework to study the mortality effect of crossing the Social Security eligibility age. Results using the 2SLS estimator are comparable and available upon request.

Individual characteristics	Yes	Yes	Yes
Wave fixed effects	Yes	Yes	Yes

Source: Experiment. Notes: OLS estimates. Robust standard errors in parentheses. Individual characteristics include gender, higher education and age controls. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Moreover, to test whether this systematically increases with age, we specify a number of placebo tests, by setting alternative ERA thresholds (from 55 to 71 years old) and adjusting the treatment and local age functions in Equation (3) accordingly. The results are in Figure 2. The probability of volunteering is not statistically different from zero away from the cutoff. It sharply becomes positive and significant for ages 61-63 years old, taking its highest value for the age of 62 (0.361; std.err = 0.096) which is the ERA threshold applying to the experiment participants. As these are the ages where the retirement probability also jumps disproportionately (Figure 1) we read those results as the ITT effects of retirement on volunteering.

Figure 2: Intent-to-treat effect of retirement and placebo tests.



Source: Experiment. Notes: The actual ERA threshold is set at 62 years old (red line). Thresholds around that are placebo ones and the model specification in Equation (3) has been adjusted accordingly. Outcome is volunteering (either formal or informal) and the sample excludes those early retired. Real ERA is set at 62 years old. Vertical lines represent 95% CIs based on robust standard errors. Black dots and vertical lines correspond to fake ERAs. All estimates are conditional to individual characteristics and wave fixed effects.

5.2.2 **Incentive-compatible prosocial behaviour**

Effort

Most of the participants chose to produce effort (to earn, gift or donate money) whilst a minority (n=47) refused to take part. Over three quarters (76.7%) of those produced effort chose to donate earnings to charity, whilst the rest of them (23.3%) opted to keep the earnings for themselves or give them to a friend or relative (Appendix Figure A4.1). Among the charities, the cancer research one attracted most in-kind donations overall and, also, highest effort intensity.

The relationship between the effort intensity and earnings recipient was significant in the OLS analysis (model 1, Appendix Table A4.1). Overall, effort intensity was significantly lower among retirees compared to non-retirees, which is expected given that any task is likely to become more difficult with age. People who participated online, compared to those participated by phone, provided significantly more effort. We verified that retirees were not more likely to complete the study by phone (model 2, Appendix Table A4.1).

Money

Money donations were multimodal. The majority of participants chose to keep, gift or donate sums of €0, €100, or €200 (a handful of people did not participate in the lottery). On average, participants chose to keep €52.124 to themselves, but, as expected, there was a high variation in these amounts (s.d=80.075). We use winnings-kept-to-self as the main outcome variable, which is the reverse of winnings-given away[23] In line with the pattern observed in the in-kind donations above, the cancer research charity attracted most monetary donations compared to other charities, as well as the highest shares of the total lottery pot (Appendix Figure A4.2).

Retirement and prosociality

Next, we test if retirement increases prosociality by comparing the amount of winnings that retirees and non-retirees intend to keep for themselves (as opposed to donating to charities or family/friends). A decrease in money-to-self would indicate that retirement leads to increased prosocial gifting across both in-kind and monetary domains. Results in Table 4 support the hypothesis of increased prosociality driving the increased volunteering at retirement. Those eligible for retirement keep on average between €40-€56 less to themselves, compared to those not eligible (columns 1-3). These choices of monetary gifts are also significantly associated with choices of the in-kind donation (column 4). The experimental subjects kept on average €41 in expected lottery winnings for every €1 kept of real-effort task earnings. Of course, the real-effort earning of up to €5 allows for value-signalling, hence we are careful to not interpret this result beyond the outcome consistency.

Table 4. Monetary and in-kind contributions upon retirement: Evidence from experiment data.

	Total sample	Excluding early retired	Excluding early retired & using -/+ 15 years around ERA

23 We also consider an alternative outcome variable which is the difference in money-to-charity and money-to-self which yields similar results.

	[1]	[2]	[3]	[4]
Crossed ERA	-39.718** (17.224)	-46.034*** (18.639)	-55.997*** (19.788)	-57.590*** (18.151)
Real-effort earnings (in €) kept to self	-	-	-	41.614*** (3.348)
R-squared	.059	.060	.065	.240
Observations	249	219	209	209
Local age function	Linear	Linear	Linear	Linear
Individual characteristics	Yes	Yes	Yes	Yes
Wave fixed effects	Yes	Yes	Yes	Yes

Source: Experiment. Notes: OLS estimates. Outcome is lottery winnings (in €) kept for self. Individual characteristics include gender, higher education and age controls. Robust standard errors in parentheses. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. [a] €0-€5.0, calculated based on 28 units of real-effort task with €5.0 maximum earnings.

Overall, the data provided consistent evidence that transition to retirement (and retirement eligibility) increases the likelihood of engaging in prosocial activities. Moreover, this increase is due to enhanced prosociality rather than merely due to having more free time. Given that (a) these activities have been shown to be beneficial for both individual well-being and societal welfare, and (b) population ageing will intensify, policy interventions should aim at increasing participation in post-retirement unpaid work.

6 Concluding Remarks

Retirement is one of the major single lifestyle shifts in most people's lives, yet not much is known about its effect of preferences. A possible reason for this knowledge gap is the endogeneity of the retirement choice, combined with the fact that many relevant factors change synchronously to retirement. Lab experiments would be optimal to control important factors, but simulating the retirement experience is hardly feasible in the lab (given the major changes in income and passage of time involved). Our paper addresses this by sampling directly from the population of people who experienced retirement and tapping directly into the preference change. Using large scale survey data from European countries we find evidence of volunteering increasing substantially upon retirement. We build on this evidence by using an incentivised experiment to uncover the causal links in this behavioural change.

In the literature, social preferences are usually assumed to be stable, as is the case with any fundamental economically relevant trait. Any preference shifts that have been shown to date are driven by major negative lifestyle shocks, e.g. military conflicts, that are not common for most populations. This paper is the first to identify the impact on preferences of a mild but globally relevant shock, retirement. Combining large scale survey data and controlled, incentivised experiments we separate the effect of retirement from other factors, like age, on two

manifestations of prosociality: volunteering and cash donations. We find retirement does not just lead to people donating more of a resource that they have plenty of, time. Retirees also donate more in cash, although retirement presumably lowers their endowment in that dimension. All things considered, retirement seemingly *makes you a better person*.

Given the continuing population ageing in the West, but increasingly other countries too, our findings are policy relevant. Reforms aiming to change (almost without exception, raise) the average retirement age have to take into consideration the effect on overall welfare. Even though economists often attach a zero wage to various prosocial activities, e.g. volunteering, the implications of raised prosociality for the economy are substantial. Survey evidence suggests that these activities represent a considerable part of the overall labour supply and generate value. Although disengaged from paid employment, retirees can have significant contributions to the public good and reduce social costs through such activities, apart from the benefits on their own well-being. Our evidence on time and effort allocation decisions of retirees, as well as their productive capacity, suggest that the gain for pension systems from higher retirement ages, will come at a significant loss for members of society benefiting from retiree volunteering, as well as from direct money transfers. Raising the retirement threshold does not only increase the working proportion of the population, it also decreases the retired and volunteering proportion of population - which should be considered.

In studies like this, there is always a subtle balance to strike between external validity and uncovering causality. In the experiment we find strong evidence for a change in preferences, in survey data we find that this likely extends across countries and cultures. More research is needed to investigate how exactly the retirement effect changes across cultures, and also what the exact goals of retiree charity are. In our sample retirees donated substantially to cancer related charities but less for refugees and the environment (see Appendix Figure A10), indicating that their preferences might be influenced in part by awareness of issues.

A major question remains as to *why* retirement would make you nicer to others? Is this shift driven by feeling happier about shifting into a more relaxed part of life or is it reciprocal to the benefits retirees are now receiving, from the working population? This question remains open for future research, but we conjecture that retirees benefitting from pension plans with higher replacement rates (i.e. people who are presumably getting more back from society comparing to what they gave) would be exhibiting a stronger pro-social effect.

Identifying how exactly retirement leads to preference change, can also help identify other shocks that affect preferences. Transition to unemployment, for example, is similar to retirement in that people experience a lifestyle shift, with more free time and lower income. However, this shock is often involuntary, unanticipated and mostly perceived by the individual to be unfair. Do unemployed people volunteer more? If unemployment makes people more miserable, does it lead to lower prosociality and, if so, would this effect be mitigated by more generous unemployment benefits? These questions remain open for future research.

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Appendix

A1 Survey data

Table A1.1 Early retirement ages and sample sizes for countries in the EU-SILC and SHARE data.

Country	EU-SILC sample	SHARE sample	2011	2013	2015	2017
Austria	3,236	8,740	M: 62; F:58	M:64; F:59	M:64; F:59	M:65; F:60
Belgium	2,936	11,304	60	60	60	62
Switzerland	3,700	7,080	M:63; F:62	M:63; F:62	M:63; F:62	M:63; F:62
Cyprus	2,323	576	63	63	63	63
Czech Republic	5,122	11,984	60	60	60	60
Germany	7,483	9,151	63	63	63	65
Denmark	2,259	8,045	65	65	65	65
Estonia	3,408	11,484	60	60	60	60
Greece	6,781	3,380	M:60; F:55	M:60; F:57	62	62
Spain	5,713	7,689	61	61	61	61
Finland	3,464	1,301	63	63	63	63
France	6,523	9,543	60	60	61	61
Ireland	1,498	-	66	66	66	66
Italy	5,452	6,290	M:62; F:61	M:63; F:62	M:63; F:62	M:63; F:62
Luxemburg	1,834	2,093	57	57	57	60
Netherlands	3,114	-	65	65	65	65
Norway	1,752	-	67	67	67	67
Poland	5,813	4,579	M:65; F:60	M:65; F:60	M:65; F:60	M:66; F:61
Portugal	4,686	1,933	55	55	65	65
Sweden	1,749	7,616	61	61	61	61
Slovenia	2,821	6,846	M:58; F:57	M:58; F:57	M:59; F:58	M:60; F:59
Slovakia	4,028	1,548	60	60	60	60

Total	85,695	121,182	-	-	-	-

Source: Social Security Programs Throughout The World; OECD Pensions At A Glance.
Notes: M is for Males and F for Females. Ireland, Norway and the Netherlands are not included in the SHARE estimation samples. Sample sizes correspond to the baseline estimation samples. For the EU-SILC sample, figures refer only to 2015.

A2. Outcome variables and descriptive statistics

A2.1. Volunteering indicators

Within the official International Labour Organisation (ILO) definition of volunteering, EU-SILC data measures two sub-types of volunteer work: informal and formal. The first prosocial behaviour indicator is about participation in formal voluntary work. Respondents aged 16 years old and over reported if, during the last 12 months, they carried out any unpaid non-compulsory work for or through an organisation, a formal group, a club as well as for a charitable or religious organisation. Activities related to people, the environment, animals and the wider community, and attending meetings related to those activities were considered. Unpaid internships in profit-making companies were not considered. Respondents justified their non-participation in formal volunteering due to lack of interest, lack of time or other reasons. Their answers were grouped to construct a binary outcome indicating participation or not to formal volunteering.

The second prosocial indicator records participation in informal voluntary activities. Respondents aged 16 years old and over in the 2015 EU-SILC wave were asked whether, during the last 12 months, they undertook any informal unpaid activities that were not arranged, organised or motivated by any organisation. These activities include helping other people including family members living outside their household (e.g. cooking for others, taking care of people in hospitals or at home, taking people for a walk, shopping etc.), taking care of homeless or wild animals, and participating in other informal voluntary activities (cleaning a beach, a forest etc.). Informal volunteering excludes any activity related to own household, work or undertaken within charitable organisations. Respondents also reported the reasons for not being engaged in informal volunteering, i.e. due to lack of interest, time or other reasons.

A.2.2. Other prosocial behaviour indicators

The 2015 EU-SILC wave also reports if individuals participated in political or local interest group activities, public consultation, peaceful protest, petition signing, participation in demonstration, writing letters to politicians or the media. Active participation using the internet and attending meetings related to these activities were also considered. Voting and participation in elections were not considered. Not participating in such activities was justified due to lack of time, interest or other reasons. An active citizenship indicator was constructed using those responses. Similarly, the 2016 EU-SILC wave collected information on providing care or assistance to others (excluding childcare). Three outcome variables were constructed using those responses: (a) whether the respondent provided care or assistance to people from inside or outside their household relative to those who not engaging in such activities; (b) whether someone provided care or assistance only to household members relative to those who do not provide any care or

assistance; and (c) whether someone provided care or assistance only to people from outside the household relative to those who do not engage in any caring activity.

A2.3 Descriptive statistics

Table A2.1 presents descriptive statistics, by retirement status, on the outcome variables available in the surveys and experiment data. Statistics are weighted by the respective survey weights where relevant. As throughout our analysis, samples have been restricted to include individuals within a 10-year window around their country, survey year gender-specific ERAs.

Table A2.1 Descriptive statistics on outcome variables.

	Retirees	Non-retirees	Difference	Observations
	[1]	[2]	[3]	[4]
Voluntary work (SHARE)	.207	.184	.023***	-
Observations	70,557 (58.2%)	50,625 (41.8%)	-	121,182
Informal voluntary work (EU-SILC)	.294	.256	.038***	-
Observations	41,291 (47.1%)	46,477 (52.9%)	-	87,768
Formal voluntary work (EU-SILC)	.242	.234	.008*	-
Observations	41,293 (47.1%)	46,475 (52.9%)	-	87,768
Provide care inside household (EU-SILC)	.068	.066	.001	-
Observations	42,207 (49.3%)	43,383 (50.7%)	-	85,590
Provide care outside household (EU-SILC)	.091	.100	-.010***	-
Observations	43,454 (48.4%)	46,264 (51.6%)	-	89,718
Active citizenship (EU-SILC)	.147	.167	-.020***	-
Observations	41,290 (47.1%)	46,462 (52.9%)	-	87,752
Formal voluntary work (experiment)	.315	.211	-.104*	-
Observations	143 (56.7%)	109 (43.2%)	-	252

Source: EU-SILC; SHARE; experiment. Notes: EU-SILC waves: 2015, 2016; SHARE waves: 4, 5, 6, 7; Experiment waves: all. Means are weighted by the respective survey weights (EU-SILC and SHARE). Survey samples cover individuals 10 years around their country, survey year and gender-specific ERAs.

A3 What drives volunteering after retirement? Survey data

A3.1 Observable characteristics

We also examine, by splitting the survey samples accordingly, whether the impact of retirement varies with observable characteristics (Table A3.1). The baseline effect on volunteering is driven by females, especially in SHARE, and this is confirmed in the EU-SILC data. However, the EU-SILC data suggest that retirement affects informal volunteering for females and formal volunteering for males. Volunteering after retirement is more likely for those who have completed tertiary education. Regarding the retirement impact on informal volunteering, the parameter estimate is higher, although significant at the 10%, for those having completed only secondary education.

Results by subjective health status indicate the existence of a health gradient behind the baseline effects. Individuals were grouped based on having reported bad or very bad health status, or fair, good or excellent health. The retirement effect is strong and positive only for those with good self-reported health status, and it is not significant for poor health individuals. This is confirmed when the samples are split using a variable indicating whether respondents are limited in their activities due to health issues. In both samples, the baseline effect is driven by those reporting that their activities are not limited due to health-related issues. In the case of formal volunteering the only significant estimate comes from those reporting not being severely limited in their activities due to health problems. For those severely limited due to health issues, the estimated parameters are either very low or negative, and always not significant.

Table A3.1. Retirement and prosocial behaviour: Analysis by group.

	Voluntary work (SHARE sample)	Voluntary work (EU-SILC sample)	Informal voluntary work (EU-SILC sample)	Formal voluntary work (EU-SILC sample)
	FE-2SLS	2SLS	2SLS	2SLS
Sub-group:	[1]	[2]	[3]	[4]
Males	.055 (.053)	.071 (.049)	.038 (.040)	.081* (.044)
Females	.150*** (.047)	.087* (.051)	.081* (.046)	.062 (.044)
Primary or less education	.168 (.110)	-.104 (.092)	-.063 (.082)	-.007 (.069)
Secondary education	.026 (.042)	.079* (.042)	.065* (.036)	.043 (.036)
Tertiary education	.259*** (.076)	.191*** (.092)	.112 (.078)	.235*** (.088)
Fair/Good/Very Good health status	.093** (.037)	.091** (.037)	.063** (.032)	.087*** (.033)
Bad/Very Bad health status	.052 (.320)	-.038 (.131)	.063 (.103)	-.109 (.112)

Not limited in activities due to health	.099** (.048)	.079* (.042)	.060 (.036)	.058 (.038)
Not severely limited in activities due to health	.072 (.084)	.099 (.075)	.078 (.067)	.156** (.065)
Severely limited in activities due to health	.119 (.179)	-.039 (.125)	.006 (.107)	-.080 (.108)

Source: EU-SILC; SHARE. Notes: Results are weighted using survey weights. Models use a local linear age function, and control for the usual set of individual characteristics and fixed effects. Robust standard errors in parentheses. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

A3.2 Social network and spillover effects

Individual social networks cannot be identified in the data. Nevertheless, using the SHARE sample we examine whether a person's volunteering activity is affected by their partner's activity. Table A3.2 (Panel A) displays the FE-2SLS results using a local linear age function and a 10-year window around ERA. Column 1 confirms the positive retirement impact and demonstrates a sizeable positive effect for individuals whose partner is volunteering. Then, the sample is split based on the partner's volunteering activity during the same year (columns 2-3). Retirement has a positive effect regardless the partner's prosocial behaviour, however, its impact is considerably higher when partners have also volunteered during the same year. Furthermore, the longitudinal design of the SHARE data allows to calculate how intense is the partner's volunteering activity across the 4 waves of the survey. Column 5 suggests that retirement increases volunteering when partners of retirees tend to volunteer more often. The results hold when we use samples of individuals whose partners' retired more than 2 and more than 3 times in the period.

Next, we empirically test the hypothesis that transitions to retirement could cause spillover effects on prosocial behaviour within the household. We construct a binary indicator on whether an individual's partner is retired and instrument it the usual way, i.e. a dummy on having crossed the respective ERA. Panel B in Table A3.2 displays the results. There is a strong first-stage evidence for partners as well, however, own volunteering is not affected by partner's retirement (column 1). Controlling for both own and partner's retirement (column 2) confirms this result; the probability of volunteering is only affected by own retirement. Column 3 provides further evidence showing that own retirement does not have an impact of partner's volunteering. In columns 4-5 the sample is split based on partner's retirement status. Own retirement does not affect the volunteering probability for individuals whose partners are retirees (column 4). On the contrary, own retirement has a strong positive relationship with volunteering for those whose partners are still in the labour market. This could be an indication of a substitution effect for couples of retirees towards more home-oriented activities, in line with the evidence presented by Stancanelli and Van Soest (2012).

Table A3.2: Retirement and prosocial behaviour: Couple complementarities.					
	[1]	[2]	[3]	[4]	[5]
	Panel A: The role of partner's volunteering activity				
	Total sample	Partner did not volunteer in same year	Partner volunteered in same year	Partner did not volunteer in period	Partner

					volunteered ≥1 time in period
Retired	.113** (.048)	.096* (.050)	.302* (.159)	.083** (.037)	.191** (.089)
Partner volunteering	.123*** (.013)	-	-	-	-
Observations	51,249	39,130	7,329	79,676	19,164
	Panel B: The role of partner's retirement				
	Own volunteering (total sample)	Own volunteering (total sample)	Partner's volunteering (total sample)	Own volunteering (partner retired)	Own volunteering (partner not retired)
Retired	-	.115** (.057)	.048 (.049)	.095 (.111)	.224*** (.080)
Partner retired	.035 (.052)	-.012 (.061)	-	-	-
First stage: Own age>ERA	-	.231*** (.013)	.241*** (.013)	.184*** (.020)	.193*** (.019)
First stage: F-statistic	-	97.88	183.03	82.54	96.50
First stage: Partner's age>ERA	.239*** (.013)	.232*** (.013)	-	-	-
First stage: F-statistic	171.99	93.97	-	-	-
Observations	52,212	52,212	52,093	19,271	29,570

Source: SHARE. Notes: FE-2SLS estimates. Results are weighted using survey weights. Models use a local linear age function and control for the usual set of individual characteristics and fixed effects. Robust standard errors in parentheses. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Another hypothesis could be that prosocial behaviour post-retirement is affected by own previous experience and activity. This point has been raised by Erlinghagen (2010) who argued that the effect of retirement on volunteering is rather exaggerated and it is own previous experience that determines prosocial behaviour after leaving the labour market. The longitudinal design of the SHARE data allows to test this argument. Therefore, a dynamic version of Equation (1) is estimated by including a one-year lagged dependent variable alongside the rest regressors and fixed effects. Due to the fact that the sample consists of thousands of individuals followed for a relatively short period of time, i.e. 4 waves, the 2SLS and the 2SLS-FE estimators will be upwards and downwards biased, respectively (Nickell, 1981).[24] In cases with "small T, large N" panels, fixed effects, serial correlation within individuals, endogenous regressors and, possibly, predetermined lagged explanatory variables, the system Generalised Method of Moments (GMM) estimator has

[24] In the 2SLS case, the lagged dependent variable would be correlated with the individual fixed effect in the error term. Demeaning the data would eliminate the time invariant effect, however, the lagged dependent variable will remain correlated with the disturbance term. Even if the number of individuals is large, this sort of correlation induces a bias of order $1/T$, which is quite sizeable in small panels as in here where T=4 (Nickell, 1981).

been shown to be quite consistent; especially when T ≥ 3 (Arellano and Bond, 1991; Blundell and Bond, 1998; Bond, 2002; Roodman, 2009).

Table A3.3 (Panel A) displays the results. For reference, results for a static specification are also provided. SHARE is not a balanced panel of individuals, hence results are reported using both the original panel, a more balanced version of it where individuals are observed at least in 3 waves, and a fully balanced panel of individuals observed in all waves, i.e. T=4.[25] Regarding the static specifications, the results confirm a positive effect of retirement on volunteering activity. Although the GMM evidence suggests that the relationship is weaker relative to the 2SLS-FE estimates, the retirement status coefficient estimates are statistically significant at the 1%. Controlling for dynamics, columns 3-4, confirms that previous volunteering experience is a very strong predictor of current activity. However, including a lagged dependent variable leaves the retirement status coefficient unaffected, therefore indicating that there is an autonomous impact of retirement on the probability of offering volunteering work, regardless of past activity.[26]

Table A3.3: Retirement and prosocial behaviour: Past activity and volunteering frequency.

	Panel A: The role of past volunteering activity			
	[1]	[2]	[3]	[4]
Retired	.024*** (.007)	.040*** (.012)	.028*** (.008)	.039*** (.012)
Volunteered last year	-	-	.212*** (.022)	.227*** (.026)
Panel time dimension	$T \geq 1$	$T = 4$	$T \geq 1$	$T = 4$
First stage: F-statistic	83.38	28.67	4.49	38.12
Instrument count	28	21	29	25
Hansen test	10.20	16.67	15.42	27.64
Observations	121,182	44,244	61,311	31,407
	Panel B: The role of volunteering frequency			
	Volunteer less than every month	Volunteer almost every month	Volunteer almost every week	Volunteer almost every day
% retired among those who:	48.20	55.12	67.24	70.51

[25] Results are robust when using samples with $T \geq 3$. Also, we obtained FE-2SLS estimates using subsamples of SHARE individuals observed in at least 3 and all 4 waves. All first-stage relationships are strong and the impact of retirement is higher as compared to the baseline results using the total -unbalanced- panel. In the case were $T=4$ the impact of retirement is statistically significant even when higher order local functions of age are used at both sides of the cutoff. All tests are available upon request.

[26] Moreover, past volunteering activity is a stronger predictor of today's behaviour in the case of non-retirees. After splitting the sample by retirement status (and using those within 10 years before or after their ERA), the coefficient of the lagged dependent variable is .224 (standard error = .039) for non-retirees and .198 (standard error = .026) for those retired.

% volunteer among retired:	4.07	5.66	8.29	3.39
Retired	-.005 (.007)	.001 (.008)	.047*** (.010)	.011* (.006)
Volunteered last year	.070*** (.020)	.074*** (.020)	.126*** (.024)	.037** (.016)
Panel time dimension	$T = 4$	$T = 4$	$T = 4$	$T = 4$
First stage: F-statistic	5.96	9.65	26.20	6.71
Instrument count	25	25	25	25
Hansen test	15.53	18.61	13.01	10.37
Observations	25,823	26,350	27,080	25,116

Source: SHARE. Notes: System Generalised Method of Moment (GMM) estimates. Results are weighted using survey weights. Models use a local linear age function and control for the usual set of individual characteristics and fixed effects. In dynamic specifications, lagged variables are instrumented using instruments dated *t*-2 and earlier. Samples include individuals within 10 years at both sides of the ERA cutoff. Windmeijer-corrected cluster-robust standard errors in parentheses. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Another concern could be around the impact of retirement on the intensity -or frequency- of offering unpaid work. Although the actual number of volunteer hours is not available, SHARE respondents reported how often they provided voluntary or charity works within the last 12 months. Those who volunteered, were given the following options: (a) almost every day; (b) almost every week; (c) almost every month; and (d) less often. Based on these responses, four binary indicators are constructed. Those not volunteered were the reference group in each case. Then, the dynamic version of Equation (1) was estimated, using those four indicators as outcomes and controlling for past volunteering behaviour (regardless of its frequency and treating it as predetermined). Panel B of Table A3.3 displays the system GMM estimates. The fraction of retirees among volunteers increases with the frequency of volunteering activity. For example, 48% of the sample of those who volunteer less than once per month (column 1) are retirees. However, the fraction of retirees in the sample of those who report volunteering activity almost every day rises to 70%. This could be partially attributed to increased time availability post-retirement, although a distinction in the SHARE sample among volunteering types, i.e. formal, informal, household oriented or not, would be quite useful to look deeper in their activity patterns. The prevalence of volunteers in the sample of retirees follows a hump-shaped pattern as volunteering frequency increases. More specifically, 4% of retirees volunteer less often than every month, 8.3% of them volunteer every week, and 3.4% volunteer almost every day.

Using the sample of individuals observed in all 4 SHARE waves, reveals that the impact of retirement also follows a hump-shape profile as the frequency of volunteering activity increases. The effect is zero in columns 1-2 where only those volunteering every month or less often are used. However, retirement has a positive and significant impact on volunteering almost every week, relative to non-volunteers (column 3). There is also a lower, and less precisely estimated, positive impact of retirement on the probability of volunteering almost every day. Moreover, past

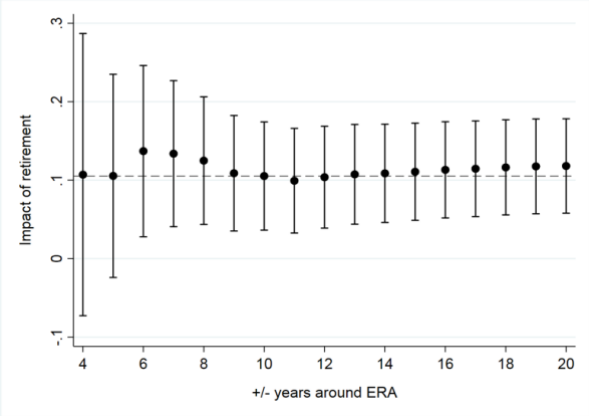
volunteering activity is always a strong predictor of current volunteering frequency – especially for those volunteering almost every week.

A3.4 Robustness checks

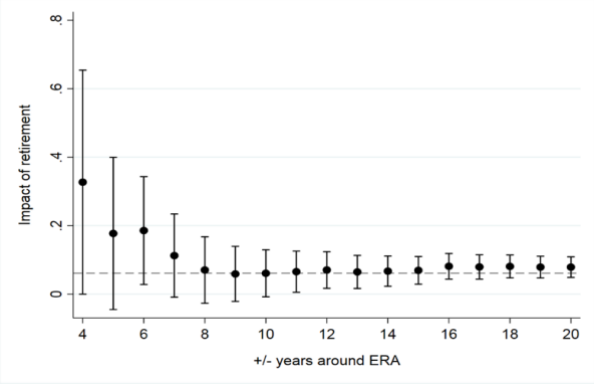
The results so far have been estimated using a 10-year bandwidth around the ERA cutoff. To check their sensitivity to the bandwidth choice, baseline models using a local-linear age function are re-estimated using a range of alternative bandwidths. Figure A3.2 displays the results. 2SLS coefficients are plotted with their 95% confidence intervals. Horizontal dashed lines represent the baseline effects. For all volunteering indicators, the results are robust alternative bandwidths although point estimates become noisier as time windows narrow.

Figure A3.2. Retirement and volunteering using alternative bandwidths around ERA

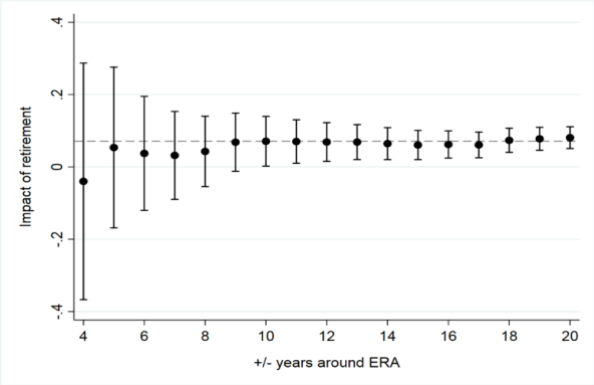
Panel A: Voluntary activity (SHARE)



Panel B: Informal voluntary work (EU-SILC)



Panel C: Formal voluntary work (EU-SILC)



Source: SHARE; EU-SILC. Notes: 2SLS (EU-SILC) and FE-2SLS (SHARE) estimates using a local linear age function. Horizontal dashed lines correspond to the baseline effects (Table 2). Vertical lines represent the 95% confidence intervals based on robust standard errors.

Another robustness test is to replace the actual ERA for each individual with fake ones ranging a few years back. This will indicate whether prosocial behaviour is affected before crossing the official ERA, because individuals might opt to retire earlier, or they start adjusting their behaviour as they prepare to exit from the labour market. Table A3.4 displays the results. Regarding informal volunteering, there are some statistically significant estimates up to four years before the actual ERA that disappear for earlier years. The results are in accordance with Mutchler *et al.* (2003) who reported that informal volunteering is not affected by working status, mainly due to its obligatory nature. Moreover, they argued that as people grow older and retire, they should be receiving less requests for informal help because their social networks shrink post-retirement. This could also be implied by the diminishing parameter estimates in column 1; recall that the actual baseline effect is .061, i.e. lower than the placebo one estimated for *t*-1.

However, there are no significant estimates when placebo ERAs are used when formal volunteering is the outcome (column 2). This indicates that people tend to change only their informal volunteering behaviour as they approach their ERA. This is not the case for formal volunteering as the latter is more likely to be more structured and scheduled, and hence less compatible with working and commuting patterns. 2SLS and 2SLS-FE estimates for volunteering using the SHARE sample are also positive and significant up to four years before the actual ERA but the effect disappears after that. This could be conflating retirement implications on informal volunteering, however, no further disaggregation into volunteering types is possible as in the EU-SILC data. Therefore, these results can provide some support to the claim that people tend to change their prosocial behaviour as they as they approach their ERA, at least regarding the incidence of their volunteering and charity activity.

Table A3.4: Retirement and prosocial behaviour: Falsification tests.

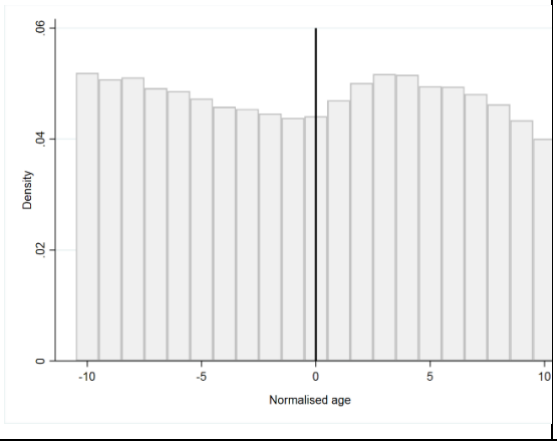
	Informal volunteering (EU-SILC sample)	Formal volunteering (EU-SILC sample)	Volunteering (SHARE sample)

	2SLS	Obs.	2SLS	Obs.	2SLS	Obs.	FE-2SLS	Obs.
Fake ERA set at:	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
t-1	.068** (.033)	84,436	.065* (.033)	86,435	.084*** (.024)	116,691	.094*** (.036)	94,644
t-2	.088** (.037)	86,821	.058 (.037)	86,820	.082*** (.026)	111,370	.100*** (.038)	89,707
t-3	.118** (.047)	86,845	.063 (.047)	86,848	.088*** (.030)	105,541	.092** (.043)	84,335
t-4	.154** (.067)	86,831	.045 (.068)	86,829	.110*** (.041)	99,051	.106** (.052)	78,355
t-5	.202 (.123)	86,642	.094 (.125)	86,648	.117 (.075)	92,299	.124 (.081)	72,300
t-6	.415 (.440)	86,229	.111 (.447)	86,241	.356 (.302)	85,052	.330 (.200)	65,866

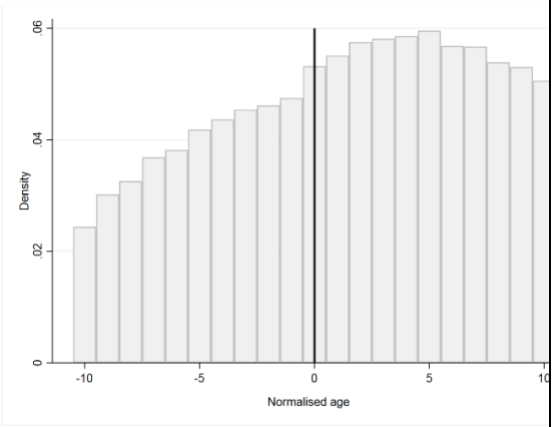
Source: EU-SILC; SHARE. Notes: Models are weighted using survey weights. Models use a local linear age function and control for the usual set of characteristics and fixed effects. Robust standard errors in parentheses. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Figure A3.1. Density of the forcing variable around the cut-off.

EU-SILC sample



SHARE sample



Source: EU-SILC; SHARE.

A4 Experiment data

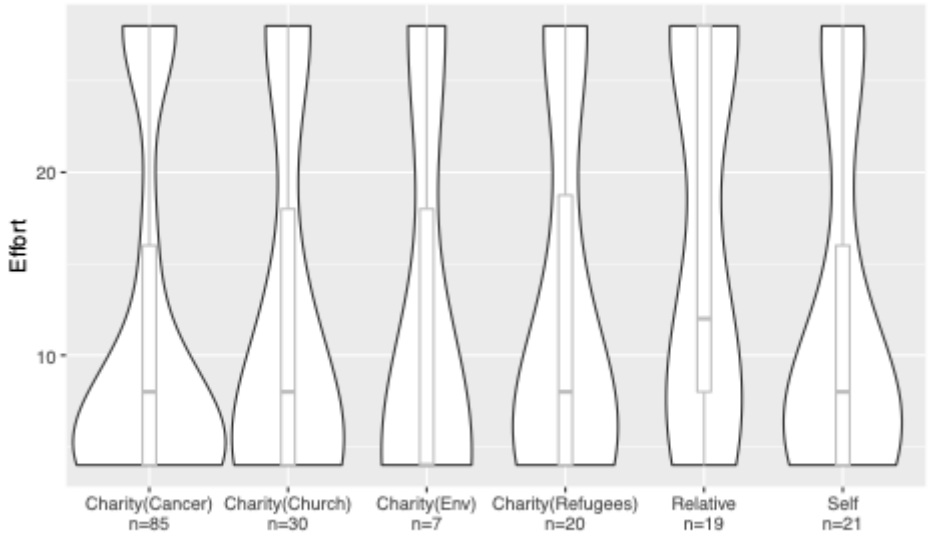
Table A4.1 Real effort (€) and recipients.

	In-kind contribution (€0-5)a	Completed study over email (vs phone)
	[1]	[2]
Retired	-2.822** (1.401)	.051 (.085)
Recipient: charity (Ref category: Self)	6.831*** (1.034)	
Recipient: Relative/Friend	10.127*** (2.386)	
Completed study over email (vs phone)	13.147***(1.648)	
Age	.068 (.095)	-.015*** (.005)
R-squared	.531	.378
Observations	253	253
Local age function	Linear	Linear
Individual characteristics	Yes	Yes
Interview wave fixed effects	Yes	Yes

Source: experiment. Notes: Robust standard errors in parentheses. Asterisks ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

a Calculated based on 28 units of real-effort task with maximum earnings of €5.

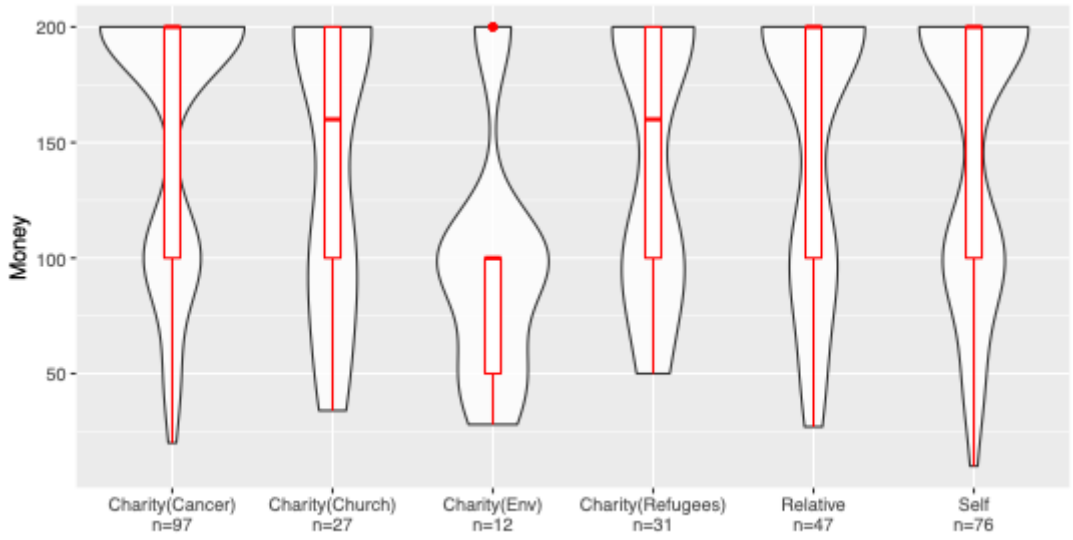
Figure A4.1. Effort intensity by recipient.



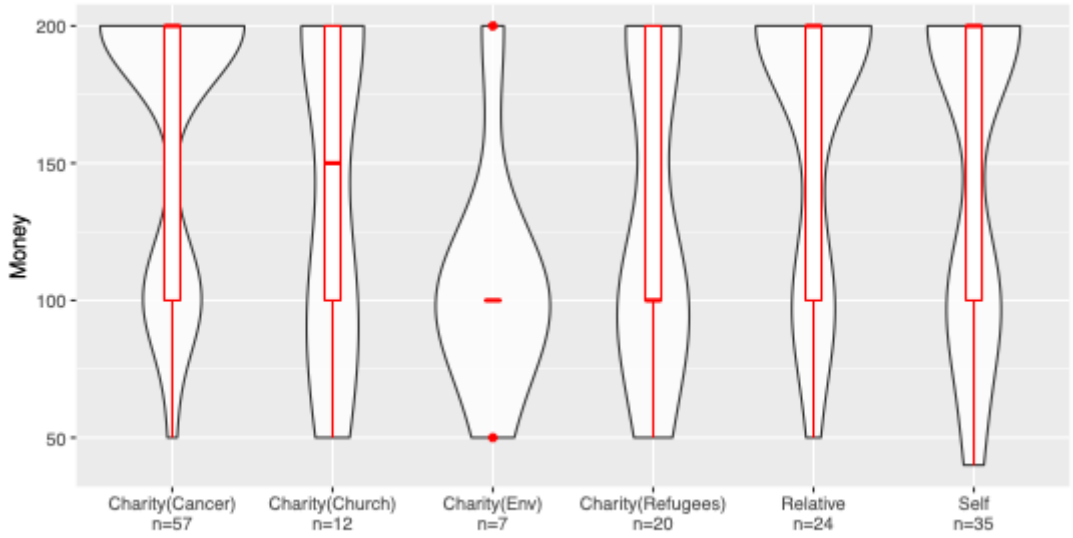
Notes: The vertical box indicates interquartile range, with thick horizontal market for the median and whiskers indicating most extreme data points. The outer shape illustrates density of the distribution of observations. Vertical axis measure in number of completed tasks (0-28). Payment pro-rata, €5 for all 28 tasks.

Figure A4.2. Money allocations by recipient type.

Panel A: Total sample



Panel B: Retirees sub-sample



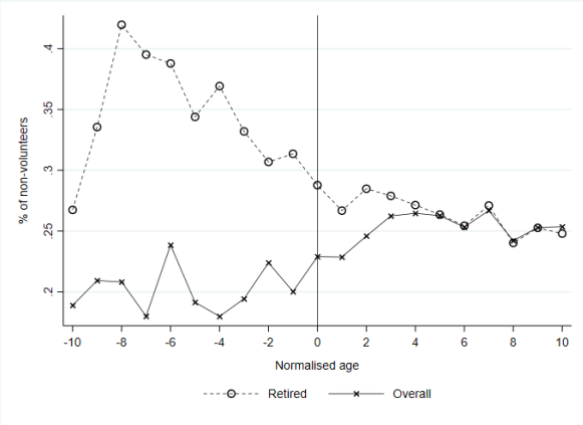
Notes: Vertical axes measure in Euros. Vertical boxes indicate interquartile range, thick horizontal markers the median, and whiskers the most extreme data points. The outer shape illustrates density of the distribution of observations.

A5 Reasons for not volunteering

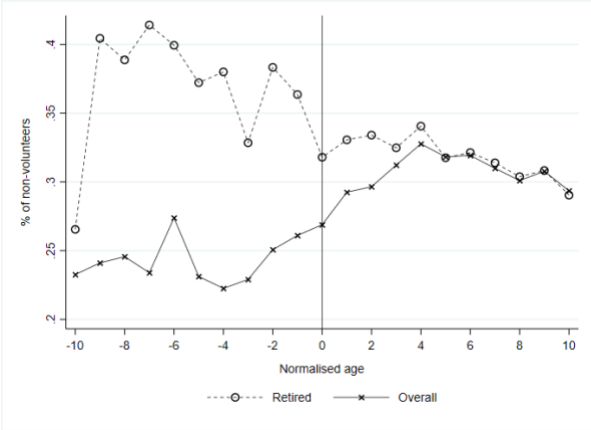
The EU-SILC asked respondents why they were not engaged in any kind of volunteer work, i.e. due to lack of interest, due to lack of time, or due to any other reason. Figure A5.1 graphs those trends by age. Among all non-volunteering individuals, the fraction of those being time-constrained decreases with age. Regarding non-volunteering retirees, the share of those being constrained by time, is small but relatively stable around ERA and starts decreasing quite late. Similar patters hold for those not engaged in volunteering due to other reasons. To rule out any health-related reasons, shares were also calculated using only those not being limited in their activities by some health condition but the trends are identical.

However, after crossing the ERA, there is a considerable increase in the fraction of those who do not volunteer, either formally or informally, due to lack of interest. The fraction of retirees not engaged in informal volunteering due to lack of interest decreases as the approach their ERA but to a much lesser extent after crossing it. Moreover, the fraction of retirees not offering formal voluntary work remains stable after crossing the ERA.

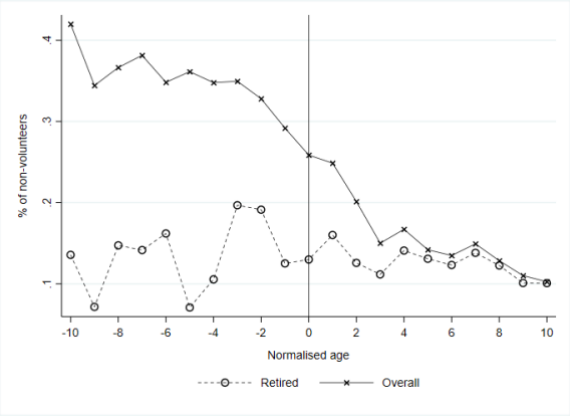
Figure A5.1. Reasons for not volunteering.	
No informal volunteering due to lack of interest	No formal volunteering due to lack of interest



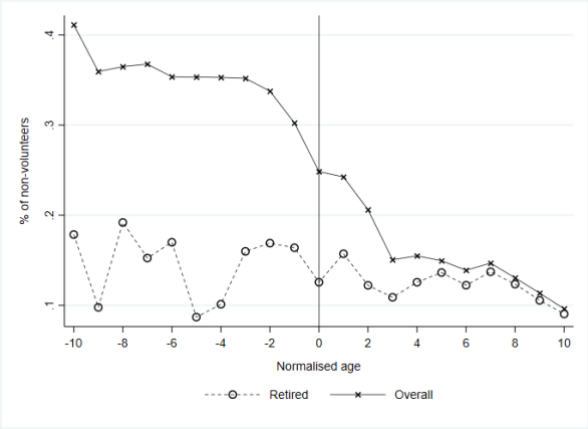
No informal volunteering due to lack of time



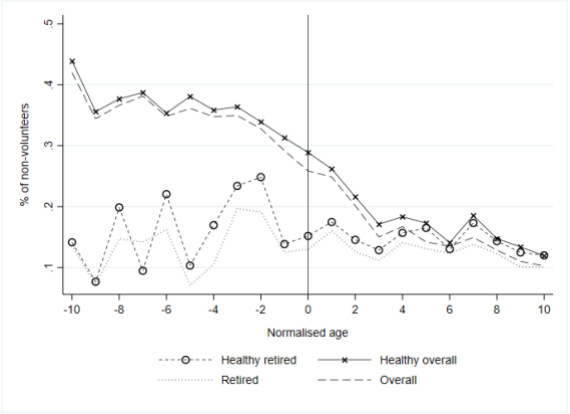
No formal volunteering due to lack of time

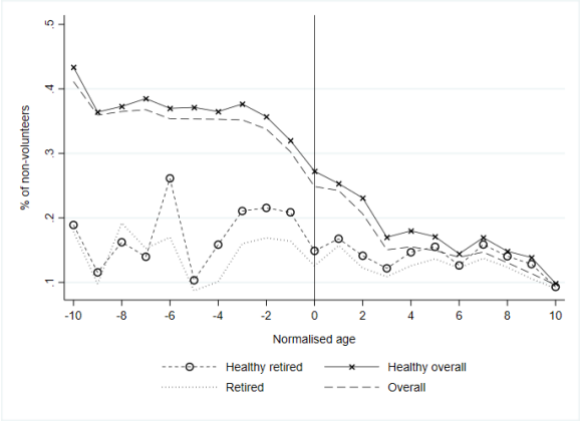


No informal volunteering due to other reasons



No formal volunteering due to other reasons





Source: EU-SILC. Notes: Means by normalised age are weighted using the survey weights. Overall refers to both retired and non-retired non-volunteers. Healthy refers to non-volunteers who report not being limited in their activities by any health-related conditions.