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**Working Paper**

## Stung by Pension Reforms: The Impact of a Change in State Pension Age on Mental Health and Life Satisfaction of Affected Women

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## ABSTRACT

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# Stung by Pension Reforms: The Impact of a Change in State Pension Age on Mental Health and Life Satisfaction of Affected Women

Several reforms increased the state pension age (SPA) in the UK and equalised it to age 65 for both men and women. We use panel data and a difference-in-difference approach to comprehensively analyse the direct and indirect effects of these reforms, investigating mechanisms for indirect effects. We also analyse the heterogeneity of the effects of smaller versus larger increases in SPA, by partnership status, as well as spill-over effects to male partners. Consistent with previous research, we find a positive impact of the reform on employment and labour force participation, but also large negative impacts on various aspects of personal, financial, and mental wellbeing. The effect is larger for women who have to wait longer to reach their SPA, and smaller for women with a partner (compared to those without a partner). The effect of the reform partially spills over to affected women partner's labour market participation. Our results can be generalised to other countries that are seeking to implement similar reforms.

**JEL Classification:** I31, J22, J26

**Keywords:** policy reform, retirement, labour supply, care supply, leisure, wellbeing

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## 1. Introduction

The gender effects of pension reforms are complex: in their report to the European Commission, Bettio et al. (2013) remarked that gender imbalance in pensions is affected by three separate sets of factors. The first is ageing: women have higher life expectancy and their past employment patterns typically differ substantially to those of men both in participation and remuneration (Costa Dias et al., 2016); in addition, the effect of family arrangements are also asymmetrically distributed as evidence on the child wage penalty indicates (Kleven et al., 2019). The second is past pension reforms and particularly the asymmetric effects occurring from the privatisation of risk that has accompanied the shift from public to benefit-based pension. The third is the effect of short-term pressures connected to the different responses of women and men to labour market changes and economic crisis.

Bettio et al. (2013) estimated the gross gender pensions gap (the difference in average pensions before tax between women and men over 65) for 2013 across Europe at an average of 39% (the figure for the UK was 45% in that year), and the corresponding figures when estimated with median pensions were 42% for the EU average and 36% for the UK. When looking at the real values of mean pensions, it becomes evident that only two countries, Bulgaria and Cyprus, had mean pensions that were above the poverty line (the UK was exactly at the poverty line). When compared with pay gaps, pension gaps are generally wider across countries but there is no systematic relationship between the two, since they refer to two different groups of people, with women now retired having probably experienced much wider pay gaps than younger women do. The UK belongs to the group of countries in which the pension system reproduces the labour market and amplifies – rather than reducing – gender inequality.

In addition to reduced working lives due to caring responsibilities, pay and career gaps, women also make up the majority of those giving and receiving late life care (McKenna, 2017). The pension gap can thus be seen as the cumulative outcome of gender inequalities accumulated over the life course, and is affected by gender norms of societies (Burkevica et al., 2015) so that an equalisation of state pension age still leaves women facing higher risks of poverty and in fact may exacerbate the very gender inequalities it seeks to redress.

Banks and Emmerson (2018), who have analysed the history of state pension policy in the UK since 1948, show that the generosity of the system rose over the period as whole but has fallen in recent years, and in contrast to many countries, there were generally never large implicit taxes on work arising from the state pension system. As a result, they found the system

to be now broadly neutral with regard to work incentives for men (for whom the system has been designed). The review by the UK Pensions Commission in 2004 observed that the UK state pensions were amongst the least generous in the developed world (the basic state pension in 2012 was less than half the minimum wage for a 3 hour work week- £107 vs £217) and that women experienced particular disadvantage, making recommendations to include those who had periods out of the labour market for caring responsibilities. As noted by Ginn and MacIntyre (2013), the review failed to account for the caring responsibilities that accrue to women in their 50s and 60s, when they often provide unpaid care for grandchildren, partners and other family members. Thus, even reforms that were intended to redress inequality failed to move from a breadwinner model and are thus not likely to reduce gender inequalities in older age (Foster et al., 2017).

McKenna (2017) observes that the focus of reforms has been on improving financial sustainability of the system and reducing pressure on the working population, but encouraging work into later life can only be responded to by those who are able to do so and have no other constraints. Hence, men retiring in the UK in 2017 will be 45% better off than their female peers, leaving women vulnerable to poverty and more reliant on state support.

In this paper, we present the first comprehensive analysis of the direct and indirect effects that the equalisation of the state pension age of women and men in the UK had on cohorts of women born in the 1950s, who saw their state pension age (SPA) increasing by as much as 6 years. Cribb et al. (2016) and Cribb and Emmerson (2017) have analysed the impact of the change in the SPA on employment, income, poverty and deprivation using either cross-section or a very short panel of 5 quarters, focussing only on the first part of the reform. In contrast, we analyse the full impact of the reform that equalised the SPA and use an eight-year long panel data, which allows us to better control for various confounding factors. We also contribute to the previous literature by analysing the impact of the reform not only on employment, but also on various other aspects of wellbeing. In addition, we explore heterogeneous effects on non-partnered and partnered women, as well as spill-over effects on their partners.

Although our case study focuses on the UK, the results can be generalised to other countries who are adopting similar policies.

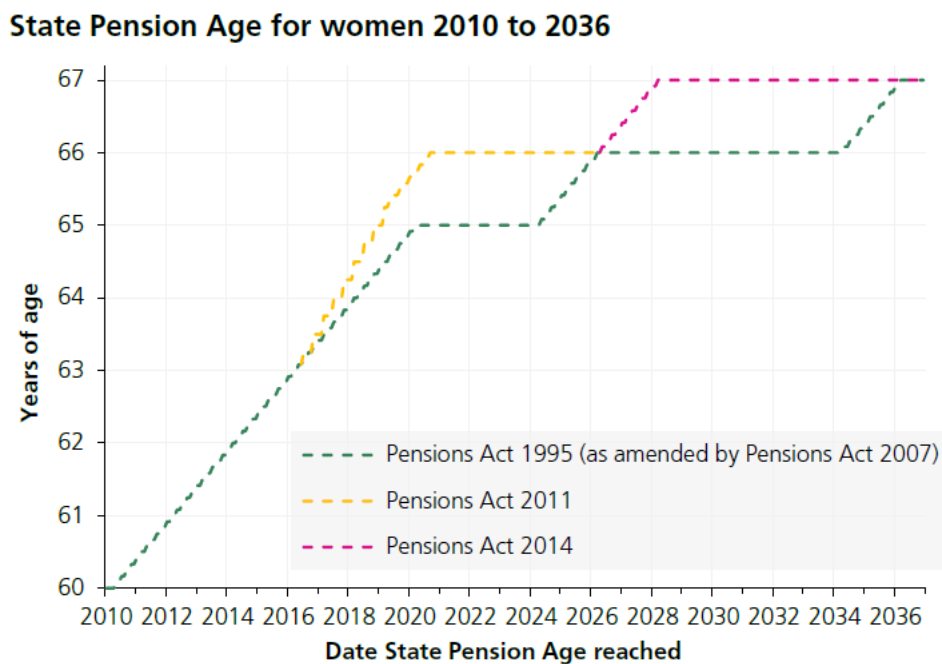
## 2. Background

### *2.1. The Equalisation of the State Pension Age in the UK*

As already mentioned, in this paper we document the welfare effects of provisions equalising the state pension age of women and men in the UK on the cohort of women born in the 1950s, who saw their state pension age increase by as much as 6 years. This group was affected by several changes (Thurley and Keen, 2018): from the 1940s until April 2010, the SPA was 60 for women and 65 for men. The Pensions Act 1995 was intended to increase the SPA for women from 60 to 65 over the period April 2010 to 2020. However, the Coalition Government legislated a new Pensions Act in 2011 to accelerate the latter part of the increase: starting from April 2016 when women's SPA was 63, the new pension age would be increased to 65 by November 2018 rather than April 2020. The equalised SPA will then rise to 66 for both men and women by October 2020 (extended from the initial April proposal as concerns were raised about the short notice involved for some women to whom the increase would have been as much as two years). Provision to increase the equalised SPA from 66 to 68 in stages over the period 2024 to 2046 was included in the Pensions Act 2007, while the Pension Act 2014 brought forward the increase in SPA to 67 to the period 2026-2028.

Figure 1 below from Thurley and Keen (2018) illustrates these different changes in women's SPA. While the green line shows the timetable in the Pensions Act 1995 and Pensions Act 2007, the yellow line shows the timetable after the Pensions Act 2011, and the red line shows the timetable for increases to 67 after the Pensions Act 2014.

**Figure 1: Changes in state pension age following the various Pension Acts**



Source: Thurley and Keen (2018), page 5

Thurley and Keen (2018) estimate that the number of women born in the 1950s affected by changes to the State Pension Age (SPA) exceeds 1.5million. The document covers all UK-resident women born between 6 April 1950 and 5 April 1960 and incorporates SPA changes legislated for by the Pension Acts 1995, 2007 and 2011.

A large campaign was formed to protest against the reforms by the group of women who have been most affected, as several of them did not receive proper communication of the changes. WASPI (Women Against State Pension Inequality) was formed in 2015 to argue for the government to provide transitional payments to women born in the 1950s receiving their pension after the age of 60 and women who now receive a state pension but had to wait longer. This campaign, and associated ones, have been growing in strength with a petition with more than 100,000 signatories to Parliament resulting in a Parliamentary debate and legal action to challenge the decisions made and their communication to the women affected by them. Several parliamentary discussions on the issue have since occurred, but despite the debate, to date, there is still no comprehensive systematic evidence on the overall impact of the reform on affected women. This paper aims to fill this knowledge gap.



## *2.2 Effects of the Reforms*

The income and labour market effects of the pension reforms in the UK have been analysed by Cribb et al. (2016) and Cribb and Emmerson (2017), who have found that increased earnings for those who were able to continue work partially offset the loss of state pension income. This still left affected women's household incomes on average £32 per week lower due to the reform. The effect was larger for lower-income women (with an increased income poverty rate for women aged 60-62), who are also likely to be employed in less rewarding jobs. Cribb and Emmerson (2017) found the effects not to persist upon reaching SPA and that women managed to smooth consumption over the period. The displacement of caring activities provided by women upon retirement has been investigated cross-sectionally by Carrino et al. (2019), who show that an increase in employment substantially reduces the intensity of informal care with those working 30 hours/week reducing care-intensity by 6.6 hours/week, and the probability of providing intensive care (more than 20 hours per week) by 4 percentage points, with effects driven by women working in physically and psychologically demanding jobs.

Retirement is usually associated with improved mental health: Kodoziej and Garcia Gomez (2019) present a causal analysis using data from the Survey of Health, Ageing and Retirement in Europe and find protective effects of retirement on mental health across all countries, with larger protective gains for those close to the (clinically defined) threshold of being at risk of depression, and larger preserving effects for women and blue collar workers, perhaps suggesting once more that the nature of the job matters. Di Gessa et al. (2016) arrive at similar conclusions considering the association between working beyond SPA and measures of mental health among men aged 65-74 and women aged 60-69 who participate in the English Longitudinal Study of Ageing (waves 2-4) who were in paid work beyond the SPA. They found that it was those who were in good health and more socioeconomically advantaged that were working beyond the SPA to begin with, highlighting again the problem of self-selection and heterogeneous effects that SPA reforms are eliciting.

In this paper we analyse the direct and indirect effects of the change in pension age, focusing on employment (as Cribb et al. 2016), labour force participation and hours worked, but also on caring activities, on measures of subjective financial wellbeing, mental wellbeing, satisfaction with life overall, with household income, with the amount of leisure time. We particularly want to assess the effect on wellbeing of having to wait for a longer period of time, as this arguably would affect both the ability to smooth income and the extent of revision of expectations required by the women and their households. We investigate time use changes, income and financial wellbeing as possible mechanisms that affect wellbeing.

### 3. Empirical Strategy

#### 3.1. Data: the UK Household Longitudinal Study<sup>1</sup>

We estimate the impact of the change in women's state pension age using the Special Licence version of Understanding Society, the UK Household Longitudinal Study (UKHLS). UKHLS has various advantages over datasets that have been used in the past to evaluate the impact of changes in the state pension age. First, its longitudinal nature allows us to combine a difference-in-difference approach with individual fixed effects, thus allowing a better identification of the causal impact of a transition from being below to being above retirement age. We use all waves available to date, from 2009-10 (wave 1) to 2016-17 (wave 8) and focus on women aged 50 to 70. Our sample includes both women who were born before 6 April 1950, who were not affected by the reform and reached state pension age at 60, as well as those born up to the end of December 1953, who saw their pension age (gradually) increase from age 60 to 65.<sup>2</sup> As the survey includes information on the month but not the day of birth, we assume that the treatment applies to women born from the 1<sup>st</sup> of the month instead of the 6<sup>th</sup>; hence, only a small proportion of women will be misclassified between control and different treatments. This minor issue applies also to previous research (e.g. Cribb et al. 2016; Cribb and Emmerson 2017).

Second, UKHLS includes various individual characteristics, as well as information on attitudes and behaviours, thus allowing a more complete analysis of the socio-economic impact of the reform on various aspects of women's lives. We analyse the impact of the reform on labour force participation and employment (as Cribb et al. 2016), but also on caring activities, on measures of subjective financial wellbeing, mental wellbeing, satisfaction with life overall, with household income, with the amount of leisure time.

Third, the household nature of the data, whereby all adult members of the household are interviewed, allows us to analyse the impact of the reform on women with different living situations, thus comparing those with and without a partner, and, most importantly, it allows us to analyse the impact that the reform had on male partners' employment and wellbeing.

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<sup>1</sup> University of Essex, Institute for Social and Economic Research. (2019). *Understanding Society: Waves 1-8, 2009-2017 and Harmonised BHPS: Waves 1-18, 1991-2009: Special Licence Access*. [data collection]. 10th Edition. UK Data Service. SN: 6931, <http://doi.org/10.5255/UKDA-SN-6931-9>.

<sup>2</sup> Younger cohorts are not of relevance for your research question: those born until March 1960 will see the state pension age remain at age 65; those born from April 1960 onward will see state pension age gradually increase up to 67 for both men and women.

As already mentioned, our estimation strategy combines the difference-in-difference and the individual fixed effects approaches. Using individual fixed effects means that only women who experience changes in the dependent variable and who transition from below to above the state pension age during the course of the survey contribute to the identification of the effect; Table 1 shows the number of women who are observed transitioning in our data: given the timing of the data collection, we have 120 women who were not affected by the reform, 168 who saw their state pension age increase by between 1 and 6 months, and 188 who saw an increase between 7 and 12 months. In addition, 319 women saw their pension age increase between one and two years (to 61 and 62), while 376 saw an increase of more than two years (to 63 up to 65). The sample sizes for our analysis refer to the number of person-years and include women who do not transition during the period of observation, either because they are too young, or too old (and have already transitioned).

TABLE 1 ABOUT HERE

### 3.2. Method: Difference-in-Differences with Individual Fixed Effects

The reform allows us to analyse the labour market behaviour and wellbeing of affected women and their partners using a difference-in-difference approach (Angrist and Pischke 2015). The reform can be considered exogenous as it affects women depending on their year and month of birth. In addition, as discussed above, it is argued that the reform was largely unanticipated and women affected did not have enough time to adjust to it.

Similarly to Cribb et al. (2016) and Cribb and Emmerson (2017), the treatment ( $T_{ict}$ ) is represented by a dummy which is 1 for women who are below the state pension age. This treatment affects women born after (5<sup>th</sup>) April 1950, and younger women are treated for a longer period than older women. Our first set of models is:

$$y_{it} = \alpha T_{it} + \alpha_i + \gamma_t + \lambda_t + \sum_{a=50}^{70} \delta_a (age_{it} = a) + X_{it}\beta + \varepsilon_{it} \quad (1)$$

Where  $T_{it}$  identifies the treatment; this is one if woman  $i$  is below state pension age at time  $t$ , and zero if she is above it. The coefficient  $\alpha$  is the additional effect of still being below state pension age in comparison with a woman with similar age and characteristics who has already reached her state pension age. Since we are using a panel dataset, we observe some women reaching state pension age and exiting the treatment (i.e. switching from one to zero). The

inclusion of individual fixed effects implies that only women who are observed both below and above state pension age during the observation period contribute to the identification of our treatment parameters.

The model also includes time dummies identifying the survey wave ( $\gamma_t$ ), dummies for survey year ( $\lambda_t$ ), dummies for each year of age ( $\sum_{a=50}^{70} \delta_a(\text{age}_{it} = a)$ ) as well as individual fixed effects ( $\alpha_i$ ). Dummies for cohort or year of birth are unnecessary since they would be perfectly collinear with the individual fixed effects. The individual fixed effects also pick up the effect of factors such as work identity and personality traits that are unlikely to vary over the survey period.

Our models also include various additional explanatory variables that may affect the outcome variable; these are: a dummy for married or cohabiting as opposed to single, widowed or divorced; a dummy for homeowners as opposed to renters, a dummy for having a long term health issue, a dummy for the presence of other adults in the household, as well as the log of equivalised household income. We also include a dummy identifying the large proportion of those who, from wave 6 onwards move from face-to-face to web interviews since this change may affect the way respondents answer to survey questions.

Since our aim is to give an overview of the effect of the change in the state pension age on different aspects of women's lives, we use a variety of dependent variables ( $y_{it}$ ). First, in line with the previous literature, we focus on employment and economic activity to test whether the reform of the state pension age increases the probability of women working. Our first dependent variable identifies labour force participation and is one for women who are employed, self-employed, or unemployed, and zero for those who are inactive. Our second dependent variable identifies employment and is one for women who are either employed or self-employed, and is zero for those who are either unemployed or inactive. Whether because of financial needs or because a change in the state pension age represents a signal on the appropriate retirement age (Cribb et al. 2016), we would expect women affected by the reform to be more likely to be active in the labour market and/or employed. Our third dependent variable is usual weekly hours of work, conditional on being in a paid job; in this case women who do not work or who are self-employed are excluded. The results are robust to different specifications of hours of work which include hours of work for the self-employed as well as those who do not work (observed working zero hours).

Besides increasing employment, an increase in the state pension age may have an indirect effect on women's wellbeing. While the descriptive literature finds that people who

work later in life have higher levels of wellbeing, Kodoziej and Garcia Gomez (2019) causally show that this is driven by selection into working in later life. If working in older age is a constraint, e.g. because of the change in state pension age, rather than a choice, we would expect a negative impact of the treatment on wellbeing. Our third and fourth dependent variables therefore are satisfaction with life overall and GHQ. Life satisfaction and GHQ measure different aspects of wellbeing: while life satisfaction is an overall long-term assessment of one's life, GHQ is a short-term evaluation of wellbeing which is associated to mental health. GHQ is a numerical variable which varies from 0 to 36 and for which higher values indicate worse mental health; for ease of interpretation, we reverse-coded it so that higher values indicate better mental health. Life satisfaction is an ordered variable that varies between 1 (completely dissatisfied) to 7 (completely satisfied); higher values indicate higher levels of satisfaction.

All models are estimated using OLS. Although satisfaction is an ordinal variable, it is commonly modelled as continuous to allow for the inclusion of individual fixed effects (Ferreri-Carbonell and Frijters 2004). Similarly, although labour force participation and employment are dummies, non-linear models including fixed effects do not allow a proper estimation of marginal effects; hence, for simplicity of interpretation, in our main specifications we use Linear Probability Models (LPMs). Finally, we cluster our standard errors by year and month of birth to account for shocks in employment that might be correlated for women in the same cohort (we have about 240 clusters).

### *3.3. Mechanisms: Income and Leisure*

We investigate two types of mechanisms that may lead to an effect of the change in the pension age on wellbeing. The first relates to time use: women who have to continue working may have to compromise on the amount of voluntary work they do, the amount of caring they provide to household and non-household members and/or their amount of leisure time. While volunteering may easily change as a result of additional commitment, such as work, if the provision of care is related to needs, women may not be able to reduce the amount of care provided even if they remain active in the labour market. In this case it is likely that they will compensate with a reduction in volunteering and/or in their leisure time. We therefore estimate models similar to those in Equation (1) where the dependent variable is either a dummy for whether women provide any amount of care either to household or non-household member, or a dummy for whether women engage in any volunteering work, or a measure of satisfaction

with the amount of leisure time, again measured on a scale from 1 to 7. The results are robust to different specifications of caring and volunteering, as discussed in Section 4.1.

The second mechanism we investigate is related to income and financial wellbeing. Cross-sectional evidence suggests that, despite increasing employment, the increase in the state pension age also reduces household income and partially increases the risk of poverty (Cribb and Emmerson 2017). Here we focus on three subjective measures of financial wellbeing. The first measure reflects answers to the question “How well would you say you yourself are managing financially these days?” and results in a dummy which is zero for those who say either that they are “living comfortably” or “doing alright”, and one for those who say they are “just about getting by”, “finding it quite difficult”, or “finding it very difficult” (the results are robust to the re-coding of “just about getting by” from one to zero). The second measure is a dummy which is one for those who say they are behind with some or all bills (results are robust to the inclusion of mortgage payment in the variable, but at the cost of a reduced sample size, since not all households have a mortgage). Our third and final measure is satisfaction with income, measured on a scale from 1 to 7.

Also in this case all models are estimated using OLS.

### 3.4. *Heterogeneous Effects and Spill-over Effects*

We investigate various sources of possible heterogeneous effects of the increase in the state pension age. First, the reform was designed in such a way that women were differently affected by the reform depending on their date of birth. Nevertheless, most analyses of the impact of a change in state pension age only have one treatment. It is possible, however, that women react differently to the treatment depending on how long they are treated for, and that women who had to wait longer to reach the state pension age may have been impacted more than those who only had to wait a short time. To analyse heterogeneous effects by length of treatment we re-estimate all models discussed above with a different operationalisation of the treatment variable  $T_{it}$ . Following Beerli et al. (2018) the treatment variable is split into five mutually exclusive treatments, which distinguish how many additional months women had to wait to reach state pension age:

$$y_{it} = \alpha_0 T_{it} I(d_i = 0) + \alpha_1 T_{it} I(0 < d_i \leq 6) + \alpha_2 T_{it} I(6 < d_i \leq 12) + \alpha_3 T_{it} I(13 < d_i \leq 24) + \alpha_4 T_{it} I(d_i > 24) + \alpha_i + \gamma_t + \lambda_t + \sum_{a=50}^{70} \delta_a (age_{it} = a) + X_{it} \beta + \varepsilon_{it} \quad (2)$$

Where the impact of the treatment is allowed to vary by age and month of birth:  $\alpha_0$  refers to women born before April 1950, and whose state pension age was 60;  $\alpha_1$  is the effect of treatment on those who have to wait between 1 and 6 additional months (above the age of 60) to reach state pension age;  $\alpha_2$  is the effect on those who have to wait between 7 and 12 months, and so on.

Heterogeneity of the impact of the reform may also depend on the individual situation of each woman. For example, women who are living with a partner may be less affected by the reform if they can rely on additional income and support from their partner, while we may expect the reform to have a larger impact on women who are single, widowed or divorced (e.g. Cribb et al. 2016). We test this by re-estimating our models separately for women with and without a partner.

Finally, we analyse spill-over effects by focusing on the male partners of those women who were affected by the reform. By affecting income, labour force participation and wellbeing of women, the reform may also have had an indirect effect on those who live with them. Therefore, we re-estimate the previous models where the treatment still refers to the female partner, but the dependent and other explanatory variables refer to the male partner. Besides all other covariates, these models also include a dummy for whether the female partner has a job or not.

## **4. Empirical Results**

### *4.1. Effect of the Increase in State Pension Age*

Table 2 shows the impact that the reform had on women's labour market and wellbeing outcomes. Columns (1) and (2) suggest, in line with the previous literature, that being below the state pension age increases women's probability of being in the labour market by 11.6 percentage points, and increases their probability of having a job by about 9.3 percentage points. These effects are only marginally larger than what found by Cribb et al. (2016) using the Labour Force Survey and focusing on the first part of the reform. We also find an increase in almost 2 hours of work per week for those who have a paid job (Column (3)). These are sizable effects, considering the averages in the sample, reported at the bottom of the tables.

Although Table 2 confirms that the increase in the state pension age had the desired effect of keeping women in employment, the last two columns also suggest clear negative

impacts on wellbeing: women below the state pension age have worse mental health (GHQ) as well as lower levels of life satisfaction.

#### TABLE 2 ABOUT HERE

Does the increase in women employment have a negative impact on other activities typically performed by women of this age such as caring activities? The first column of Table 3 suggests that this is not the case and there is no statistically significant difference in the probability of providing care. This result is robust to changes in the definition of caring: besides a dummy for providing any care (Table 3), we also experimented with dummies separating caring provided to household members vs. non-household members, as well as with dummies separating those who spend a significant amount of time in caring activities (we experimented with more than 5, 10 and 20 hours per week), including and excluding those who provide no care at all. This is in contrast with Carrino et al. (2019) who also use the UKHLS but do not exploit the panel nature of the data. Our results are consistent with the nature of caring activities, which are generally provided on the basis of need, and irrespectively on the working situation of the person who provides the informal care.

Not only the increase in the SPA did not seem to have any relevant effect on the probability of providing care, it also did not seem to have any relevant effect on the probability of volunteering, as shown in Column (2) of Table 3 (the smaller sample size is because questions on volunteering are only asked every other wave: 2, 4, 6, 8). These results are robust to changes in the definition of volunteering: we also estimated models using the number of hours spent volunteering, including and excluding those who do not engage in this activity. Descriptive statistics suggest that about half of women in our sample who provide care or engage in volunteering do not work, while the remaining half have a job. These proportions only vary slightly across waves, thus suggesting a lack of relationship between working and caring/volunteering; in contrast, among those who provide caring or volunteering more than 80% engage in only one of these two activities.

Column (3) of Table 3 suggests that women who are below the pension age experience a lower level of satisfaction with the amount of leisure time. This is consistent with the previous results: women below the state pension age are more likely to work, but having the same probability of providing volunteering and informal care to household and non-household members, is likely to result in a decrease in the amount of leisure time compared to what desired, and a consequent decrease in satisfaction with it.



### TABLE 3 ABOUT HERE

Besides time use, the increase in the state pension age also had a negative financial impact. The bottom part of Table 3 suggests that women who are below the state pension age are more likely to say that they are finding difficult to manage on their income (Column (4)), they are slightly more likely to be behind with bills (Column (5)) and, as a consequence, are less satisfied with their household income (Column (6)).

As robustness tests, we have also re-estimated our models using correlated random effects probits instead of LPMs. The coefficients are consistent with the one discussed above. In summary, although the reform in the state pension age had the desired effect of increasing women's employment and participation in the labour market, our results show that it also had a negative impact of various aspects of their wellbeing.

#### *4.2. Heterogeneity and Spill-over Effects*

An increase in the state pension age may not have a large impact on women if the increase is only a few months compared to their original expectation (i.e. 60 years): while some women may decide to work the few additional months until they reach their (new) state pension age, others may have enough financial resources to retire at 60 even when their state pension age has been increased. Women who have to wait one or more additional years, on the other hand, may be more badly affected by the change. Tables 4 and 5 analyse the heterogeneity of the response to the increase in the state pension age as a function of the number of additional months or years women had to wait to reach their new state pension age, as discussed in Equation (2). Table 4 shows that the increase in the probability of being in the labour market, the probability of having a job, as well as hours worked are relatively stable across groups, suggesting that the reform has the desired effect of increasing employment and labour market participation for all groups. Although all groups seem to show a worsening in both life satisfaction and mental health, this is statistically significant only for those who have to wait either 7-12 months, or two or more additional years (for mental health).

In line with the previous results, Table 5 suggests that there is no clear difference in the probability of providing care or volunteering across groups, while all those who experience an increase in the state pension age show a lower level of satisfaction with their leisure time and seem to be more likely to say they struggle financially. Most of the coefficients are statistically significant for those who have to wait more than six months.

## TABLES 4 AND 5 ABOUT HERE

Table 6 compares women with and without a partner: the effect on those without a partner is in the top panel, while the effect on those with a partner is in the bottom panel. For simplicity, our main model uses only one treatment, as in Equation (1). We might expect the increase in the state pension age to have a smaller effect on women with a partner since they may have additional savings, income and support to stop working at age 60 and before reaching their new state pension age. As expected, for all outcomes analysed, the regression coefficients are consistently larger for women without a partner, thus suggesting that this group of women is particularly negatively affected by the reform.

We have also estimated models where the impact of the treatment is allowed to vary depending on the length of the treatment, as in Equation (2). The results in Table A1 in the Appendix confirm that the effects are larger for women without a partner, especially in terms of wellbeing.

## TABLE 6 ABOUT HERE

Finally, Table 7 focuses on spill-over effects and analyses whether there has been a change in behaviour and wellbeing of male partners of those women who have been affected by the reform. While the sample is now different (men instead of women), the model estimated is very similar to the one in Equation (1): dependent and explanatory variables refer to men with the only exception of the variable “under state pension age”, which refer to the female partner. The results suggest that the reform of women’s pension age partially spilled-over to their partners, who are now slightly more likely to be active in the labour market and to have a job if she is still below pension age. As one would expect, the magnitude of the effect, however, is smaller than for women. Despite the change in employment behaviour, the reform had no impact on the male partners’ mental health or wellbeing possibly due to the smaller magnitude of the employment effect.

We have also estimated models where the impact of the treatment is allowed to vary depending on the length of the treatment, as in Equation (2). The results in Table A2 in the Appendix confirm that men are much less affected by women, and if there is an effect, this is concentrated among men whose partner needs to wait longer to reach her pension age.

## TABLE 7 ABOUT HERE

### 5. Conclusions

In this paper we have analysed the causal direct and indirect impact of reforms equalising state pension age (SPA) between women and men in the UK. We used the UK Household Longitudinal Study (UHKLS) for the period 2009-10 (wave 1) to 2016-17 (wave 8) to combine a difference-in-difference approach with individual fixed effects.

In line with Cribb et al. (2016) we find that the increase in the SPA increased women's probability of being in the labour market by 11.6 percentage points, their probability of having a job by about 9.3 percentage points, and their working hours by about 2 hours per week. However, we also found that the increase in the SPA had a negative financial impact on those affected, as we find that they are more likely to state that they find it difficult to manage on their income, they are behind with bills and, possibly as a consequence, are less satisfied with their household income. This suggests that consumption smoothing may not in fact be taking place (or not to satisfactory levels). We also investigated time use effects and found no statistically significant difference in the probability of providing care, but a lower level of satisfaction with the amount of leisure time; this suggests that women are likely to take on more responsibilities of both care and work as the SPA increases, with a negative impact on their leisure time. Perhaps not surprisingly, we also found that the increase in the SPA had a negative impact on mental health (GHQ) and on life satisfaction; these effects are stronger for those who have to wait for longer to reach SPA.

Although all groups seem to show a worsening in mental health, this is statistically significant only for those who must wait two or more additional years to reach their new SPA. Life satisfaction, on the other hand, seem to be worse for all women who must wait more than six months. This provides evidence of the damage caused by unanticipated changes in women's expectations, as well as the direct effect of leisure displacement and financial impacts. This is an important aspect of the effects of the reforms that has not been formally considered up to now.

We also found that the presence of a partner helps mitigate some of these effects: for all outcomes analysed, the regression coefficients are consistently larger for women without a partner, thus suggesting that this group of women is particularly negatively affected by the reform. Finally, men whose female partner is affected by the increase in the SPA also show a higher probability to be active in the labour market and to have a job although, as one would

expect, the magnitude of the effect is smaller than for women. Despite the change in employment behaviour, the reform had no impact on the male partners' mental health or wellbeing.

Our results provide insights on direct and indirect effects that pension reforms may have, and since they are not specific to the UK, they can be generalised to other countries that are seeking to implement similar pension age reforms. It is important that the positive fiscal impact of the increase in the SPA should be weighed against the negative effect on wellbeing and the consequent increase in inequality between those who can and those who cannot afford to retire at their preferred age. Additional inequalities are also created based on family structure (e.g. partnered vs. non-partnered women) and should be taken into account.

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## Tables

Table 1: Number of women observed both below and above state pension age in our data

Increase in pension age (months above 60 years of age)	Number of women observed below pension age at t-1 and above pension age at t
0 months – retirement age: 60	120
1-6 months	168
7-12 months	188
1-2 years	319
More than 2 years	376
Total	1,171

Table 2: Effect of being below state pension age on employment and subjective financial situation

	(1) Active in the labour market	(2) Has a job	(3) Hours worked (paid job)	(4) Mental health (GHQ)	(5) Life satisfaction
Under state pension age	0.116*** (0.012)	0.093*** (0.011)	1.983*** (0.446)	-0.428*** (0.163)	-0.116** (0.051)
Average of depended variable:	0.504	0.478	28.744	-11.577	5.162
Observations (person/year)	62,915	62,915	26,270	55,690	55,462

All models are estimated using linear models with individual fixed effects. Other covariates included: a full set of dummies for wave of data, for year of the survey, for each year of age, a dummy for those who are married or cohabiting (as opposed to single, divorced, widowed), one for homeowners (as opposed to renters), and one for having a long term illness, one for the presence of other adults in the household, and one for mode of interview. All models also include the log of equivalised household income.

Standard errors in parenthesis are clustered by year-month of birth. \* Statistically significant at 10%, \*\* Statistically significant at 5%, \*\*\* Statistically significant at 1%

Table 3: Effect of being below state pension age on subjective wellbeing

	(1) Caring	(2) Volunteering	(3) Satisfaction with amount of leisure time
Under state pension age	-0.011 (0.015)	0.020 (0.014)	-0.184*** (0.048)
Average of the depended variable:	0.328	0.217	4.918
Observations (person/year)	51,485	30,216	55,428

	(4) Struggles financially	(5) Problems Paying bills	(6) Satisfaction with income
Under state pension age	0.066*** (0.011)	0.011** (0.005)	-0.155*** (0.052)
Average of the depended variable:	0.327	0.033	4.632
Observations (person/year)	60,873	62,834	55,440

All models are estimated using linear models with individual fixed effects. Other covariates included: a full set of dummies for wave of data, for year of the survey, for each year of age, a dummy for those who are married or cohabiting (as opposed to single, divorced, widowed), one for homeowners (as opposed to renters), and one for having a long term illness, one for the presence of other adults in the household, and one for mode of interview. All models also include the log of equivalised household income.

Standard errors in parenthesis are clustered by year-month of birth. \* Statistically significant at 10%, \*\* Statistically significant at 5%, \*\*\* Statistically significant at 1%

Table 4: Effect of being below state pension age on employment and subjective financial situation, by state pension age

Under state pension age and individual State Pension Age is:	(1) Active in labour market	(2) Has a job	(3) Hours worked (paid job)	(4) Mental health (GHQ)	(5) Life satisfaction
60 years	0.138*** (0.040)	0.138*** (0.035)	2.534* (1.514)	-0.236 (0.398)	-0.073 (0.096)
60 years + 1-6 months	0.130*** (0.013)	0.085*** (0.014)	2.309 (1.643)	-0.240 (0.491)	-0.048 (0.121)
60 years + 7-12 months	0.079** (0.036)	0.074** (0.033)	1.776*** (0.622)	-0.518** (0.220)	-0.203*** (0.072)
60 years + 1-2 years	0.113*** (0.017)	0.093*** (0.018)	1.958*** (0.693)	-0.297 (0.218)	-0.114 (0.071)
60 years + at least 2 more years	0.128*** (0.015)	0.097*** (0.016)	1.800*** (0.671)	-0.627** (0.249)	-0.109 (0.091)
Observations (person/year)	62,915	62,915	26,270	55,690	55,462

All models are estimated using linear models with individual fixed effects. Other covariates included: a full set of dummies for wave of data, for year of the survey, for each year of age, a dummy for those who are married or cohabiting (as opposed to single, divorced, widowed), one for homeowners (as opposed to renters), and one for having a long term illness, one for the presence of other adults in the household, and one for mode of interview.

All models also include the log of equivalised household income.

Standard errors in parenthesis are clustered by year-month of birth. \* Statistically significant at 10%, \*\* Statistically significant at 5%, \*\*\* Statistically significant at 1%



Table 5: Effect of being below state pension age on subjective wellbeing, by state pension age

	(1)	(2)	(3)
Under state pension age and individual State Pension Age is:	Caring	Volunteering	Satisfaction with amount of leisure time
60 years	0.047 (0.058)	0.034 (0.067)	-0.140 (0.140)
60 years + 1-6 months	-0.046 (0.036)	0.021 (0.042)	-0.277** (0.111)
60 years + 7-12 months	-0.025** (0.012)	-0.014 (0.029)	-0.152 (0.127)
60 years + 1-2 years	-0.012 (0.019)	0.018 (0.018)	-0.187*** (0.067)
60 years + at least 2 more years	-0.002 (0.028)	0.035** (0.018)	-0.171** (0.080)
Observations (person/year)	51,485	30,216	55,428
	(4)	(5)	(6)
	Struggles financially	Problems Paying bills	Satisfaction with income
60 years	0.061 (0.038)	-0.012 (0.014)	-0.026 (0.146)
60 years + 1-6 months	0.056*** (0.020)	0.003 (0.015)	-0.135 (0.088)
60 years + 7-12 months	0.060*** (0.015)	0.022** (0.011)	-0.202** (0.090)
60 years + 1-2 years	0.046*** (0.015)	0.022*** (0.007)	-0.132* (0.075)
60 years + at least 2 more years	0.094*** (0.022)	0.000 (0.006)	-0.189** (0.078)
Observations (person/year)	60,873	62,873	55,440

All models are estimated using linear models with individual fixed effects. Other covariates included: a full set of dummies for wave of data, for year of the survey, for each year of age, a dummy for those who are married or cohabiting (as opposed to single, divorced, widowed), one for homeowners (as opposed to renters), and one for having a long term illness, one for the presence of other adults in the household, and one for mode of interview. All models also include the log of equivalised household income.

Standard errors in parenthesis are clustered by year-month of birth. \* Statistically significant at 10%, \*\* Statistically significant at 5%, \*\*\* Statistically significant at 1%

Table 6: Effect of being below state pension age by marital status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Women without a partner	Active in the labour market	Has a job	Hours worked (paid job)	Mental health (GHQ)	Life satisfaction	Satisfaction with amount of leisure time	Struggles financially	Problems paying bills	Satisfaction with income
Under state pension age	0.157*** (0.022)	0.115*** (0.022)	2.416*** (0.819)	-0.706*** (0.268)	-0.142* (0.084)	-0.231*** (0.089)	0.140*** (0.024)	0.016 (0.013)	-0.323*** (0.106)
Average of the depended variable:	0.481	0.440	30.278	-12.531	4.804	4.778	0.479	0.061	4.124
Observations (person/year)	19,001	19,001	7,485	16,901	16,790	16,772	18,670	18,870	16,788
Women married or cohabiting									
Under state pension age	0.097*** (0.014)	0.085*** (0.014)	1.718*** (0.488)	-0.260 (0.183)	-0.095 (0.060)	-0.162*** (0.061)	0.031*** (0.012)	0.007 (0.006)	-0.072 (0.057)
Average of the depended variable:	0.515	0.494	28.132	-11.162	5.317	4.979	0.260	0.021	4.853
Observations (person/year)	43,914	43,914	18,785	38,789	38,672	38,656	42,203	43,864	38,652

All models are estimated using linear models with individual fixed effects. Other covariates included: a full set of dummies for wave of data, for year of the survey, for each year of age, a dummy for those who are married or cohabiting (as opposed to single, divorced, widowed), one for homeowners (as opposed to renters), and one for having a long term illness, one for the presence of other adults in the household, and one for mode of interview. All models also include the log of equivalised household income. Standard errors in parenthesis are clustered by year-month of birth. \* Statistically significant at 10%, \*\* Statistically significant at 5%, \*\*\* Statistically significant at 1%

Table 7: Effect of being below state pension age on their (male) partners

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Female partner's retirement age	Active in the labour market	Has a job	Hours worked (paid job)	Mental health (GHQ)	Life satisfaction	Satisfaction with amount of leisure time	Struggles financially	Problems paying bills	Satisfaction with income
Under state pension age	0.031** (0.014)	0.033** (0.014)	0.548 (0.498)	0.118 (0.136)	-0.054 (0.046)	0.014 (0.056)	0.020 (0.013)	0.001 (0.004)	-0.061 (0.051)
Average of the depended variable:	0.545	0.519	36.743	-10.029	5.347	5.094	0.269	0.021	4.816
Observations (person/year)	38,905	38,905	14,790	32,158	32,038	32,030	34,938	38,870	32,025

All models are estimated using linear models with individual fixed effects. Other covariates included: a full set of dummies for wave of data, for year of the survey, for each year of age, a dummy for those who are married or cohabiting (as opposed to single, divorced, widowed), one for homeowners (as opposed to renters), and one for having a long term illness, one for the presence of other adults in the household, one for whether the partner works, and one for mode of interview. All models also include the log of equivalised household income.

Standard errors in parenthesis are clustered by year-month of birth. \* Statistically significant at 10%, \*\* Statistically significant at 5%, \*\*\* Statistically significant at 1%

## Appendix

Table A1: Effect of being below state pension age by marital status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Women without a partner	Active in the Labour market	Has a job	Hours worked (paid job)	Mental health (GHQ)	Life satisfaction	Satisfaction with amount of leisure time	Struggles financially	Problems paying bills	Satisfaction with income
60 years	0.157** (0.067)	0.161** (0.063)	0.559 (2.235)	-0.136 (0.724)	0.056 (0.214)	0.098 (0.259)	0.116* (0.069)	-0.064* (0.036)	-0.278 (0.322)
60 years + 1-6 months	0.223*** (0.045)	0.149*** (0.035)	8.451** (4.188)	-0.130 (0.604)	0.059 (0.184)	-0.399** (0.157)	0.137*** (0.047)	-0.016 (0.029)	-0.329 (0.247)
60 years + 7-12 months	0.072* (0.038)	0.059 (0.046)	1.653 (1.939)	-0.724* (0.432)	-0.272** (0.121)	-0.142 (0.266)	0.204*** (0.030)	0.039 (0.025)	-0.450** (0.183)
60 years + 1-2 years	0.174*** (0.030)	0.144*** (0.037)	1.710* (0.928)	-0.770* (0.459)	-0.143 (0.135)	-0.336** (0.132)	0.087*** (0.032)	0.038** (0.018)	-0.143 (0.182)
60 years + at least 2 more years	0.158*** (0.024)	0.091*** (0.030)	3.032*** (0.961)	-0.925** (0.455)	-0.188 (0.137)	-0.167 (0.136)	0.169*** (0.040)	0.010 (0.018)	-0.448*** (0.161)
Observations (person/year)	19,001	19,001	7,485	16,901	16,790	16,772	18,670	18,970	16,788
<b>Women married or cohabiting</b>									
60 years	0.129** (0.053)	0.132** (0.052)	4.020** (1.965)	0.009 (0.440)	-0.022 (0.119)	-0.164 (0.149)	0.032 (0.042)	0.002 (0.015)	0.067 (0.144)
60 years + 1-6 months	0.083*** (0.025)	0.051*** (0.016)	0.791 (1.051)	-0.111 (0.373)	-0.042 (0.122)	-0.285** (0.119)	0.023 (0.027)	0.009 (0.011)	-0.028 (0.059)
60 years + 7-12 months	0.086** (0.039)	0.084** (0.034)	1.603*** (0.411)	-0.382 (0.319)	-0.177* (0.098)	-0.116 (0.122)	-0.000 (0.018)	0.015 (0.009)	-0.095 (0.142)
60 years + 1-2 years	0.084*** (0.024)	0.073*** (0.026)	2.253*** (0.856)	-0.101 (0.259)	-0.098 (0.079)	-0.125 (0.087)	0.028 (0.018)	0.013* (0.007)	-0.100 (0.077)
60 years + at least 2 more years	0.116*** (0.017)	0.101*** (0.018)	0.802 (0.682)	-0.477 (0.301)	-0.083 (0.115)	-0.180 (0.115)	0.055*** (0.020)	-0.004 (0.007)	-0.073 (0.091)
Observations (person/year)	43,914	43,914	18,785	38,789	38,672	38,656	42,203	43,865	38,652

All models are estimated using linear models with individual fixed effects. Other covariates included: a full set of dummies for wave of data, for year of the survey, for each year of age, a dummy for those who are married or cohabiting (as opposed to single, divorced, widowed), one for homeowners (as opposed to renters), and one for having a long term illness, one for the presence of other adults in the household, and one for mode of interview. All models also include the log of equivalised household income. Standard errors in parenthesis are clustered by year-month of birth. \* Statistically significant at 10%, \*\* Statistically significant at 5%, \*\*\* Statistically significant at 1%

Table A2: Effect of being below state pension age on their partners

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Female partner's State Pension Age	Active in the Labour market	Has a job	Hours worked (paid job)	Mental health (GHQ)	Life satisfaction	Satisfaction with amount of leisure time	Struggles financially	Problems paying bills	Satisfaction with income
60 years	-0.053 (0.039)	-0.042 (0.042)	-2.079 (1.494)	0.087 (0.505)	0.156 (0.108)	0.366** (0.174)	-0.052 (0.040)	0.005 (0.020)	0.124 (0.173)
60 years + 1-6 months	-0.033 (0.030)	-0.028 (0.030)	0.870 (1.046)	-0.532 (0.422)	-0.043 (0.089)	0.044 (0.133)	0.004 (0.036)	0.004 (0.013)	-0.073 (0.136)
60 years + 7-12 months	0.058* (0.030)	0.043 (0.029)	-0.474 (0.956)	0.139 (0.318)	-0.018 (0.102)	-0.001 (0.108)	0.033 (0.024)	0.005 (0.010)	0.226* (0.117)
60 years + 1-2 years	0.035* (0.020)	0.041* (0.021)	0.922 (0.890)	0.056 (0.217)	-0.093 (0.070)	0.012 (0.093)	0.023 (0.021)	0.010 (0.007)	-0.147* (0.084)
60 years + at least 2 or more years	0.051** (0.024)	0.054** (0.022)	1.088 (0.925)	0.388 (0.236)	-0.089 (0.075)	-0.067 (0.093)	0.026 (0.022)	-0.013*** (0.005)	-0.158* (0.085)
Observations (person/year)	38,905	38,905	14,790	32,158	32,038	32,030	34,938	38,870	32,025

All models are estimated using linear models with individual fixed effects. Other covariates included: a full set of dummies for wave of data, for year of the survey, for each year of age, a dummy for those who are married or cohabiting (as opposed to single, divorced, widowed), one for homeowners (as opposed to renters), and one for having a long term illness, one for the presence of other adults in the household, one for whether the partner works, and one for mode of interview. All models also include the log of equivalised household income.

Standard errors in parenthesis are clustered by year-month of birth. \* Statistically significant at 10%, \*\* Statistically significant at 5%, \*\*\* Statistically significant at 1%