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Mind the Gap! The effect of an increased UK State Pension Age on expected working life of employees

Ricky Kanabar[1,3] and Adriaan Kalwij[2,3]

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Abstract

We examine how individuals' retirement expectations adjust in the wake of significant reforms introduced in the 2011 and 2014 Pension Act to the State Pension Age (SPA) in the UK. Our empirical results suggest a widening of the gap between SPA and the expected retirement age (ERA): men and women do not significantly adjust their expectations upward in response to an increase in SPA, as would be consistent with the policy objective. While ERA varies by socioeconomic group, we do not find that particular at-risk groups such as the low educated or unskilled adjusted their ERA differently than other groups. Our findings may suggest that workers are not adjusting their retirement planning for the increased UK State Pension Age and could be insufficiently preparing for retirement.

JEL classification: J26

Keywords: Retirement, Expectations, United Kingdom Household Longitudinal Study

[1] Corresponding author: Department for Social and Policy Sciences, University of Bath, Bath, BA2 7JP. United Kingdom. Email: R.Kanabar@bath.ac.uk

[2] Utrecht University School of Economics, P.O. Box 80125, 3508 TC Utrecht. The Netherlands. Email: a.s.kalwij@uu.nl

[3] Network for Studies on Pensions, Ageing and Retirement (Netspar; www.netspar.nl)

1. Introduction

The 2018 Industrial Strategy published by the UK government stated the ageing society as one of the country's Grand Challenges. The fiscal implications of an ageing population have a significant impact on current and future government expenditures such as health care services and state pensions. Since the 1990s the retirement decision, often defined as a gradual reduction or complete cessation of labour supply (Denton & Spencer, 2009), has gradually come to the forefront of the policy agenda with the aim of curbing the long-term trend of earlier labour market exits among older workers and thereby increasing income tax revenues (Blundell, Meghir & Smith, 2002; Banks, Emmerson & Tetlow, 2018). The situation is not unique to the UK; governments in many OECD countries have introduced reforms to reduce the burden on the state of an ageing population. Increasing the State Pension Age (SPA) reduces State Pension expenditures[1] and has the potential to influence retirement, or more generally labour market participation and/or work intensity at older ages, due to its implications for individuals' consumption as State Pension is an important source of income (DWP, 2018) and the strong social norms associated with reaching SPA (Kohli, 1991; Amin-Smith & Crawford, 2018).[2] Understanding future labour supply intentions related to retirement and how such intentions respond to SPA reforms is therefore of significant policy relevance.

In this paper, we examine the effect of raising the age at which individuals become eligible to claim their state pension, that is the State Pension Age (SPA), on their future expected retirement age (ERA). Alongside other OECD countries, the UK government began reforming

[1] For instance, keeping the SPA fixed at 66 in the UK as opposed to increasing it as legislated to 68 by 2045/46 has been estimated to cost £250 billion (DWP, 2017a)

[2] Unretirement in the UK is relatively uncommon among the already retired though higher rates have been estimated for initially employed individuals (Kanabar, 2016; Platts et al., 2017).

SPA from the mid- 1990s onwards; in 1995 legislation enacted sought to equate women's SPA (historically 60) to that of men (65). Subsequent reforms increased the pace of equalisation and also raised the SPA of both men and women to 66 or 67, depending on their date of birth. Due to the timing of the reforms and the cohorts affected (with the exception of certain older women) very little is known about how men and women *have or intend* to react in terms of their labour supply behaviour in response to higher SPA in the UK.[3] A key question addressed in this paper, therefore, is how do individuals *intend* to respond to such policy changes? Only then is it possible to understand whether individuals have adjusted their labour supply intentions in a manner which is consistent with the policy objective. We analyse how the 2011 and 2014 State Pension Acts in the UK affected men's and women's Expected Retirement Age (ERA) using the United Kingdom Household Panel Study.

We analyse how individuals intend to change their age of retirement in response to increases in SPA by making use of expectation data. Expectations data has been shown to play an important role in explaining major lifecycle decisions such as the decision to retire (Manksi, 2004; Chan & Stevens, 2004; Benitez-Silva & Dwyer, 2005; Botazzi, Japelli & Padula, 2006; Cobb-Clark & Stillman, 2006). Disney and Tanner (1999), using the UK Retirement History Survey, compare expected versus actual retirement ages and find that most individuals reported their expected retirement age (ERA) to be the SPA at the time. Moreover, these individuals subsequently retired at that age, highlighting (i) the accuracy of expectations data in predicting subsequent labour supply decisions and (ii) the strong cultural norms associated with reaching SPA or, put another way, the notion of what individuals perceive 'retirement' to mean in the

[3] Cribb, Emmerson and Tetlow (2016) found that about 1 in 10 of women (aged 60 to 62) who had been affected by the SPA reform adjusted their labour supply.

UK (Kohli, 1991).[4] Related to social norms is the 2011 Employment Equality Regulations (EER) reform which made it illegal for employers to retire employees unless there was a justifiable legal basis for doing so. Furthermore, the age at which individuals elicit their retirement expectations has been shown to be important; for example, the arrival of information close to retirement can lead to revisions in expected retirement age consistent with economic theory (Bernheim, 1989).[5]

Given the importance of retirement expectations in determining future labour supply behaviour on the one hand, and the strong connection between reaching SPA and ceasing or reducing paid work on the other; surprisingly few studies have analysed how changes in SPA affect retirement expectations. Notable exceptions include Botazzi, Jeppelli and Pudula (2006), De Grip, Fouarge and Montizaan (2013), Copolla and Wilke (2014) and Hess (2018). Botazzi, Jeppelli and Pudula (2006) have shown that a series of reforms introduced in Italy during the 1990s to raise the SPA by five years increased men's ERA by two years and by three years for women (see also Mastrogiacomo, 2004). The magnitude of the reforms is also likely to affect the extent individuals will adjust their ERA. De Grip, Fouarge and Montizaan (2013) have shown that those affected by the increased SPA from 65 to 66 in the Netherlands adjusted their ERA by 3.6 months while those who faced an increase in SPA from 65 to 67 adjusted their ERA by 10.8 months. Whilst the reform affected both men and women in the same way their findings also show that the changes in ERA were driven by highly educated females who also have higher pension wealth. It was not clear why similarly educated men and less educated

[4] Consistent with the findings of Bernheim (1988), they find as well that individuals report their most likely retirement age as opposed to their mean (expected) retirement age. Note that the so-called earning test was abolished in 1989; though employers could legally require individual's to retire at 65 up until 2011.

[5] A related issue not addressed in this paper is that expectations may change with increasing age (Benitez-Silver and Dwyer 2004; Cobb-Clark and Stillman 2006).

individuals did not adjusting their expectations in the manner expected. The extent to which individuals adjust their ERA is also related their work capacity for example due the nature of their main career job (manual versus professional). Related to this, the authors suggest the reform had an income effect and individuals who had made a higher number of pension contributions were less responsive to the policy change. For Germany, in contrast, Coppola and Wilke (2014) findings suggest that lower educated individuals failed to adjust their expectations in a manner consistent with the policy objective of a SPA reform introduced in 2007 that is similar to the one in the Netherlands. Hess (2018) analyses trends in ERA over a longer period than Coppola and Wilke (2014), though does not use a causal framework, and notes increases in ERA (particularly among the low skilled), and more generally convergence in ERA, across all educational groups.

There exists little empirical evidence on the role of SPA in retirement expectations for the UK. The one exception we are aware of is Disney and Tanner (1999) whose data cover the late 1980's/early 1990s and is prior to any kind of reform to SPA**.** We address this gap in knowledge using a rich large scale nationally representative survey, the United Kingdom Household Panel Study (UKHLS). We exploit the fact during our sample period (2010-2016) three different State Pension Acts were in operation, allowing us to determine how differences in SPA impact ERA.

Our main findings show that both men and women do not significantly adjust their ERA in response to changes to SPA. In our analysis we control for a rich set of individual and household level characteristics and find occupational pension, income, education, job occupation and sector of work are important determinants of ERA. Similar to previous studies, we also investigate whether particular at-risk groups such as the unskilled or low educated do not adjust, or adjust less, given legislated changes to SPA. Our results based on interactions

between SPA with our rich set of controls suggest that, irrespective of gender, such groups are not less likely to adjust their expectations than their higher educated or higher skilled counterparts; however, we do find that women living in households who report higher levels of income are less likely to adjust their ERA.

Our findings are of policy relevance and suggest that by and large individuals do not, on average, adjust their ERA in a manner consistent with the policy objective. If the intention of policymakers is to keep individuals in employment for longer or, put another way, to have them delay retirement, then the government needs to design strategies to improve communication of changes in SPA. One example could be more effective information campaigns.[6] Of course, it might be that individuals are fully aware of the increase in SPA and stick to their original retirement plans. Nevertheless, the retirement decision has a wide range of welfare implications for both the individual in terms of consumption, savings and living standards at older ages; and for the state from a taxation and welfare spending perspective (Manski, 2004; Cribb et al., 2016). Therefore, understanding how SPA and different economic and sociodemographic characteristics affect retirement expectations is crucial if policymakers wish to ensure that individual's adequately plan for retirement.

The rest of the is paper is set out as follows. Section 2 summarises the main features of the UK pension system. Section 3 describes the United Kingdom Household Panel Survey. Section 4 describes the methodology used and Section 5 presents estimation results. Section 6 discusses the implications of our findings and concludes.

[6] This implies that the notion of retirement in the UK is associated with a reduction in hours worked or complete exit from the labour market. Whilst the 'default retirement age' was scrapped in the UK in 2012; there remains a strong association between reporting being 'retired' and number of hours worked or exit from the labour market (Banks and Smith, 2006).

2. Overview of Pension Policy in the UK

The UK pension system consists of three pillars. The first is the (Basic) State Pension. The new Basic State Pension was introduced in April 2016 and is a single tier flat rate pension based on a Pay as You Go funding structure. Individuals who reached SPA prior to this date remain under the 'old' system which has two tiers: a flat rate basic pension and an additional pension related to earnings.[7] Our sample is composed of older individuals for whom the rules of the pre-2016 system determine their level of state pension whilst for younger individuals the new system applies. Individuals in the UK are eligible to claim their State Pension (SP) when they reach the eligibility age (SPA) and not before. The level of SP benefit depends on the number of years of National Insurance Contributions made when in employment and an individual's date of birth.[8] In the 2018/19 tax year, the maximum SP benefit an individual can receive under the new single tier system is £164.35 per week.[9]

Expenditure on state pensions represents a significant proportion of welfare expenditures: in the tax year 2017/18 this was forecasted to be £93.8 billion or just under 5% of GDP in Great-Britain (OBR, 2018). In terms of its generosity, however, the UK has the least generous public state pension among OECD countries (OECD, 2017). Whilst most individuals make additional voluntary retirement saving through occupational and private pensions (the second and third pillars respectively) which determines the majority of their pension, for the poorest pensioners

[7] See Bozio et al. (2010) for a comprehensive description of system in place prior to April 2016.

[8] A recent OECD report showed that gaps in employment have limited impact on retirement income in terms of state pension accrual due to welfare policies in operation in the UK (OECD, 2015).

[9] In 2018-2019 the full basic state pension amounted to £125.95 per week under the old system, however the amount calculated is a function of numerous factors such as the `class' of the contribution and whether an individual was 'contracted out' (Bozio et al., 2010).

almost 80% of their income is state pension (Age UK, 2018). The DWP (2017) recently estimated that about 1.1 million single pensioners rely on their State Pension alone as their sole source of income (Independent, 2017). As the second and third pillars are not at the focus of this paper, further details can be found in Appendix A.

2.1 State Pension and Pension Acts in the UK

The basic structure and features of the UK State Pension system were introduced in the Beveridge Report published in 1948. Between 1948 and 5th April 2010 the SPA for women (men) remain fixed at 60 (65); however various other changes were enacted such as the abolishment of high marginal tax rates on employment earnings post SPA (see Bozio et al. (2010) for further details). The first change to SPA was made in the 1995 Pension Act, which legislated to equate the female SPA to that of males, specifically female SPA would be increased by one month every month for those individuals born after 6th April 1950, starting from April 2010. The full effect of the reform when originally legislated would not be complete until March 2020.

The introduction of the 2007 Pension Act raised the SPA for both men and women to 66 between 2024 and 2026 (increasing by one month, every month), to 67 between 2034 and 2036 and to 68 between 2044 and 2046. The rationale for the reform was related to the increases in life expectancy observed since the 1950s (ONS, 2015), which had not been matched by an equivalent or proportional increase in SPA. Increasing longevity puts significant pressures on government finances and has called into question the sustainability of the UK state pension system (Lassila and Valkonen, 2017).

The objective of the 2011 Pension Act was to bring forward the rise in the female SPA. The equalisation would now be achieved by November 2018. Moreover, the increase in the SPA from 65 to 66, for both men and women, was also brought forward (from 2024-2026) and is

due to take place between December 2018 and October 2020**.** The magnitude and far reaching extent of the 2011 reforms were non-trivial: estimates suggest 5 million individuals were affected (House of Commons library, 2017). The 2014 Pension Act brought forward planned increases to SPA of the 2011 Pension Act.[10]

The legislated changes to SPA are summarised visually in Figure 1 for men and Figure 2 for women. It is important to note that the exact increase in SPA under the reform is not uniform between men and women or within gender and depends on an individual's exact date of birth. Each figure shows the age at which an individual is eligible to claim their SP depending on the Pension Act in place at the time of their survey interview. Specific details of the changes made to SPA in each Act are detailed in Appendix B. The Figures show there have been strong increases in SPA for individuals in the affected cohorts over a relatively short period of time: the largest increase for men is one year and for women it is two years.

The changes made to SPA for women has been criticized by the so-called Women Against State Pension Inequality (WASPI) group which argues that females in the most affected cohorts received insufficient advance notification of the changes they faced (House of Commons library, 2017). In terms of actual labour supply effects, Cribb et al. (2016) analyse the increase in female SPA from 60 to 62 and found the reform increased the employment rate of affected individuals by 6.3 percentage points. At the time of writing, the reforms to men's SPA had only just begun to take effect and no data is available to analyse the effect of the reform. Indeed, the fact that many of the changes to SPA will not take place for some time and have only been

[10] The 2014 Pension Act also legislated that the SPA would be reviewed on a periodic basis. The March 2017 recommendation of the Cridland Review of bringing forward the increase of SPA from 67 to 68 does not affect our sample respondents.

implemented gradually underlines the importance of understanding whether individuals intend to adjust their ERA.

Figure 1: **UK State Pension Acts and Men's SPA**

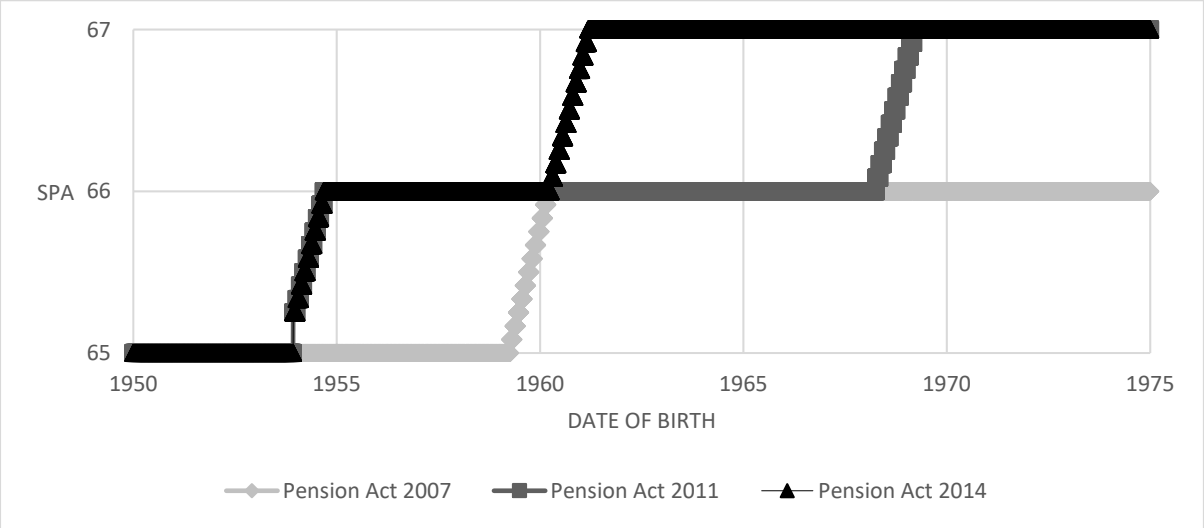
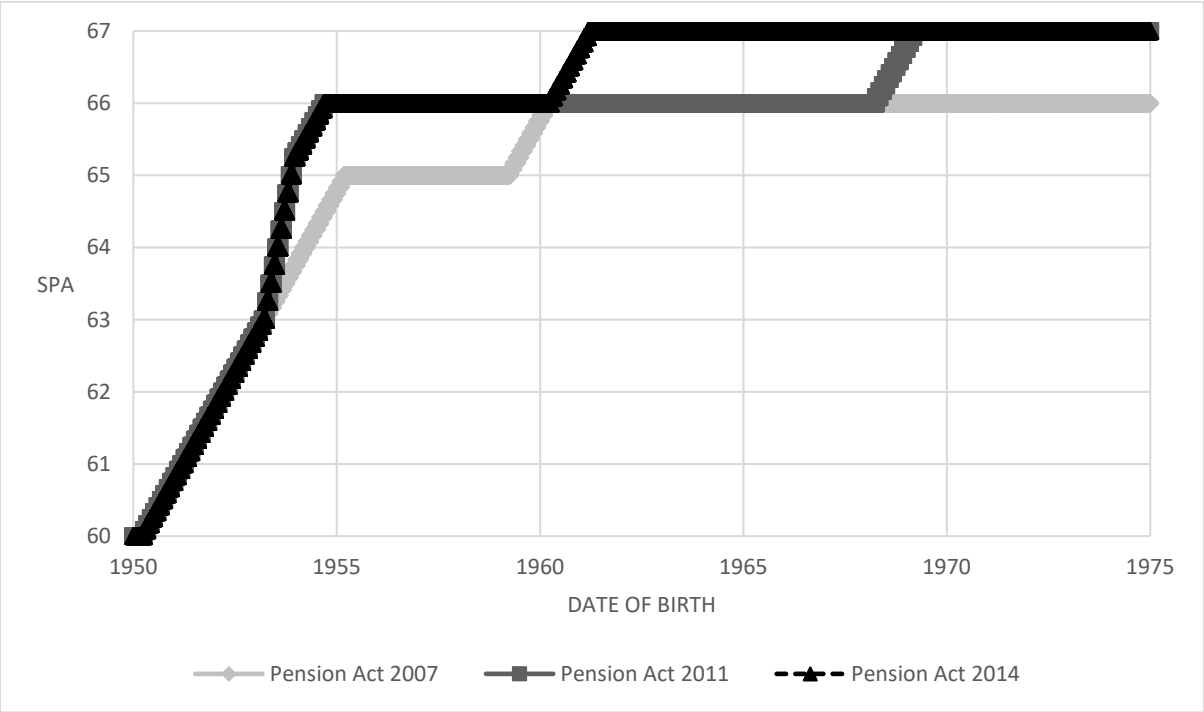


Figure 2: UK State Pension Acts and Women's SPA



2.2 Abolishment of the mandatory retirement age

Until October 2011, existing legislation meant that employees had relatively few employment rights after the age of 65; for example, employees were required to request permission to work past this age and therefore 65 became the 'default retirement age' (Lain et al., 2017). In 2011 the implementation of the Employment Equality Regulations (EER) reform scrapped the so-called default retirement age and allowed employers to retire employees only if there is a justifiable legal basis for doing so.

The abolishment of mandatory retirement did not correspond with a sudden increase in employment rates among older workers, however there has been a general increasing trend in participation rates among individuals aged 65 and over since the early 2000's (ONS, 2018c). On balance, we do not expect the 2011 EER to affect the impact SPA has on ERA in a systematic way, due to strong cultural norms and social security incentives between reaching

SPA and reducing work hours or exiting the labour market in the UK (Kohli, 1991; Blundell, Bozio and Laroque, 2013). Moreover, the EER affected labour supply at the age 65, which would affect relatively more men than women in our sample given the historic differences in SPA conditional on gender. This contrasts with evidence from the US, which found a positive effect on participation rates following the introduction of a similar policy (von Wachter, 2009).

3. Data

The main analysis uses data from waves 2-6 (2010-2015) of the United Kingdom Household Panel Study (Understanding Society) the largest annual longitudinal household survey in the UK, providing information on around 40,000 households (Knies, 2017).[11] Understanding Society contains detailed information relating to a range of individual and household economic and sociodemographic characteristics. We use the secure version of the study which contains individual's day, month and year of birth which is, as discussed above, required to construct the exact age at which an individual is eligible to claim their State Pension.

We follow previous research (Banks & Smith, 2006; Blundell, Bozio & Laroque, 2013) and assume that individuals perceive the term 'retirement' to correspond to a significant reduction in labour supply; this could be a reduction at the intensive margin (hours worked) or at the extensive margin (cessation of employment).

Understanding Society fields a 'retirement planning' module at each wave which contains a range of questions asking individual's for their subjective expectation of particular events associated with retirement. The specific question utilised in our analysis is worded as follows:

[11] An additional robustness check uses waves 2,3,7 and 8 (2010-2017).

"*There is a lot of policy interest in how people are planning for their long term future and retirement. At what age do you expect you will retire or will consider yourself to be retired*?"

Respondents provide an integer value or 'don't know'. The retirement planning module is age-triggered therefore only individuals aged 45, 50, 55, 60 and 65 who consider themselves not retired are eligible to answer. We exclude 65-year-old men and 60-year-old women from our sample due to selection; it is likely that these individuals are systematically different (in an unobservable way) from the rest of our sample as they are working at or past SPA at the time the survey was administered.[12] Appendix C describes the key economic and sociodemographic characteristics used in the analysis. Appendix D provides summary statistics on these same characteristics by gender.

We restrict our sample to all individuals at each wave of the survey who are eligible to answer the survey and retirement planning question. We drop 228 men and 386 women whose response on the retirement planning question is 'don't know' (5.86% and 7.54%, respectively).[13] We then combine wave specific observations such that we have one observation per individual.[14] This gives an initial sample of 6,094 men and 7,485 women. Given the historic differences between employees and the self-employed in terms of pension provision and the types of

[12] An alternative way of eliciting expectations is using subjective probabilities (Manski 2004) which has not been done in Understanding Society.

[13] These have relatively lower levels of education, are more likely to be public-sector workers and to be single, and also reported on average a lower level of income. We do not attempt to include these individuals in the estimation sample using a Heckman type framework due to the relatively low number of individuals in this group and unavailability of appropriate exclusion restrictions.

[14] Whilst Understanding Society is an annual survey, in a small number of cases the survey interview took place just after an individual's, say, 45th birthday and just before their 46th birthday. We only kept one observation (the first) for each individual.

retirement saving vehicles utilised, in addition to issues such as selection and unobserved heterogeneity we restrict our analysis to only employees (3,897 men and 4,990 women). Finally, we restrict our estimation sample to include only those individuals for whom we know are a member of their workplace pension scheme. Our final sample consists of 2573 males and 1834 females for which we have a complete information set.

Only for Tables 1 and 2, we split our sample period into three subperiods defined by the State Pension Act in operation at the time of the individual's survey interview. For men and women separately, we then split our sample into (roughly) single year age bands based on SPA and compute ERA for each SPA (band)-period combination.

Table 1 Mean ERA by period and SPA for male respondents.

Cells: mean ERA	Period			
SPA (age bands)	January 1, 2010 - November 2, 2011	November 3, 2011 - May13, 2014	May14, 2014 - December 31, 2015	All
[65,65.5)	64.0	65.2	65.6	64.6
[65.5,66.5)	64.0	64.5	64.9	64.4
[66.5, 67)	No obs.	65.0	64.4	64.5
All	64.1	64.6	64.6	64.5

Notes: ERA= Expected Retirement Age; SPA = State Pension Age

Table 2 Mean ERA by period and SPA for female respondents.

Cells: mean ERA	Period			
SPA (age bands)	January 1, 2010 - November 2, 2011	November 3, 2011 - May13, 2014	May14, 2014 - December 31, 2015	All
[60, 60.5)	64.0	No obs.	No obs.	64.0
[60.5,61.5)	63.5	64.0	No obs.	63.7
[61.5,62.5)	62.3	63.9	No obs.	63.8
[62.5, 63.5)	No obs.	63.7	No obs.	63.7
[63.5,64.5)	62.9	63.9	64.6	63.5
[64.5, 65.5)	63.4	64.8	65.1	63.6
[65.5, 66.5)	62.9	(63.9	64.1	63.6
[66.5, 67)	No obs.	63.9	64.1	64.1
All	63.1	63.9	64.1	63.7

Notes: ERA= Expected Retirement Age; SPA = State Pension Age

These tables show that younger cohorts of men and women (those with the highest SPA) do not sufficiently revise their ERA given the legislated increase in SPA. Over time males whose SPA band is between 65 and 66.5 report on average higher ERA compared to men whose SPA is over 66.5. For women, we find that those who have a SPA between 60 and 62.5 and surveyed earlier in the sample period report on average higher ERA. Table 2 also shows ERA increasing between the first and second period for women.

4. Methodology

Figures 1 and 2 show that the change to SPA is gradual and relatively small for some cohorts; whilst for others it is much larger (up to two years). Moreover, the magnitude of the changes differs by DOB in different calendar years. This complex relationship between SPA on the one hand and calendar time and cohort on the other, makes it difficult to use standard econometric frameworks such as Difference-in-Difference, regression discontinuity designs (RDD) or regression kink designs (RKD) for analysing the relationship between the SPA and the ERA (Card et al., 2015; Card et al. 2017).[15] Nevertheless, these studies show that if one controls for flexible (smooth) functions of the assignment variables, then one can identify the effect of SPA on ERA by exploiting the discontinuities as shown in Figures 1 and 2. We therefore take a parametric approach in which we control for polynomials in the assignment variables, which in our case are date of birth and survey interview.

Our dependent variable is ERA and the assignment variables determining SPA are date of birth and time of the interview and are denoted by, respectively, *d* and *t*. We estimate the following equation by Least Squares for each gender:

$$(1) \qquad ERA = \omega_0 + \omega_1 SPA_i + \omega_2 \tilde{d}_i + \omega_3 \tilde{d}_i^2 + \omega_2 \tilde{t}_i + \omega_3 \tilde{t}_i^2 + \mu \boldsymbol{X}_i + \boldsymbol{\delta H}_i + \mathfrak{z}_i$$

The individual is indexed by i, $\tilde{d}_i$ is birth date in deviation of the sample minimum, $\tilde{t}_i$ is calendar time in deviation of the sample minimum and $\mathfrak{z}_i$ is an error term. $\boldsymbol{X}_i$ refers to individual characteristics and $\boldsymbol{H}_i$ refers to household characteristics including that of the spouse. We include a rich set of controls that have been shown to be important in influencing ERA. For instance, being enrolled in an occupational pension scheme, individual's income, health and

[15] One possibility is to analyse the SPA-ERA relationship around the kink and jump points separately, however the low number of observations around these points, as there are many, makes this impossible.

spouse's income (e.g., Chan & Stevens, 2004; Cobb-Clark & Stillman, 2006; Ho & Raymo, 2009).[16] It is possible that such factors have changed over time and could potentially influence SPA results if not controlled for, as SPA is cohort specific. In addition to following previous studies regarding the relative importance of controlling for particular characteristics, we believe they are of interest in their own right given the policy relevance of this paper.

The key coefficient of interest is ω_1 associated with SPA_i. If ω_1 is positive (negative) this indicates ERA rises (falls) for a given increase in SPA and if equal to one it would mean that individuals adjust their ERA with exact the same number of years as the rise in their SPA. If ω_1 is equal to zero, that is no effect of SPA on individual's ERA, this would be consistent with individuals having perfect foresight or, in the other extreme, individuals being 'naïve' with respect to announced changes to SPA. Finally, to investigate if the effect of SPA on ERA differs by socioeconomic status, we estimate models with interactions between SPA and **X** or **H**.

5. Estimation results

Our main specification controls for a rich set of individual and household characteristics, results suggest a subset of these are especially important in determining ERA and therefore we focus our discussion on these factors. We estimate two versions of Eq. (1); the first does not include interactions between these factors and SPA whereas the latter does, thus allowing us to determine whether particular subgroups of individuals adjust their ERA more rapidly in response to changes in SPA.

[16] In preliminary specifications, we controlled for an extensive set of spousal characteristics however only few were found to be statistically significant.

5.1 Men

Table 3, first column, indicates that an increase in SPA has no significant effect on men's ERA conditional on controlling for all other factors. Concerning individual economic and sociodemographic characteristics, men who do not report being a member of their workplace pension scheme report, on average, an ERA which is 0.83 years higher compared to those who are a member. This may suggest that occupational pensions are not only important in determining the level of income in retirement but also the age at which individuals expect to retire. Relative to individuals who hold a degree, having a lower level of educational attainment has a negative effect on ERA. The size and significance of this effect varies depending on level of attainment: having an A-level (13 years of fulltime education) compared to a degree (16 years of fulltime education) lowers the ERA by around 0.73 years and is even larger for individuals with 'other' (relatively basic) types of qualification.

Individuals' job occupations significantly affect their ERA; belonging to lower grade occupational groups has a negative effect on ERA. In terms of the magnitude of this effect the predicted effect on ERA for a male in an unskilled occupation is -1.1 years relative to a professional. In addition to occupation, sector of work is also of significant importance. The marginal effect of working in the public sector lowered men's ERA by on average 1.2 years.

The results suggest that higher levels of monthly household and individual income lower ERA. For example, holding all other factors constant at their average values, a one standard deviation increase in individual (household) income leads to ERA decreasing by 0.73 (0.25) years compared to the mean. Housing tenure was also found to be important, relative to individuals who owned their home outright; owning with a mortgage or renting had a positive impact on

ERA.[17] Whilst we control for a range of spousal level characteristics (not reported) we do not find any factors which are statistically significant.

[17] In preliminary specifications we control for a range of spousal characteristics however none were statistically significant.

Table 3 Determinants of the Expected Retirement Age for men and women

	Men	Women
State Pension Age (SPA)	0.143	0.291†
	(0.282)	(0.168)
Educational attainment (reference is university degree)		
Other higher degree	-0.587*	-0.609*
	(0.267)	(0.303)
A-level etc	-0.725**	-0.327
	(0.247)	(0.321)
GCSE etc	-0.464	-0.372
	(0.278)	(0.336)
Other qualification	-0.902**	-0.201
	(0.317)	(0.431)
No qualification	-0.658	-0.782
	(0.465)	(0.677)
Occupation (references is professional)		
Managerial & technical occupation	-0.817**	-0.286
	(0.295)	(0.439)
Skilled non-manual	-1.736***	0.291
	(0.366)	(0.496)
Skilled manual	-0.942**	0.933
	(0.339)	(0.720)
Partly skilled occupation	-0.885*	0.22
	(0.397)	(0.527)
Unskilled occupation	-1.103*	0.371
	(0.496)	(1.066)
Public sector (relative to private sector)	-1.216***	-0.456*
	(0.179)	(0.227)
No occupational pension (relatively to having one)	0.830***	0.687*
	(0.216)	(0.323)
Housing tenure (reference is owned outright)		
Owned with mortgage	0.584**	0.979***
	(0.203)	(0.242)
Rent (or other)	1.600***	2.555***
	(0.286)	(0.381)
Equivalized real monthly household income	-0.517*	-0.994***
	(0.228)	(0.253)
Real individual monthly income	-1.558***	-0.326
	(0.263)	(0.248)
Number of observations	2573	1834
Adjusted R-squared	0.096	0.088

Notes: †p<0.10, * p<0.05, ** p<0.01 and ***p<0.001. Standard errors in parentheses. Other controls are quadratic cohort and time polynomials, self-reported health, long term health condition, region, ethnic minority group and number of dependent children. For women we also control for spouses' health, education and occupation. Sample based on waves 2-6 of Understanding Society secure access version (study number SN 6676), see University of Essex (2018).

6.2 Women

Table 3, second column, shows that females make a partial adjustment with respect to the age at which they expect to retire for a given change in SPA. ERA increases on average by 0.29 years for a one-year increase in SPA, though we note that our finding is only weakly significant at the 10% level.

Occupational pension membership also plays an important role in determining ERA for females, not being a member of such a scheme raises ERA by 0.69 years. The magnitude of the effect is not dissimilar to that found for men and we also find that women who work in the public sector report a significantly lower ERA of just under half a year compared to private sector female employees.

Whilst we find the same general pattern as men in terms of education namely, those who are lower educated report on average lower ERA, the result is only significant for individuals who held other types of higher degree (teaching qualifications, nursing qualification). The magnitude of the effect reduced ERA by around 0.6 years compared to those with a traditional university degree. We do not find significant effects for occupation skill levels.

Turning to household level factors, we also find housing tenure is important in influencing ERA. Compared to women who own their home outright those who have a mortgage or (in particular) rent report on average a higher ERA (0.98 and 2.56 years respectively). We note the importance of household income; those females residing in households who report higher levels of income report on average a significantly lower ERA.

Evidence suggests couples coordinate their retirement behaviour (Ho and Raymo, 2009; Merkurieva, 2017). Results not reported in Table 3 show that spousal characteristics such as economic status, health and occupation also affect ERA for women. Females who have a

spouse that is unemployed at the time of the survey interview report an ERA on average 2.85 years higher than that of a female whose partner is employed. Our results suggest females who have a spouse in poorer health report a higher ERA ceteris paribus, whereas those who have spouse's in lower skilled occupations report a lower ERA. However, we find these results are statistically significant for only particular levels of health and occupation.

5.3 Interaction effects and robustness check

One concern for policymakers is whether potential at-risk groups have adjusted their ERA in response to changes to SPA. We explore whether there are any significant differences between particular sub-groups of men and women in light of the results in Sections 5.1 and 5.2. To do this we interact SPA with factors which were shown to be significant in the specification reported in Table 3.[18] As the interactions effects are mostly, but not all, (jointly) insignificant, we discuss the main findings and refer interested readers to Appendix E.

One potential at-risk group is the lower educated or unskilled who on average save less for retirement (Banks & Oldfield, 2007; Copolla & Wilke, 2014). While Table 3 shows that education is important for determining men's ERA, we found no significant differences in revision to ERA (for a given change in SPA) by levels of education or skill. We did find a significant difference between public and private sector workers: male public sector employees who contribute to an occupational pension made a smaller adjustment to their ERA compared to their private sector counterparts. Furthermore, we found that men residing in households who report higher levels of income are significantly less likely to adjust their ERA in response to increases in SPA, conditional on all other factors.

[18] Based on a F-test of joint significance.

It could be that individuals who are less sensitive to a given change in SPA can afford to and poorer individuals adjust their ERA simply because they must work for longer as they do not have the means to financially bridge the gap. Banks and Smith (2006) found richer British male employees (who are more likely to have an occupational pension which can be claimed at age 55) tend to exhibit higher rates of early retirement. For women, and not for men, we find a strong negative effect when household income level is interacted with SPA on ERA holding all else constant; women living in households with higher income levels are on average less likely to adjust their ERA for a given increase in SPA. We find similar (albeit mild) evidence when we interact occupation and SPA: women who are in a managerial or technical occupation are less likely to adjust their ERA relative to those in a professional occupation. However, we find no evidence that the partly skilled or unskilled behave in a significantly different way relative to professionals. Finally, our results also suggest there is an interaction effect between housing tenure and SPA: women living in rented accommodation are more likely to adjust their ERA for a given increase in SPA, relative to women who own their home outright conditional on all other factors.

The results suggest that whilst there are some differences in the speed at which certain subgroups adjust conditional on gender; on balance most interactions are either insignificant or only mildly so. The one exception being household income. These findings are of policy relevance. If, for example as we find that lower educated and/or skilled men women do not adjust their ERA in response to legislated changes to SPA, and this group has a lower ability to save for old age this would imply significantly lower retirement savings compared to the highly educated and/or skilled. This will have a significant impact on their future living standards and impact pensioner poverty levels in years to come.

Evidence suggests there is a significant heterogeneity in pension and retirement wealth (including housing wealth) in the UK by education level and cohort (Department for Work and Pensions, 2010). This is likely to be related to differences during working life in availability of a workplace pension *and* type. For example, public sector employees in the UK were historically enrolled into a defined benefit workplace pension, whereas private sector employees were more likely to join a defined contribution scheme (ONS, 2018b). The former type of scheme is often described as relatively more generous (their availability has been significantly reduced) and this may explain why public sector employees made a smaller adjustment to their ERA. Similarly, we restate the importance of occupational pensions in determining not only living standards in retirement but influencing how much individuals intend to adjust their future labour supply in response to changes in SPA.

Robustness check

Despite controlling for a rich set of characteristics at both individual and household level, one may be concerned that unobservable individual level factors could affect our findings. To address this, we exploit the panel aspect of Understanding Society, noting that conditional on not attriting the same individual completes the retirement planning module once every five years. Therefore, it is possible to construct a balanced panel for those individuals who were eligible to complete the retirement planning module at wave 2 or 3 and again at wave 7 or 8. We restrict the analysis to those men (women) aged below 60 (55) in their initial wave of observation and cluster standard errors.

We estimate a fixed effect regression model to account for individual level time invariant unobserved heterogeneity for a simple specification, which controls for our main covariates of

interest: SPA, occupational pension membership and income.[19] We find, for both men and women, no statistically significant evidence that changes in SPA affect ERA. For men this is consistent with our finding in Table 3, however for women it may suggest that the partial adjustment effect reported in Table 3 is not robust and that also women's ERA is not responsive to changes in SPA. We refer interested readers to Appendix F.

6. Discussion and concluding remarks

Given the fiscal implications of population ageing, influencing how individuals prepare for retirement and old age has become a key issue for governments in advanced OECD countries including the UK. One policy lever is to extend working lives by increasing SPA. In the UK successive State Pension Acts have increased the SPA or brought forward already legislated increases to reduce the cost of state pensions for the exchequer (Barrell, 2011).

In this paper we have considered whether individuals adjust their ERA in response to changes in SPA, and if the direction of adjustment is consistent with the policy objective. Our main results suggest that individuals have not adjusted their ERA in response to increases in SPA up to one year for men and two years for women. If policymakers wish to use SPA as a tool to alter ERA and extend working lives among future cohorts then our findings suggest additional initiatives are required. In particular, if the root-cause of this non-adjustment is related to insufficient information given the number of reforms introduced in a relatively

[19] Results are available on request. An extended specification was also estimated which included a wide set of characteristics however they did not change the qualitative nature of the results described above. We also estimated random effect specifications and tested for which specification preferred using a generalised Hausman test. Whilst for (men) women the null hypothesis was (not) rejected; implying a fixed specifications for females only, we report results based on this specification for both groups for comparability. Note that in this case it was not possible to control for cohort effects, as these are time invariant.

short period of time, it would highlight the need for effective communication on the consequences of the increased SPA for individuals' long-term financial plans. Of course, it is possible individuals adjust their actual behaviour once they are 'close' to SPA; though we note that existing evidence suggests only 1 in 10 women affected by recent reforms have done so (Disney and Tanner, 1999; Cribb et al., 2016) and future research can address if this also holds for the SPA reforms considered in this paper.

Alongside SPA we also consider whether individual and household characteristics influence ERA. Occupational pensions play a major role in determining living standards for a large section of the older population in the UK. We find not being an active member of an occupational pension plan increases ERA; moreover when interacted with SPA these same individuals are also more likely to adjust their ERA upwards than those who are contributing to such a scheme. This effect could be related to the fact that, unlike in countries such as the Netherlands and Germany, occupational pensions in the UK can be claimed at age 55, over 10 years prior to being eligible to claim state pension.

Household income also affects ERA directly and when interacted with SPA, individuals living in higher income households report a lower ERA and are slower to adjust ERA for given changes in SPA consistent with past evidence of actual retirement behaviour in the UK (Banks and Smith, 2006). Sector of work (and job occupation) was also important for women (men), due to data limitations it was not possible to determine whether working in a particular industry affected ERA, something which should be addressed in future work.

In terms of adjusting ERA to the recent SPA reforms, our results suggest three groups are at risk: those working in the public sector, the low educated and/or skilled and younger individuals. This is of serious concern given that some of these characteristics have been shown to be strongly associated with pensioner poverty in the UK (Kanabar, 2016). Public

sector workers have traditionally been eligible for (relatively generous) defined benefit pension schemes, though these are now increasingly rare, especially for new entrants. Younger individuals have been auto enrolled into workplace pensions but whilst coverage levels are high, at the time of writing little is known about how participation rates will adjust once planned increases in individual contributions are introduced. We also note that this reform will not adequately address pension saving shortfalls (adequacy) for lifetime low earners and older workers who shortly plan to exit the labour market.

Given the importance of retirement planning for both individual's own future wellbeing and central government expenditures, one route policymakers could take is to improve the effectiveness of marketing and information campaigns related to changes to SPA and planning for later more generally. A recent initiative being considered by the DWP is a so-called 'Pensions Dashboard' which will provide individuals with their personal (forecasted) financial position in retirement (DWP, 2019). Policies such as auto enrolment have also been introduced to boost pension savings, however, are primarily aimed at low wage workers and have initially been concerned with pension coverage rather than contribution level.

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APPENDIX A

Occupational and personal pensions in the UK (Second and Third Pillars)

Occupational pensions.

Occupational pensions are a voluntary form of retirement saving and make up the second pillar of the UK pension system. These have traditionally been Defined Contribution (DC) or Direct Benefit (DB) type pension schemes; individuals are taxed on receipt of income from their occupational pension not at point of contribution. Occupational pensions (and personal pensions) play an important role in providing income in retirement, given that the level of state pension is relatively low in the UK (OECD, 2017). For example, average net replacement rates increase from 29 percent (state pension alone) to 62.2 percent after accounting for the presence of an occupational pension (OECD, 2017). From April 2002 individuals have been able to claim their state pension from the age of 55 (up from 50); highlighting the significant gap between claiming occupational and state pension in the UK for both men and women. A recent DWP report highlights that only 62 percent of pensioners expect to receive income from an occupational pension (DWP, 2015).

In an effort to increase occupational pension coverage and hence retirement saving (but not retirement age *per se*), the UK government in April 2012 introduced Auto Enrolment (AE) a policy whereby employees were automatically enrolled into a workplace pension. Evidence has shown that such 'nudge' behaviour has been effective in terms of changing individuals behaviour in a particular way (in this case minimising opt out) given a particular policy objective (Cribb and Emmerson, 2016).[20] Early evidence from the introduction of AE

[20] Auto enrollment was gradually phased in starting with larger employers before moving on to smaller employers, note that it does not cover the self-employed and we do not include such individuals in our sample for analysis

suggests it has been largely successful in terms of coverage but issues such as increasing contribution rates conditional on participation still remain (Cribb et al. 2016; DWP 2017b).

The UK government has also made significant changes to the way in which retirement savings made via a DC pension can be drawn and used. Until March 2015 individuals could draw down up to 25 percent (tax free) as a lump sum and annuitize the remainder; however, following the introduction of the Pensions Schemes Act 2015; individuals are free to use their retirement savings as desired. A priori it is not clear how this policy change may influence retirement expectations. One possibility is that given it came into effect soon after the 2014 state pension act, which introduced further increases to SPA, the 2015 Pensions Schemes Act (PSA) could have mitigated upward revisions to ERA. For example, if individuals were likely to be liquidity constrained, the policy reform meant this would no longer be the case and *ceteris paribus* induce individuals to retire earlier.

Thurley (2017) summarises the impact of the 2015 PSA on individuals and shows that the introduction of the reform led to significantly more individuals drawing down their pension pot early (before age 65), that the majority of these early withdrawers had relatively small pension pots (<£30,000) and the number of annuities being taken out falling sharply and drawdown becoming the norm. Importantly, evidence suggested most individuals did not consider their DC pension as their main source of retirement income (the majority reported DB and State Pension) and that it was common for individuals to access their pension pots whilst still employment (FCA, 2018). Evidence also suggested the reforms did not lead

purposes due to the way the UK pension system has historically treated self-employed versus employees, in addition to issues such as selection and unobserved heterogeneity.

individuals ‘squandering’ their retirement savings and instead choosing to invest in alternative forms of saving (Thurley, 2017).

Personal pensions.

Personal pensions are another type of voluntary retirement saving, between an individual and a provider (usually an insurance firm); and make up the third tier of the UK state pension system. Personal pensions are usually a DC type scheme and are treated in the same way as occupational pensions from a taxation perspective.[21] Individuals must be aged at least 55 before they are eligible to claim their personal pension; the ‘Pension Freedom’ reforms introduced in 2015 affected personal pensions in the same way they did occupational pensions.

The widespread availability and uptake of occupational pensions since the 1950s and the fact that the UK labour market has historically been made up of employees means the proportion of individuals who have a personal pensions is higher among the self-employed, a group of individuals who we do not consider in this study.[22] This also means that when analysing retirement age expectations among employees it is relatively more important to control for the presence of an occupational pension rather than a personal pension.

[21] An individual can have an occupational and personal pension although certain limits exist in terms of total contributions made within a tax year. a tax year runs from 6th April each year to 5th April the following year. The annual pension contribution allowance on a personal pension is set by government; in the 2018-19 tax year it is £40,000.

[22] Self-employment rates have increased in the period after the Financial Crisis; nonetheless the self-employed still only make up 15% of the labour force in the UK (ONS, 2018a).

Appendix B: Summary of the UK State Pension Acts.

Men

Period 1: 2007 Pension Act.

Law from beginning of sample period until November 2, 2011

Main changes made to SPA:

- If a man is born before 6th April 1959: SPA=65
- If a man is born after 6th April 1959: SPA=65+1 month (1 month if born on 6th April, less if born after 6th April), born between 6th May and 5th June 1959: SPA=65+2 months (if born on 6th May less if born after). Born between 6th February and 6th March 1960: SPA=65+11 (11 months if born on 6th February 1960, less if born after)
- If a man is born after 6th March 1960 but before 6th April 1968: SPA=66

Period 2: 2011 Pension Act.

Law between November 3, 2011 and May 13, 2014

Main changes made to SPA:

- If a man is born before 6th December 1953: SPA=65
- If a man is born after 6th December 1953 and before 5th January 1954: SPA=65+3 months, born between 6th January and 5th February 1954: SPA=65+3+1, …., born between 6th September 1954 and 5th October 1954: SPA=65+3+8 (for the youngest i.e. born 5th October 1954, it will be 66 for those born on 6th September 1954).
- If a man is born October 1954 – March 1968: SPA=66
- If a man is born between 6th April-5th May 1968: SPA=66+1, …, between 6th February 1969 and 5th March 1969: SPA=66+11 (if born on 6th February 1969)
- If a man is born from 6th March 1969 onwards: SPA=67
- If a man is born after 5th April 1969 but before 6th April 1977 attains pensionable age when the person attains the age of 67. Born 6th April 1977 to 5th May 1977 then SPA is 67+1 month (if born on 6th April 1977)
- If a man is born 6th May 1977 to 5th June 1977 then SPA is 67+2 month (if born on 6th May 1977) until 6th March 1978 to 5th April 1978 after which SPA: 68
- A man born after 5th April 1978 attains pensionable age when the person attains the age of 68.

Period 3: 2014 Pension Act.

Law between May 14, 2014 –and end of sample period

- Cohorts up to and including 5th April 1960: as in period 2.
- If a man is born on or after 6th April 1960-5th May 1960: SPA=66+1 month, …,6th February 1961-5th March 1961: SPA+66+11
- If a man is born in March 1961 or later: SPA=67
- The increase in SPA going from 67 to 68 is identical to that described in period 2.

Women

Period 1: 2007 Pension Act

Law from beginning of sample period until November 2, 2011

- A woman born before 6th April 1950 attains pensionable age when she attains the age of 60.
- -A women born between 6th April 1950 and 5th May 1950 reaches SPA when she is 60+1 month (at most if she is born on 6th April 1950), If 6th May1950≤born<5th June 1950 then SPA: 60+2 months... and so on...until 6th March 1955≤born<5th April 1955: SPA is 64 years and 11 months.
- A woman born after 5th April 1955 but before 6th April 1959 she attains pensionable age when she is 65
- -A woman after 6th April 1959- same rules as detailed for men above.

Period 2: 2011 Pension Act.

Law between November 3, 2011 and May 13, 2014

- -A woman who is born 6th April 1953 -5th May 1953: SPA is 63 years + 3 months…… (note that under the 1995/2007 act her SPA would have been 63 years+1 months), so an increase of two months.
- -A woman born 6th May 1953-5th June 1953: SPA is 63 years + 6 months (note that under the 1995/2007 act her SPA would have been 63 years+2 months), so an increase of four months.
- …and so… until:
- A woman born 6th November 1953-5th December 1953: SPA is 65.
- Then for those born after 6th December 1953 the spa for females is same as that for males above, note however that the increase in state pension age is larger for those individuals born between December 1953 and March 1955, compared to individuals born after 1955.

Period 3: 2014 Pension Act.

Law between May 14, 2014 –and end of sample period

- Same rules as for men.

Appendix C variable definitions

Variable	Definition & Categories
Dependent variable	
ERA	Individuals expected age of retirement
Individual level covariates	
SPA	Age at which individual is eligible to claim their state pension according to State Pension Act in operation at time of respondent's survey interview and his or her date of birth.
Marital status	Single, Married/living as a couple, Divorced or Widowed
Self-reported health	Excellent, Very good, Good, Fair, Poor
Government office region of residence	North East, North West, Yorkshire and Humberside, East Midlands, West Midlands, East of England, London, South East, South West, Wales, Scotland, Northern Ireland
Highest educational qualification	University degree, Other higher degree (for example nurse), A-level (13 years full time education), GCSE (11 years full time education), Other qualification, No qualification
Long term health condition	0=No, 1=Yes; A long-standing physical or mental impairment, illness or disability. By 'long-standing' refers to anything that has troubled you over a period of at least 12 months or that is likely to trouble you over a period of at least 12 months.
Ethnicity	White majority, Other white groups, other ethnic group (made up of: Indian, Pakistani, Bangladeshi, Black Caribbean or mixed W&BC, Black African or mixed W&BA, Chinese, Arab, other Asian, mixed W&As or other ethnic groups).
Occupational classification	Professional, Managerial and technical, Skilled non-manual, Skilled manual, Partly skilled, Unskilled
Public sector worker	Yes=1; No=0
Log total net income	Individual. Total net income adjusted for inflation. Total net (of tax and NICS) income is the sum of: labour income, miscellaneous income, private benefit income, investment income, pension income and social benefit income.
Member of an employer's pension scheme	Yes=0; No=1
Household level covariates	
Housing tenure	Housing tenure of household individual resides in at the time of survey interview: Owned outright, owned with mortgage, rent (or other)
Household log income	Total post –tax equivalized household net income (of all household members) which has been adjusted for inflation (2015 prices) and household size using the OECD scale.
Number of individuals not in paid employment in household	0, 1, 2 or 3
Number of dependent children in household	0, 1, 2 or 3
Spousal level characteristics	Economic status (employed, unemployed or other), Self-reported health, Highest educational qualification, Occupational classification

Appendix D: Descriptive characteristics by gender.

Variable	Sample means		Variable	Sample means		Variable	Sample means	
	Men	Women		Men	Women		Men	Women
Age	51.02	50.30	South West	0.09	0.09	Public	0.37	0.65
ERA	64.00	63.14	Wales	0.07	0.06	*Number of dependent children*		
SPA	65.92	65.73	Scotland	0.10	0.11	0	0.65	0.69
DOB (linear)	11.35	11.94	Northern Ireland	0.06	0.06	1	0.16	0.18
Time (linear)	2.82	2.74	Degree	0.32	0.33	2	0.14	0.11
Income			Other higher degree (nurse, teacher etc)	0.13	0.18	3	0.04	0.03
Equivalised net household income	0.04	0.27	A level (13 years f/t education)	0.22	0.16	*Housing tenure*		
Individual total monthly net income	0.06	0.06	GCSE (11 years f/t education)	0.19	0.22	Owned outright	0.24	0.26
Occupational pension			Other qualification	0.10	0.08	Owned with a mortgage	0.63	0.65
No	0.15	0.16	No qualification	0.04	0.04	Rented or other	0.13	0.09
Self-reported health			*Long term health condition*			*Spousal characteristics*		
Excellent	0.18	0.20	Yes (=1, No=0)	0.28	0.29	Economic status		
very good	0.40	0.38	*Ethnic group*			Employed	0.99	
good	0.30	0.30	White majority	0.86	0.88	Other	0.01	
fair	0.11	0.10	Other white	0.04	0.04	*Health status*		

Poor	0.02	0.01	All other ethnic minorities	0.09	0.08	Excellent	0.19
Government office region			*Social class of current occupation*			Very good	0.40
North East	0.04	0.04	Professional	0.08	0.05	Good	0.28
North West	0.10	0.10	Managerial	0.43	0.46	Fair	0.12
Yorkshire and Humberside	0.07	0.07	Skilled non-manual	0.14	0.27	Poor	0.02
East Midlands	0.08	0.09	Skilled manual	0.19	0.04	*Social class of occupation***	
West Midlands	0.09	0.08	Partly skilled	0.11	0.14	Professional	0.08
East of England	0.09	0.09	Unskilled	0.04	0.02	Managerial	0.44
London	0.10	0.09	*Sector of work*			Skilled non-manual	0.10
South East	0.12	0.13	Private	0.63	0.35	Skilled manual	0.28
						Partly skilled	0.07
						Unskilled	0.04

Notes: Income measured as deviation from sample minimum. Sample based on waves 2-6 of Understanding Society secure access version (study number SN 6676), see University of Essex (2018).

Appendix E: Interaction results

We estimate an extended specification (by gender) to determine the relative importance of particular covariates of interest based on the results in Table 3 and their interaction with SPA. We test the null hypothesis that the interaction is jointly equal to zero. Full results are available on request.

Men

Null hypothesis: factor does not have a statistically significant effect on GAP*	Test statistic (F)	P-value	Implication
Interaction effects			
Occupational pension	1.07 F(1,2508)	0.37	Not rejected
Individual income	1.04 F (1,2508)	0.31	Not rejected
Household income	7.94 F (1,2508)	0.00	Rejected
Education	1.36 F (5,2508)	0.24	Not rejected
Occupation	1.07 F (5,2508)	0.37	Not rejected
Public sector worker	0.90 F (1,2508)	0.34	Not rejected
Housing tenure	0.77 F (2,2508)	0.46	Not rejected
* Null hypothesis tests that the estimated coefficient is not statistically different from zero			

Women

Null hypothesis: factor does not have a statistically significant effect on GAP*	Test statistic (F)	P-value	Implication
Interaction effects			
Occupation	1.93 F(5,1751)	0.09	Mildy reject
Public sector worker	0.18 F(1,1751)	0.67	Not rejected
Ethnicity	1.34 F(8,1751)	0.22	Not rejected
Housing tenure	2.8 F(2,1751)	0.06	Not rejected
* Null hypothesis tests that the estimated coefficient is not statistically different from zero			

Appendix F: specification controlling for individual fixed effects.

	ERA , Men	ERA, Women
State pension age	-0.191	-1.239
	(0.545)	(0.678)
Time polynomial	0.214	0.398
	(0.202)	(0.221)
Time polynomial squared	-0.0258	-0.0266
	(0.0247)	(0.0308)
Equivalised real monthly household income	0.0726	0.313
	(0.528)	(0.527)
Real individual monthly income	0.483	0.0737
	(0.606)	(0.357)
No occupational pension	-0.118	-0.75
	(0.519)	(0.587)
Constant	72.07*	141.4**
	(35.94)	(44.66)
Standard deviation of residuals within individual	3.73	4.21
Standard deviation of overall error term	2.53	2.9
Proportion of variance due to differences across individuals	0.68	6.78
Correlation between individual fixed effect and covariates	-0.19	-0.25
Number of observations	900	968

Notes: * p<0.05, ** p<0.01 and ***p<0.001. Standard errors in parentheses. Time polynomials are defined in terms of deviation from sample mean. Sample based on waves 2,3,7 and 8 of Understanding Society secure access data (study number Sn_6676_Und_Soc). See data source information above. Time polynomial is calculated as deviation from sample mean.