Retiring Together? Complementarities in Spousal Labour Supply and Pension Reform

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Abstract:

Using a difference-in-differences methodology, we estimate the impact of increasing the early retirement age for women on the labour force participation of their husbands. We exploit a recent increase of the early retirement age from 60 to 61 for women (with no change for men) in the UK to identify the effect of later retirement among women on the labor force participation of their husbands. Our results suggest that in response to the reform employment rates of married women increased by 5.4 percentage points at age 60, while the employment rate of their husbands rose by 4.2 percentage points. We also find that the proportion of couples where both partners work rose by 5.4 percentage points – higher than expected if partners' labour supply were substitutes for one another or were independent decisions. Our results therefore provide evidence of joint retirement caused by complementarities of leisure within couples.

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1. Introduction

It has been well-documented that husbands and wives commonly retire at the same time as one another (Hurd, 1990; Schirle, 2008; Banks, Blundell and Casanova, 2010). What is less well-established is whether there is a direct causal relationship between the two. Are the observed patterns driven by common economic variables and/or shocks, by correlated preferences that affect partnering decisions or by complementarities in leisure? This paper adds to the existing literature, using evidence from a recent increase in the early retirement age for women in the UK to estimate the causal impact of longer working among women on their husbands' labour force participation decisions. We examine changes in the behaviour of affected women's husbands to show that higher labour force participation among women does have a direct positive effect on their husbands' likelihood of being in work and that complementarities in leisure are an important part of what drives this response.

Understanding the forces driving the joint retirement of couples is important for many reasons. First, it is informative of the joint utility and decision-making processes of couples, which may affect other aspects of behaviour. Second, it is important if we are to understand the full effect of policy changes that may be targeted at one or other member of a couple, especially those affecting labour supply. This issue is now more important than ever because the labour force participation of older women has grown so dramatically over the last few decades.[1]

A number of previous papers have attempted to estimate the causal impact of one spouse's employment on the other's labour force participation. With a few exceptions (Selin, 2012) this literature has found that individuals in couples do adjust their labour force participation in direct response to their partner's behaviour, with couples' employment at older ages being found to be positively related. There is some evidence that men are more responsive than are women to their partner's behaviour (Zweimüller, Winter-Ebmer and Falkinger, 1996; Bingley and Lanot, 2007; Goux, Maurin and Petrongolo, 2014).

The challenge in this literature is to find exogenous changes in one partner's behaviour with which to estimate the causal impact on the other partner. A number of approaches to doing this have been taken. A small number of papers have examined changes in behaviour in response to specific policy reforms. Bingley and Lanot (2007) use reforms of the early retirement program in Denmark to estimate the effect of husbands' and wives' labour force participation on one another. Goux, Maurin and Petrongolo (2014) show that husbands (and, to a much lesser extent

[1] For evidence from the UK see, for example, Banks, Emmerson and Tetlow (2014).

wives) in France reduced their hours of work when their partner was forced to cut theirs as a result of new worktime regulations.

The other main branch of the literature has instead used other non-experimental identifying restrictions to estimate the causal impact of one partner's behaviour on the other's labour supply. Schirle (2008) and Mavromaras and Rong (2015) use increases in women's labour force participation across successive cohorts to estimate the impact on husbands' labour supply at older ages. A number of papers exploit the incentives generated by public pension systems (which incentivise the retirement of one partner at a particular point) to estimate the causal impact on partners' labour supply (Zweimüller, Winter-Ebmer and Falkinger, 1996; Coile, 2004; Stancanelli, 2013). These papers rely for identification on an assumption that these public pension scheme incentives affect men and women's labour supply only through the behaviour of their spouse at the point of retirement. This identification assumption would be violated if, for example, people who had a preference for retiring early (late) deliberately married partners who were going to face incentives to retire at an early (late) date. Banks, Blundell and Casanova (2010) use a difference-in-differences approach, exploiting differences between the early retirement age for women in the US and the UK, to show that the timing of husbands' retirement is sensitive to wives' retirement dates.

In this paper we use a difference-in-differences approach to estimate the effect of increasing the early retirement age (ERA) for women in the UK public pension system on husbands' labour supply. The increase in the ERA was legislated in 1995 and introduced gradually from 2010 onwards.

We may see a correlation between the timing of retirement of women and their husbands for one or more of three possible reasons. First, individuals with similar preferences (for example, for retiring early/late) may deliberately choose to partner with one another. Second, couples may experience correlated shocks, which could cause them to retire at the same time. Third, couples may have a preference for spending time together (i.e. complementarities of leisure), which also cause them to retire at the same time. Fourth, labour earnings of one member of the couple may be a substitute for earnings of the other partner, suggesting that the two members of a couple would retire at different times from one another.

The difference-in-differences estimation technique we use, exploiting the reform of the women's ERA, is likely to be robust to the first two channels. However, we might expect either or both of the other two channels to be important in determining how affected women and their husbands responded to the increase in the ERA for women. On the one hand, if couples enjoy spending their retirement together, husbands may retire later if their wives are induced to retire

later – suggesting we would see an increase in both male and female labour supply within the same families. On the other hand, if the policy change increases credit constraints or imposes a wealth or income shock on the couple, it may be that the husband's labour supply rather than the wife's responds to compensate – suggesting that we might see an increase in female labour supply in some families but an increase in male labour supply in others.

We identify the impact of increasing the ERA on the labour force participation of affected husbands by comparing cohorts who face different ERAs, while allowing for a flexible specification of cohort, age and time effects. We find that employment rates among affected women's partners increased by around 4.2 percentage points (with this result being statistically significant at the 5% level). Looking at the employment of both members of couples, we find that – among couples where the wife is aged around the state pension age – the increase in the female state pension age has led to an increase in the proportion of two-earner couples (5.4 percentage points) and a decrease in the fraction of couples where neither is in paid work (4.7 percentage points) but no significant change in the fraction of couples where only the husband or only the wife is in paid work. This suggests that there are complementarities of leisure within couples and that these dominate any substitution that happens between labour supply of members of couples in response to the policy.

Section 2 provides brief details about the state pension system and other relevant institutions and policies in the UK. Section 3 describes our empirical methodology and Section 4 discusses the data used. Section 5 presents our results and Section 6 concludes.

2. Institutional Background

The age at which an individual can first claim their state pension in the UK is known as the "state pension age". This is the only focal age in the UK state pension system – that is, there is no separate normal retirement age. In keeping with the rest of the literature, we refer to the state pension age as the *early retirement age* (or ERA) as it is the earliest point at which an individual can claim their state pension.

In 1995, the UK government legislated to increase the ERA for women from 60 to 65 between 2010 and 2020. The ERA had been 60 for women and 65 for men since 1948 and the increase in the ERA for women (to 65) was legislated in order to comply with a judgment from the European Court of Justice in 1990, which ruled that pension schemes should not discriminate on the grounds of sex.[2] The effects of this reform are shown in Figure 2.1 – women born after the 5th April 1950 had an ERA higher than 60, and women born in the months and years after this date

[2] For more details on this legislative history of this reform, see House of Commons Library (2015).

had to wait to gradually older ages before they could claim their state pension. The ERA for men remained unchanged at age 65. Figure 2.1 also show future changes to the ERA that have been legislated more recently. The increase in the ERA for women has been accelerated so that it will now reach age 65 in 2018. The ERA for men and women will then increase from age 65 to 66 between 2018 and 2020. These later changes are not examined and do not affect the analysis undertaken in this paper.

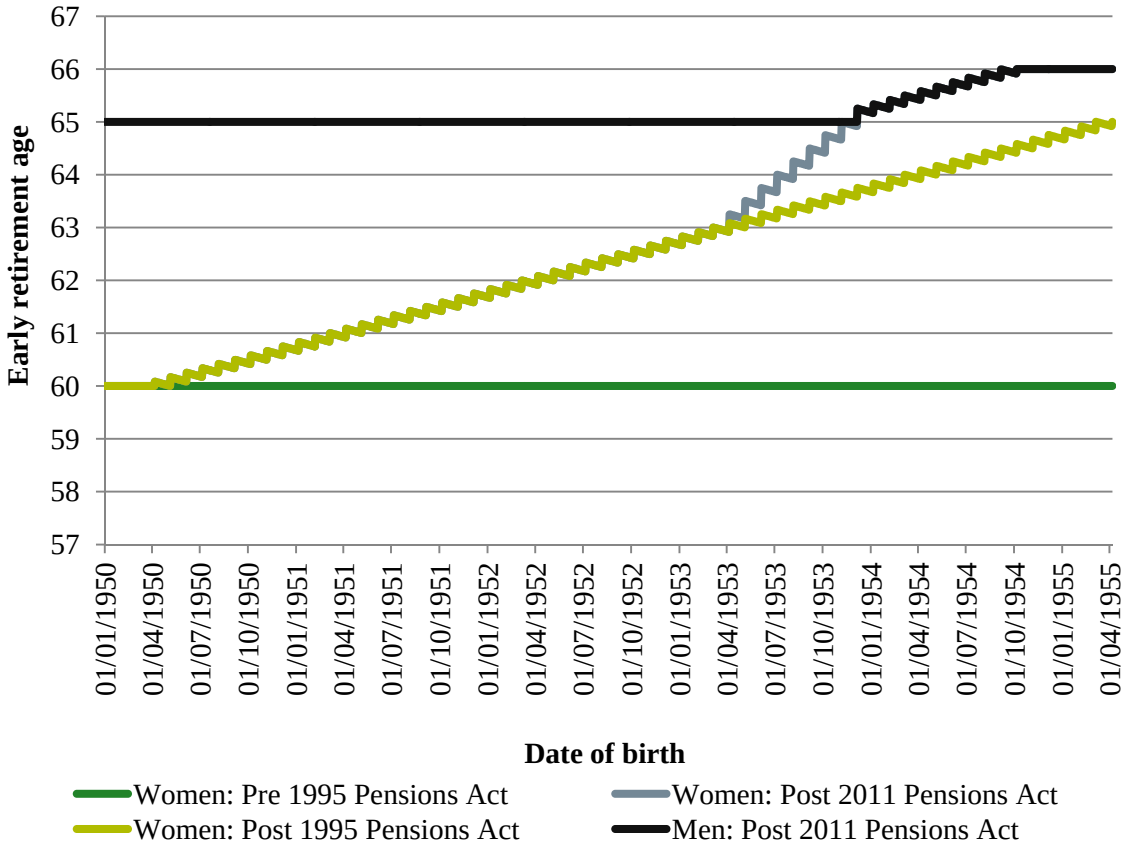
There are a number of features of the UK state pension system that are important to understand when analysing the effect of the increase in the ERA for women on their husbands.[3] The UK state pension has two parts. The first tier (known as the basic state pension) is based on the number of years (but not the level) of contributions made. Some individuals also have a second-tier state pension that is related to their earnings since 1978.[4] A full basic state pension in 2012–13 was worth £107.45 a week (equivalent to around $170 or 17% of average full-time weekly earnings). The maximum total weekly benefit (including the second-tier state pension) that could be received in 2012–13 was around $260. However, since most employees opted out of the second-tier pension scheme in the past, the majority of pensioners receive far less than this from the state.

An individual can claim their state pension from the ERA. Importantly, there is no earnings test for the receipt of the state pension (that is, the amount received is not reduced if the individual also has earned income). There are therefore only limited financial incentives for an individual to retire at their ERA. Receipt of the state pension can be deferred in return for a (generous) actuarial reduction but, in practice, very few people (only around 5%) take up this option. The state pension system operates entirely at the individual-level. Unlike in some countries, such as Australia (see Atalay and Barrett, 2015), there is no family-level means-test of the state pension. Moreover, an individual's own state pension entitlement is completely unaffected by a spouse's earnings, assets, employment decision, or decision to draw their state pension.

[3] A full description of the UK state pension system can be found in Bozio, Crawford and Tetlow. (2010). Cribb, Emmerson and Tetlow (2013) provide a description of the features of the state pension system which are pertinent when understanding the direct impact of the increase in the female ERA on female economic activity.

[4] The majority of employees has opted out of building entitlement to this second-tier pension and instead build up a private pension entitlement in return for a reduction in payroll taxes.

Figure 2.1 Early retirement age for men and women under different legislation



Source: Pensions Act 1995, schedule 4 (http://www.legislation.gov.uk/ukpga/1995/26/schedule/4/enacted); Pensions Act 2007, schedule 3 (http://www.legislation.gov.uk/ukpga/2007/22/schedule/3); Pensions Act 2011, schedule 1 (http://www.legislation.gov.uk/ukpga/2011/19/schedule/1/enacted).

Notes: the reason that the ERA increases in a "sawtooth" pattern, rather than a smooth line or a "step" pattern, is that women born in a given month are allocated a single "state pension date" at which they are eligible for a state pension. Therefore, women born later in the month have a slightly lower ERA than those born earlier in the month.

Given the institutions of the UK state pension system, there are three potential mechanisms through which the increase in the ERA for women might affect the labour supply decisions of their husbands.

First, the increase in the ERA for a woman implies a wealth loss to the family, as she receives her state pension for fewer years. Husbands may therefore choose to work more (delaying retirement) in response to this wealth loss. However, the total loss from a one-year increase in the ERA is only around $9,000 for a woman who qualifies for a full basic state pension and no additional pension, rising to about $22,400 for a woman who qualifies for a full basic state pension and a full additional pension entitlement. As Cribb, Emmerson and Tetlow (2013) show, on average, a six month loss of state pension income (the average for a woman born in 1949–50) corresponds to a reduction of only 2% of women's median state pension wealth, and 0.4% of median net family wealth.

Second, to the extent that men and women want to retire together (due to complementarities in leisure, for example), a delayed retirement for women may encourage their husband to delay their retirement too. Cribb, Emmerson and Tetlow (2013) found that the one-year increase in the female ERA led to an increase in the employment rates of 60 year old women by 7.3 percentage points across all women and by 5.4 percentage points for married women. If complementarities in leisure are important within couples, we might expect to see a sizeable knock-on response among husbands.

Third, for a small proportion of men, when their wife reaches her ERA, the family becomes eligible for the means-tested benefit known as the "pension credit guarantee". This benefit, worth £142.70 ($230) per week, is more generous than the out-of-work benefits available to working-age families and does not have any job search requirements attached to it.[5] Each family becomes eligible for pension credit guarantee when the older spouse reaches the female ERA (which is also known as "pension credit age"). Becoming eligible for pension credit guarantee therefore increases the family's potential out-of-work income and reduces the incentive to be in work. However, since in the large majority of couples the husband is (strictly) older than his wife (see Table 4.1), most families will already be eligible for pension credit guarantee before the wife reaches her ERA.[6] Moreover, even for those couples where the husband is younger than the wife, any couple with other non-employment income (such as a private pension) or significant (non-housing) wealth will be ineligible for pension credit guarantee because of the means-test. Therefore, only a very small proportion of men face a decrease in their financial incentive to work as a direct result of their wives reaching the ERA.

3. Empirical Methodology

Using data on the labour market behaviour of husbands whose wives face different ERAs allows us to estimate what impact increasing the ERA for women has had on husbands' labour market behaviour. To do this, we employ a difference-in-differences methodology. Because women born more recently do not reach the ERA until they reach an older age, this allows us to identify separately the impact on a husband's labour market behaviour of having a spouse who turns age 60 from the impact of having a spouse who reaches the ERA. Therefore we we essentially compare the labour market behaviour of men who have different ERAs because they

[5] For more details, see Hood and Oakley (2014).

[6] It is for this reason that we control for the man being over the female state pension age (pension credit age).

are born only a few months apart. Equation (1) sets out the specification we use to estimate the impact of increasing the ERA.

$$y_{ict} = \alpha(wife\ is\ under\ ERA_{ict}) + \gamma_t + \lambda_c + \sum_{a=1}^{A} \delta_a[wife's\ age_{ict} = a] + X'_{ict}\beta + \varepsilon_{ict} \quad (1)$$

Our aim is to estimate the effect on an outcome, y, of a husband having a wife aged below (rather than above) the ERA. Fixed effects are used to control for time period (γ_t), the wife's cohort of birth (λ_c) and the wife's age. In our estimation of equation (1) wife's cohort is controlled for using financial year (e.g. 1950–51) fixed effects. Time is controlled for using year and quarter fixed effects and there are age fixed effects, again in years and quarters, to control finely for wife's age, which is particularly important in ensuring that the estimate of being married to a wife who is under the ERA is not simply capturing the effect of being married to a younger wife.

We also control for a vector of individual characteristics, *X*. Most importantly, these include the husband's own age, which we control for using a quadratic plus indicators the husband for being aged over the female ERA and for being aged 65 or over (the ERA for men). In addition we control for education (of both husband and wife), housing tenure, ethnicity, geography. The full set of covariates included is laid out in Table A.2 in the appendix.

The identifying assumption is that – after controlling for own age, wife's age, time and cohort effects – any difference between the employment rates of men with a wife who are aged above and below the ERA is due to the impact of their wives reaching the ERA. For a difference-in-difference estimate in a labour market setting this should be a relatively innocuous assumption. It should also be noted here that, because we include the fixed effects for wife's cohort in our model, this controls for differences in state pension wealth across (female) cohorts that are a direct result of the increase in the ERA. Therefore, unless wealth effects affect behavior in a non-linear way that is not allowed for in our model, we can rule out that these are the driver of any response we might find.

The primary outcome of interest is the effect of increasing the female ERA on the employment of husbands. This is estimated using a probit model, calculating the average marginal effects of the treatment.[7] However, we are also interested in the other possible economic states. To assess

[7] Since being under the early retirement age is a function of both a wife's cohort and time, the indicator for the wife being under her ERA is an interaction term. In a non-linear model, calculating marginal effects on an interaction term does not produce a difference-in-differences treatment effect as it does in a linear model. To estimate the treatment effect in a non-linear model, we

these, multinomial probit models are used to examine the impact of increasing the ERA on: first, whether the husband is in full-time or part-time work or not in paid work; and, second, whether the husband is in work, retired, sick or disabled, unemployed and a residual category.

Since the the data we use (see Section 4) tracks individuals over up to five consecutive quarters of data, our sample contains multiple observations on the same individuals and so the observations are not independent of one another. We control for this by clustering standard errors at the individual level.

4. Data

We use data from the UK's Labour Force Survey (LFS) – the same dataset as Cribb, Emmerson and Tetlow (2013) in their study of the effect of increasing the ERA on female labour supply. The LFS is a household survey conducted on a quarterly basis, with all individuals in a household followed for up to five consecutive quarters ('waves') and with one-fifth of households being replaced in each wave. The sample size is large – for example, during January to March 2012, 102,531 individuals were interviewed from 43,794 households and the survey contains rich information on individual labour market activities combined with background information such as sex, age, marital status, education and housing tenure.

Importantly for this paper, the data also contain the month and year of birth of each individual, which allows us to observe whether each individual is over the ERA.[8] The household structure of the data means that we are able to observe the characteristics of an individual's spouse, including, most importantly their ERA and their economic activity. It also allows us to see the exact relationship between each member of the household. In our analysis of the labour supply decisions of husbands, we also include those who are not married, but are cohabiting partners, although as is shown in Table 4.1, less than 5% of the sample are not married. Nonetheless, for ease of notation, we use the words "husband" "wife", "spouse" and "married", even if a small fraction of them are not married.

Data from the LFS are used to produce internationally comparable unemployment statistics using International Labour Organisation (ILO) definitions of employment and unemployment.

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estimate the model and then, for each observation, look at the difference in the predicted probability of employment if above and below the early retirement age and then average across all observations to calculate the average marginal effect across the whole distribution of other regressors.

[8] Calculating whether each individual woman is above or below the early retirement age involves calculating her "early retirement date", and then comparing the date of interview to the early retirement date. Under the reform, people born from the sixth day of one month to the fifth day of the next month have the same early retirement date. While the exact day of interview is observed in the LFS, only an individual's year and month of birth are available. This means that those women born between the first and fifth days of any month are allocated a state pension date that is 2 months after they actually reach their state pension age. If dates of birth are distributed uniformly within each month, we will have misclassified whether the woman is over or under her early retirement age for only 2.7% of women.

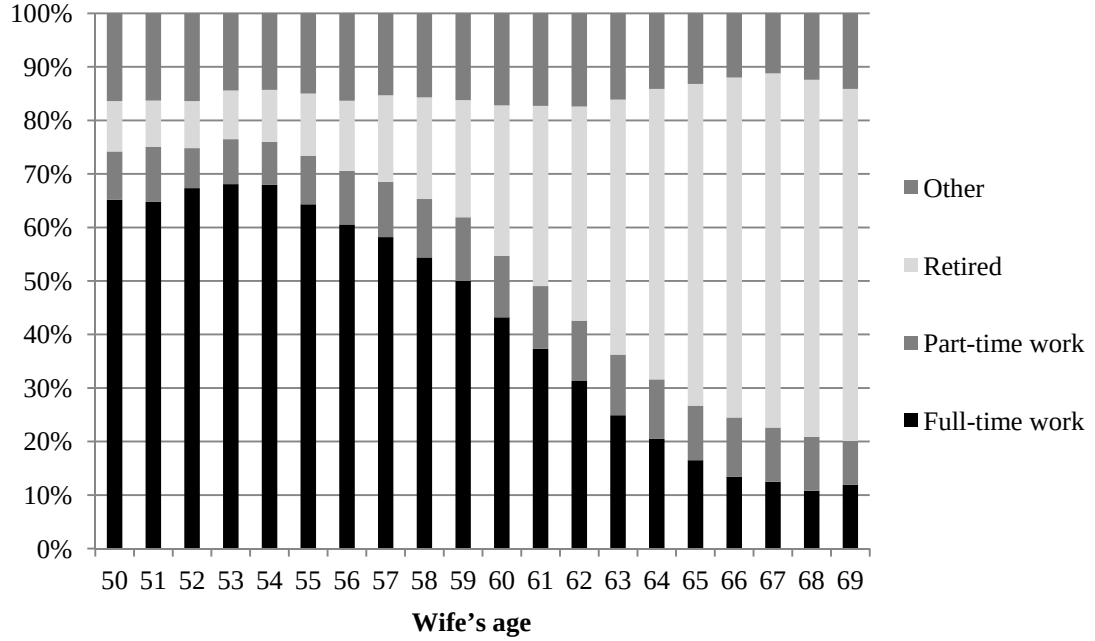
Therefore, we use ILO measures of economic activity in our analysis. Under these definitions, an individual is categorised as employed if they do any paid work (as an employee or self-employed) in the week of their interview, if they are temporarily away from paid work or if they are on a government training scheme (although this last category is rare for older people). Individuals are considered as being in full-time work if they work 30 or more hours in a usual week. If individuals are not in paid work, they are categorised as either unemployed (looking for work in the last four weeks or waiting for a job to start and they must be able to start work within the next two weeks), retired, sick or disabled, or a residual category (these are all self-defined). Each individual is categorised as being in one and only one of these categories.

The large sample sizes mean relatively large numbers of individuals are observed from each birth cohort at each age. We are primarily interested in the labour supply decisions of men married to women whose ERA is over 60. For example, about 100 men married to women born in the first quarter to be affected by the reform (1950Q2) are observed in each quarter of the LFS data that we use in our analysis (which runs from 2009Q2 to 2012Q2). Further details of the achieved sample size by wife's age and wife's cohort are shown in Table A.1 in the appendix.

The fact that the ERA for women rises between 2010 and 2012 means that, by 2012Q2, all men with a wife aged 60 now have a wife who is under her ERA. It is therefore instructive to look at how the economic activity of husbands varies by wife's age. This is shown in Figure 4.1. This uses LFS data pooled across the eight years *before* the ERA for women was increased above 60. The percentage of married men in paid work (either full-time or part-time) declines with wife's age, although much of this will be explained by the average increase in men's own age. The difference between the employment rates of men whose wife is aged 59 and those whose wife is aged 60 is 7.2ppt, larger than the 3.4ppt difference between (wife's) age 58 and 59 and the 5.6ppt difference between (wife's) age 60 and 61.

The fact that the change in employment when wife is 60 is bigger than the changes observed between other consecutive ages is suggestive evidence that there may be a spike in retirement for men when their wife reaches her ERA. Of course, this is much smaller than the spike in retirement when a husband reaches his own ERA (age 65), which is 18.3ppt (as shown in Appendix Figure A.3).

Figure 4.1 Economic activity of husbands (aged 55-69) prior to female early retirement age reform, by wife's age



Notes: Averages over the period 2003Q1 to 2010Q1.

Source: Authors' calculations using the LFS. Based on 404,428 observations. The equivalent figure by age of the husband is shown in Figure A.2 in the appendix.

The remainder of the analysis focuses on the men married to the cohorts of women who are affected (or close in year of birth to those who are affected) by the increase in the ERA, using the difference-in-differences methodology set out in section 3. All the models are estimated on data from 2009Q2 to 2012Q2 – from one year before the reform began to the point at which the ERA had risen to 61 and all 60 year old women were under the ERA. We include men whose wife was born from 1949–50 to 1952–53, which includes one cohort of wives unaffected by the reform (1949–50) and three cohorts whose ERA was changed by the reform. Given that it is unlikely that there is an impact of this change on husbands who are particularly young (because they are likely to work, whether or not their partner is over the ERA) or particularly old (because they are likely to be retired whatever the age of their partner), we restrict our attention to men aged 55 to 69. Imposing these conditions upon the data, our sample is composed of 18,774 married men.

A description of the background characteristics of these married men who make up our sample of interest is shown in Table 4.1. Almost 30% have a degree or other form of post-secondary qualification, while 43% have a secondary school qualification, making them, on average, slightly more educated than their wives. A large majority (89%) own their own home (either outright or with a mortgage) and very few of them are not white (3%). As previously mentioned, under 5% of these men are not married but instead are cohabiting with their partner. On average, at 61.4 years of age, they are 2.2 years older than their wife. Not only are there more men

slightly older than their wife than slightly younger, there are a significant proportion of men (16%) who are 5 or more years older than their wife, while only around 6% of men are more than one year younger than their wife. (It should be noted that these figures are calculated once we imposed the condition that men in the sample must be aged between 55 and 69.)

Table 4.1 Average characteristics of men with a wife born between April 1949 and March 1953, in the period 2009Q2 to 2012Q2

Characteristic	Mean
Degree or other Higher Education	0.296
Secondary education	0.432
No qualifications	0.272
Own their own home	0.886
Cohabiting	0.045
Non-white ethnicity	0.033
Age	61.4
Years older than wife	2.2
Man 2 + years younger than wife	0.055
Man 1 to 2 years younger than wife	0.049
Man same age or up to 1 year younger than wife	0.101
Man up to 1 year older than wife	0.130
Man 1 to 2 years older than wife	0.161
Man 2 to 5 years older than wife	0.342
Man 5 + years older than wife	0.163
Wife: degree or other HE	0.280
Wife: secondary education	0.358
Wife: no qualification	0.362

Notes: Totals may not sum to 1 due to rounding. Total sample size: 18,774

Source: Authors' calculations using the LFS.

5. Results

Table 5.1 reports the results from estimating equation (1) using a variety of econometric models. The upper panel of the table, shows the impact of the increase in wife's ERA on husband's employment probability, estimated using a probit model.[9] This shows that if a man is married to a women who is under her ERA, it increases the probability of him being in work by 4.2 percentage points, with this impact being statistically different from zero at the 5% level. [10]

[9] In Appendix Table A.2, we report the results of the same model estimated by Ordinary Least Squares rather than using a probit model. This gives a very similar effect of 4.4ppts with a slightly larger standard error.

[10] The point estimate is also robust to using just the first wave of data on each individual (although significance is reduced due to the lower sample size), and no evidence is found of any impact on male partners' employment rates

This is consistent with a one-year increase in the ERA from 60 to 61 leading to 8,300 more husbands in paid work. This is a large effect, in particular when it is compared to the impact of raising the female ERA on women's employment, which is reported in Cribb, Emmerson and Tetlow (2013). Using the same one-year increase in the female ERA, they find that being under the female ERA increases female employment by 7.3ppts in total, or 5.4ppts for married women.

The second and third panels in Table 5.1 show the results of estimating multinomial probit models on different measures of economic activity. According to these models the impact on men's employment of increasing the female ERA is estimated to be between 4.4 and 4.5 percentage points, both of these effects are significant at the 5% level. The results suggest that this is mainly due to an increase in the number of men in full-time work, rather than an increase in part-time work (with the point estimates suggesting that the ratio of full-time to part-time employment of husbands is broadly unaffected by the wife's ERA). There are no statistically significant impacts on any other reported economic statuses of men.

Table 5.1 Effect of increase in wife's early retirement age from 60 to 61 on husband's economic activity

	Effect of wife being under ERA	*Standard error*
Probit model		
In work	+0.042**	[0.022]
Multinomial probit model		
Full-time work	+0.037*	[0.022]
Part-time work	+0.008	[0.015]
Not in work	–0.045**	[0.022]
Multinomial probit model		
In work	+0.044**	[0.021]
Retired	–0.026	[0.017]
Sick or disabled	–0.024	[0.014]
Unemployed	+0.003	[0.007]
Other	+0.004	[0.006]

Notes: *** denotes that the effect is significantly different from zero at the 1% level, ** at the 5% level, * at the 10% level. There are 18,774 observations in all models. Estimation run on men aged 55–69 who have partners born in 1949–50 to 1952–53 and are observed 2009Q2 to 2012Q2. Standard errors are clustered at the individual level and estimated by bootstrapping with 1,000 replications. Estimates were successfully produced on all replications of the probit and multinomial probit with three outcomes and on 911 replications for the multinomial probit with five outcomes.

As mentioned above, there are two possible reasons that husbands may have changed their employment behaviour in response to the increase in the female ERA. First, there may be

of a "pseudo" reform, in which we undertake a placebo test, testing whether there is an impact imaging that the female ERA was increased two years earlier in 2008.

complementarities of leisure within couples. Second, couples might choose to adjust the husband's employment to compensate for the policy change rather than the wife working more. The results presented in Table 5.1 are consistent with both of these explanations. To unpick which of these alternative explanations is most important, we estimate a multinomial model of the joint work behaviour of couples. The dependent variable can take four possible values: both members of a couple in paid work, only husband works, only wife works, neither works. Summary results from estimating this model are presented in Table 5.2. (The sample and the other covariates included in the regression are the same as used in the models reported in Table 5.1.)

The right-hand column of Table 5.2 shows the prevalence of different joint working behaviours among couples (prior to the reform) in which the wife was aged 60 (and the husband was aged between 55 and 69). This shows that 33.7% of such couples had no one in work, 11.6% had just the wife working, 25.1% had just the husband working, and 29.7% had both partners working.

Complementarities of leisure within couples would suggest we should see an increase in the number of two-earner couples and a corresponding decrease in the number of couples where neither partner is in paid work in response to the reform. The alternative explanation instead suggests that we would expect to see a decrease in the number of couples where the husband does not work and an increase in both the number of couples where both partners work and the number of couples where just the husband works.

Table 5.2 Effect of increasing wife's early retirement age on employment of couples

	Effect of wife being under SPA	*Standard error*	*Prevalence when wife aged 60 (average 2003–2009)*
Multinomial probit model			
No one in work	–0.047**	[0.021]	0.337
Wife only in work	+0.003	[0.017]	0.116
Husband only in work	–0.010	[0.020]	0.251
Both in work	+0.054**	[0.025]	0.297

Notes: *** denotes that the effect is significantly different from zero at the 1% level, ** at the 5% level, * at the 10% level. Sample size = 18,766. Estimation run on couples in which the man was aged 55–69 and in which the woman was born in 1949–50 to 1952–53 and are observed 2009Q2 to 2012Q2. Standard errors are clustered at the couple level and estimated by bootstrapping with 1,000 replications. Estimates were successfully produced on 989 replications of the multinomial probit. Prevalence column does not sum to 1 due to rounding.

The estimates in Table 5.2 suggest that increasing the female SPA reduced the number of couples in which neither partner was in paid work and increased the number in which both were working, while having no significant effect on the fraction of couples with just the wife or just

the husband working. (If anything, the fraction of couples in which just the husband worked declined in response to the reform.)

One way of assessing whether this pattern of changes reflects complementary responses within couples is to compare the change in the prevalence of joint work behaviour shown in the second column of Table 5.2 to what one would expect to see if the responses of women and their husbands to this policy (a 5.4 ppt increase in the employment rate of married women, as found in Cribb, Emmerson and Tetlow 2013, and a 4.2 ppt increase found in the employment rate of married men, as shown in Table 5.1) were independent of one another. If the responses were independent, based on the prevalence of joint employment behaviour shown in the last column of Table 4.2, we would expect to have seen a 5.9 percentage point decline in the fraction of couples where no one worked, and an increase in the prevalence of all the other groups shown in Table 4.2: by 1.7 percentage points, 0.5 percentage points, and 3.7 percentage points, respectively. In other words, comparing this to the second column of Table 5.2, we would instead see a pattern in which much more of the response comes from one or other partner in the couple (rather than both) responding. If partners' responses were actually substitutes for one another (that is, negatively correlated), we would expect to see an even larger increase in the prevalence of one-earner couples and a smaller increase in the prevalence of two-earner couples. Our results suggest that complementarities of leisure within couples are important.

While the main results in this paper are based on the effect of the one-year increase in the female ERA from age 60 to 61 which occurred between 2010 and 2012, as was shown in Figure 2.1, the increase in the ERA for women continued to rise after 2012. It is therefore interesting to see the extent to which the effect of further increases in the female ERA has on both female labour supply and on their husbands. Therefore, we undertake additional analysis, estimating the impact in the rise in the female ERA from age 60 to 62, which includes data up to and including 2014Q2, the first point at which all 61 year old women are under the ERA. We choose our sample based on the same cohorts of women (born 1949–50 to 1952–53).

The results in Table 5.3 shows two things. First, there is a significant effect of the increase in the female ERA from 60 to 62 on the labour supply of married women. The point estimate is slightly smaller, at 0.049 than that for the increase from 60 to 61, but is more precisely estimated, as there is a larger sample size. The impact on the labour supply of husbands of the increase in the female ERA from 60 to 62 is 0.032, significant at the 10% level (the p-value is 0.068), and is not significantly different from the estimated effect of the increase from 60 to 61, estimated in Table 5.1 Moreover, given there is a slightly smaller response in terms of female labour supply

to the increase of the ERA, it may not be surprising that we also find a slightly smaller impact on their husbands too.

Table 5.3 Effect of increase in female early retirement age from 60 to 62 on the employment rates of married men and women

	Effect of wife being under ERA	*Standard Error*	*Sample size*
Increase in ERA from 60 to 61			
Using data up to 2012Q2			
Effect on women in couples	+0.054**	[0.023]	21,479
Effect on their husbands	+0.042**	[0.022]	18,774
Increase in ERA from 60 to 62			
Using data up to 2014Q2			
Effect on women in couples	+0.049***	[0.018]	33,654
Effect on their husbands	+0.032*	[0.017]	29,493

Notes: *** denotes that the effect is significantly different from zero at the 1% level, ** at the 5% level, * at the 10% level. Each estimated effect is from a probit model estimated using maximum likelihood. Models of female labour supply are estimated on women born in 1949–50 to 1952–53 who have a husband, using data from 2009Q2 up to the point specified. Models of husbands' labour supply run on men aged 55–69 who have a wife born in 1949–50 to 1952–53 using data from 2009Q2 up to the point specified. Standard errors are clustered at the individual level and estimated by bootstrapping with 1,000 replications.

6. Conclusion

Understanding the joint labour market behaviour of couples is important for many reasons, not least because it helps to predict and understand how older people will respond to increases in early and normal retirement ages that are being introduced by many developing countries. If partners are responsive to one another's labour supply decisions, such policies could have larger (or smaller) effects on overall labour supply and the public finances than looking just at the behaviour of one member of a couple would suggest. If there is substitutability in spouses labour supply and/or home production, then a policy that increases the labour supply of one partner may reduce that of the other. Conversely, if there are complementarities in leisure within couples, such a policy may increase the labour supply of both members of the couple.

Descriptive evidence suggests that couples tend to retire together. However, this observation alone is not sufficient to conclude that this is driven by complementarities in leisure, since this behaviour could also reflect other correlated shocks or unobserved factors within couples. In this paper we exploit a recent reform to the ERA for women in the UK to examine the effect of higher labour force participation among older women on their husbands' labour supply. Using a difference-in-differences approach we show that husbands' labour supply is responsive to their

wives' labour force participation and that complementarities in leisure are an important factor driving this outcome.

In 1995, the UK government legislated to increase the earliest age at which women could claim a state pension from 60 to 65 between April 2010 and March 2020. This paper is the first to examine (ex post) the impact of this policy on the economic activity of affected older women's partners. Our results, which allow for a flexible specification of cohort effects, suggest that the policy had a significant effect on employment rates of affected women's partners, with men's employment rates being found to increase by 4.2 percentage points as a result of their female partners' state pension age increasing. This suggests that the policy of increasing the female state pension age has had a knock-on effect on men's employment rates.

In principle this could reflect either complementarities in leisure or the fact that couples who make joint financial decisions decide to cushion the impact of the woman's higher ERA through a combination of both the man and the woman working for longer, rather than adjusting solely on the female labour supply margin. Evidence from looking at the employment of both members of the couple suggests that the increase in the female ERA has led to an increase in two-earner couples, a decrease in the fraction of couples where neither is in paid work and no significant change in the fraction of couples where only the husband or only the wife is in paid work. We interpret this as evidence of complementarities of leisure within couples, rather than couples using alternative margins (male and female labour supply) to respond to the policy change.

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Appendix A

Table A.1 Number of husbands observed whose wife is above and below early retirement age

Wife's birth cohort	*Wife's age in years and quarters*															
	58 Q1	58 Q2	58 Q3	58 Q4	59 Q1	59 Q2	59 Q3	59 Q4	60 Q1	60 Q2	60 Q3	60 Q4	61 Q1	61 Q2	61 Q3	61 Q4
1949Q2								46	100	100	97	103	106	94	93	71
1949Q3							42	108	98	93	85	96	77	78	74	88
1949Q4						54	106	101	102	88	95	85	75	75	75	95
1950Q1					62	112	116	116	105	108	96	84	76	84	71	87
1950Q2				56	116	128	121	115	100	101	93	87	87	104	87	78
1950Q3			56	117	111	105	95	98	78	80	74	88	94	105	90	48
1950Q4		42	105	99	105	95	91	77	77	75	77	81	94	81	42	
1951Q1	50	92	88	84	78	80	70	72	74	67	91	90	91	37		
1951Q2	94	101	112	114	109	106	97	78	81	82	98	93	42			
1951Q3	86	78	87	96	84	89	79	81	87	96	98	54				
1951Q4	91	97	102	90	83	77	75	84	81	81	36					
1952Q1	99	105	91	99	89	77	91	95	91	53						
1952Q2	102	91	94	80	83	86	111	88	50							
1952Q3	90	82	73	76	85	83	81	38								
1952Q4	91	94	79	86	78	76	43									
1953Q1	58	76	74	87	83	50										

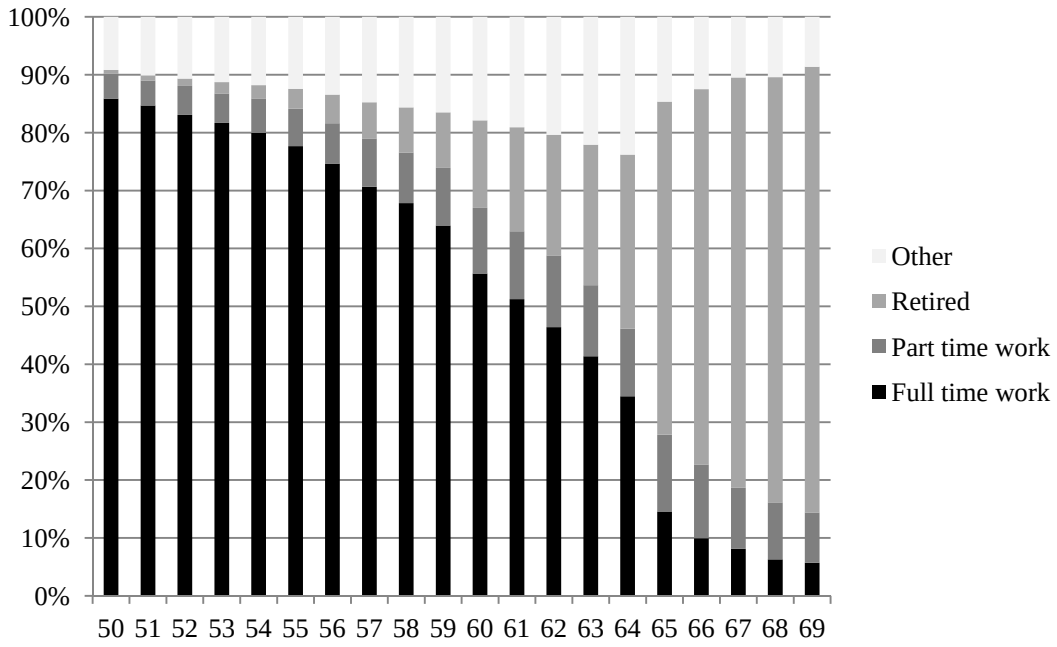
Notes: Dark shaded cells indicate men whose wife is over their ERA. Light shaded cells indicate combinations of age and cohort where some wives are above and some are below the ERA. Empty cells exist because cohorts are not observed at all ages in the period 2009Q2 to 2012Q2 which we use in our estimation. Number of men refers to number of observations in the LFS without data problems, and which are therefore used in estimation of impact of one's wife being aged under the ERA.

Table A.2 Effect of raising early retirement age for women on male employment: OLS regression results

	Effect on male employment	*Standard error*
Wife under ERA	0.044*	[0.023]
Own age	–0.086	[0.076]
Own age squared	0.000	[0.001]
Is 65 or older	–0.126***	[0.029]
Is over female ERA	–0.016	[0.021]
Cohabiting	0.019	[0.030]
Other HE	–0.017	[0.024]
A level or equivalent	–0.019	[0.019]
O level or equivalent	–0.033	[0.024]
Other	0.031	[0.023]
No qualifications	–0.076***	[0.024]
Not white	–0.117***	[0.034]
Rents house	–0.160***	[0.020]
Partner's education: other HE	–0.001	[0.023]
Partner's education: A level or equivalent	0.040*	[0.024]
Partner's education: O level or equivalent	0.012	[0.022]
Partner's education: other	0.028	[0.024]
Partner's education: no qualifications	–0.011	[0.023]

Notes: *** denotes that the effect is significantly different from zero at the 1% level, ** at the 5% level, * at the 10% level. Estimated by OLS with standard errors clustered at the individual level. Regression model using men aged 55–69 with female partners born in 1949–50 to 1952–53 from 2009Q2 to 2012Q2. Nineteen geographical area dummy variables, 12 year and quarter dummy variables, dummies for partner's age in years and quarters, dummies for partner's financial year of birth, and constant also included in the model. Effects estimated relative to baseline of partner's cohort 1949–50, partner's age 60Q1, married, white, owns house, with a degree, and with a partner with a degree. Number of observations: 18,774.

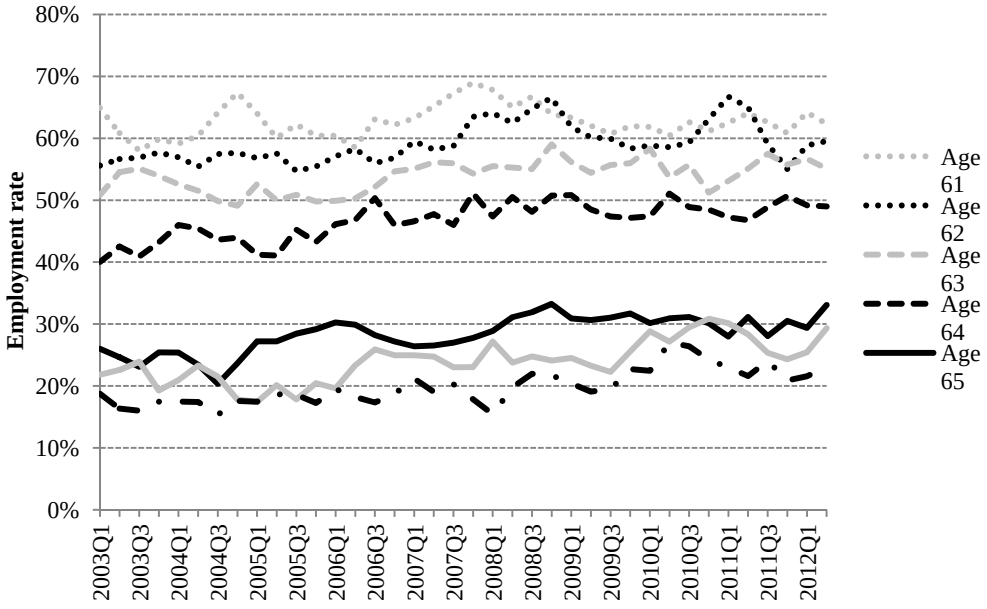
Figure A.2 Economic activity of married men prior to female ERA reform, by age



Notes: Averages over the period 2003Q1 to 2010Q1.

Source: Authors' calculations using the LFS. Based on 290, 491observations.

Figure A.3 Employment rates of husbands, 2003–12, by single year of age



Source: Authors' calculations using the LFS, 2003 to 2012. Based on 124,927observation