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Older couples' labour market reactions to family disruptions

David Haardt

SEDAP Research Paper No. 198

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Requests for further information may be addressed to:
Secretary, SEDAP Research Program
Kenneth Taylor Hall, Room 426
McMaster University
Hamilton, Ontario, Canada
L8S 4M4
FAX: 905 521 8232
e-mail: sedap@mcmaster.ca

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May 2007

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Older couples' labour market reactions to family disruptions

David Haardt*

*Institute for Social and Economic Research (ISER), University of Essex, Wivenhoe Park, Colchester, Essex CO4 3SQ, United Kingdom. E-mail: damhaa@essex.ac.uk. This research is part of my PhD thesis. It would not have been possible without the outstanding supervision which I have been receiving from Stephen P. Jenkins. Thanks are also due to my second supervisor John F. Ermisch whose supervision substantially contributed to getting started with the Arellano-Bond methodology, to Vincent A. Hildebrand for translating the abstract to French, and to Tindara Addabbo, Daniel J. Benjamin, and Silvia Pasqua for helpful suggestions. I am grateful to the data depositors of the BHPS (ISER, University of Essex) and to the UK Data Archive, University of Essex, for providing access to the data. Finally, I would like to thank the Austrian Academy of Sciences, the Economic & Social Research Council, the University of Essex, and the Provincial Government of Upper Austria for funding. The author alone is responsible for errors and opinions. An earlier version of this paper appeared as ISER Working Paper 2007-08.

Abstract

This paper analyses how spouses in older couples react to ‘shocks’ or ‘surprises’ in their partner’s labour income using data from the British Household Panel Survey, 1991–2004. Wives’ labour supply proves to be much more sensitive to shocks than husbands’. After a divorce or separation, wives reduce their labour supply while the effect on husbands’ labour supply is positive or not statistically significant. If a wife becomes unemployed, it does not affect her husband’s labour supply while wives whose husband becomes unemployed reduce their labour supply, too. A decline in husband’s health causes the wife to reduce her working hours while husbands tend to increase their labour supply when facing a decline in wife’s health. Partner’s death does not have statistically significant labour supply effects. Negative income shocks due to other reasons (such as choice) tend to reduce partner’s labour supply and vice versa, but only slightly.

Keywords: Labour supply, income shocks, older couples, BHPS

JEL Classifications: J12, J14, J16, J26

Résumé

Nous analysons comment, parmi les couples âgés, les conjoints réagissent aux chocs des revenus du travail de leur partenaire en nous appuyant sur les données de l’enquête longitudinale des ménages britanniques (BHPS). Après une séparation ou un divorce, les femmes réduisent leur offre de travail alors que l’activité de leurs maris n’apparaît pas significativement affectée. L’offre de travail des hommes ne semble pas affectée par la perte de l’emploi de leurs épouses, alors que dans le cas où les hommes perdent leur emploi, on observe aussi une baisse significative de l’offre de travail de leurs épouses. Une détérioration de la santé des hommes entraîne une réduction de l’offre de travail de leurs épouses alors que la détérioration de l’état de santé des femmes est accompagnée d’une hausse de l’offre de travail de leurs maris. Le décès du conjoint ne produit aucun effet statistiquement significatif sur l’offre de travail.

1 Introduction

The labour supply of older couples is attracting more and more interest as policy-makers attempt to increase the labour market participation of older people and postpone the average retirement age.

Of particular interest are the interactions within couples' labour supply, that is, how one spouse's labour supply affects partner's labour supply. Understanding these interactions is important in order to assess the consequences of phenomena such as increases in women's state pension age and in demographic risks or decreases in career stability.

In the United Kingdom, the state pension age for women is 60 while for men it is 65. The state pension age for women will rise to 65 between 2010 and 2020. How will older men in 5 or 10 years' time respond to the later retirement of their wives?

On a related issue, Campbell (1999) shows that older men's employment rates have declined substantially in Britain, while that of older women increased. Even though there has recently been a reversal in older men's employment rates, as demonstrated by Disney and Hawkes (2003: 21–22), it is not yet clear whether earlier levels will be reached again. Work income as a share of older people's total income has been falling in the UK (OECD 2000: 44). The labour supply consequences of these changes on the individual concerned as well as on his or her partner are not immediately clear.

As far as demographic risks are concerned, it is important to point out that the divorce rate among the 40 to 60 year olds is rising, which is different from the overall trend (cf. table 1). This implies an increasing number of older men and women losing partner's income and perhaps having to respond to this loss.

I consider the following research questions in this paper: what are the effects of unexpected changes in partner's income (which may have happened simultaneously with a demographic shock, such as a divorce) on the labour supply of older married or cohabiting

	Husbands	Wives
All ages	0.97	0.97
Age 40–44	1.16	1.15
Age 45–49	1.15	1.16
Age 50–59	1.25	1.23
Age 60 and over	0.94	0.86

Table 1: 1998 divorce rate (divorces per 1,000 married in the corresponding age group) divided by 1985 divorce rate.

Calculated from National Statistics PV9841B, Internet: <http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=4491>.

men and women in the United Kingdom? Does the cause of the income shock make a difference? Are these effects symmetric or not, in the sense that husbands react to changes in their wife’s income in the same way as vice versa? If not, what may be the reason for the asymmetries?

In order to address these questions, I build upon the methodological framework of Haurin (1989). While a lot of work has been done on explicit modelling of joint retirement, either in structural models which estimate the parameters of a particular couple utility function (cf. for instance Gustman and Steinmeier 2004) or in reduced-form hazard regression models which model the discrete choice of the couple over all possible combinations of employment statuses (cf. for instance Blau 1998) and, while these authors find strong interdependencies in older couples’ labour market decisions, these models cannot directly address how unexpected changes affecting only one spouse are transmitted to the partner. Moreover, they treat couples as a single decision unit, implying that they cannot address spousal interactions in labour supply. For the same reason, these models have to focus on stable couples and, therefore, cannot incorporate demographic instability; when looking at older people, this means not only ignoring divorce and separation but also widowhood.

Haurin (1989), contrary to this other work, explicitly focused on the effects of labour market shocks to one member in a couple on the labour supply of his or her partner. Gen-

erally speaking, ‘shocks’ (or, as Weiss and Willis, 1997, call them, ‘surprises’) are differences between actual and predicted values. In Haurin’s (1989) article, these are deviations of husband’s actual income from its predicted value which have been caused by an hours shock to the husband. A positive shock is defined to occur if the husband earns more than predicted due to working more than predicted; a negative shock occurs if he earns less due to working less. This methodology has the advantage that fixed person- and couple-specific effects cancel out since Haurin only analyses *changes*. Moreover, it allows to look directly at the transmission mechanism of a shock to one individual on the labour supply of the partner.

Haurin (1989) estimates the impact of such shocks on changes in the wife’s non-labour hours (‘leisure’) between 1981 and 1982 while also controlling for (changes in) city size, the number of children in the household, the number of other household members, assets, respondent’s health status, and respondent’s and husband’s wage (treated as endogenous). He finds that women tend to increase their labour supply substantially after a divorce or separation. He does not find statistically significant effects on wife’s labour supply for other event types (such as a health decline of the partner).

This paper builds upon Haurin’s research to analyse how labour market shocks and demographic shocks affect the labour supply of older couples in the United Kingdom. There are several contributions of this study compared to Haurin’s work:

First, while Haurin only analyses the effects of men’s shocks on women’s labour supply, I analyse shocks in both directions to be able to see whether the effects are symmetric or not. It has been common to focus exclusively on women’s labour supply, assuming that husbands will usually be employed full-time and that the reasons for husbands’ hours changes are exogenous and involuntary (i.e., labour demand side related). Gustman and Steinmeier (2004) for instance emphasise that the husband is more strongly influenced by the wife’s retirement decision than the other way around. This may be because of gender roles, perhaps indicating that the husband does not want to retire before the wife. One of my aims is to

see whether such a view is appropriate for contemporary UK or not. (The following section of this paper will cover the theoretical arguments in more detail.)

Second, I analyse the effects of labour income shocks as a whole rather than only labour income shocks due to hours changes. The rationale for this specification will be given in the next section. Decomposing the labour income shock into hours shock and wage rate shock is left as a topic for future work.

Third, while Haurin analyses all working women, I focus on older people, specifically on couples where both partners are aged 40 to 70. Starting from age 40 is useful since there are first increases in labour market exit rates and decreases in return rates to the labour market between ages 40 and 50 (cf. Haardt 2006: Figures 2 and 3, pp. 19 and 20).

Fourth, I emphasise the importance of dynamics in the econometric model. To this end, I employ the Arellano-Bond (1991) GMM dynamic panel estimator which was not yet available at the time of Haurin's paper.

Fifth and last, I analyse the United Kingdom between 1991 and 2004 (using data from the British Household Panel Survey, BHPS) while Haurin analysed the United States between 1981 and 1982. To my knowledge, a similar analysis has not yet been carried out for the UK. My data are more recent and cover a longer time span which, together with the Arellano-Bond framework, allows to model the labour supply adjustment process over time in a more comprehensive way.

Section 2 of this paper gives an overview of the theoretical background on within-couple shocks. Section 3 describes the methodology in more detail and Section 4 the data. Section 5 presents and discusses the regression results. Section 6 draws some conclusions.

2 Theoretical background

The effects of husband's unemployment on wife's labour supply have been subject of much research (research on the effects in the opposite direction has been rather limited, for reasons discussed in the introduction). Most of this research has focused on the question whether a so-called 'added worker effect' (AWE) or an opposite 'discouraged worker effect' (DWE) can be observed in the data.

An AWE is present if the wife compensates for the income loss associated with husband's unemployment by increasing her labour supply. A DWE, on the other hand, is present if husband's unemployment does in fact have the opposite effect by conveying a signal of difficult labour market conditions to the wife.¹

Another aspect which should not be forgot, and which may have implications for the symmetry or asymmetry of the effects of shocks, are gender roles. Sociologists suggest that men who have become unemployed may put pressure on their wives to reduce, or at least not increase, their labour supply, since having the wife take over the breadwinner role may be detrimental to the husband's self-esteem. Also wives themselves may be opposed to becoming the breadwinner.²

In the United Kingdom, the effects of the benefit system have attracted a lot of attention in this topic area. A substantial and growing part of benefits in the UK are means-tested, constituting a considerable disincentive to work once one spouse has become unemployed. Bingley and Walker (2001: 159) point out 'that the labour supply disincentives from the welfare system facing women married to men who remain unemployed are made significantly worse by the reform [of the Jobseeker's Allowance]'.³ There is now a consensus that the UK

¹Cf. Bingley and Walker (2001: 157–158) for a brief introduction to the AWE and DWE literature.

²McKee and Bell (1985) interviewed couples with an unemployed husband, finding that many husbands and wives opposed the wife becoming the breadwinner.

³In 1996, the Jobseeker's Allowance was introduced, replacing the Unemployment Benefit. This implied a reliance on family means-tested benefits after six months (if the individual had made enough contributions for contributory Jobseeker's Allowance) or even earlier than that (in the case of insufficient contributions.)

benefit system increases the risk of women married to men who became unemployed to leave the labour market, too.

The empirical evidence for the USA is mixed, with some authors finding evidence for an AWE and others not. There is not too much research using panel data, and even less cross-national comparative research. McGinnity (2002: 473) compared the UK and Germany using panel data, finding ‘some evidence of an added-worker effect in Germany’ but the results ‘suggest a disincentive effect of means-tested benefit on partners’ employment in Britain’.

Haurin (1989: 59) found, for the USA, no statistically significant effect whatsoever of husband’s unemployment or bad health on wife’s labour supply. However, he does find evidence for what we may call an AWE after divorce or separation: ‘If the woman worked 960 hours in 1981, the increase in work time for those women recently divorced or separated is 540 hours, while the estimate for widows indicates a slight decline in work time’ (but the latter estimate is not statistically significant at any reasonable level).

The analysis of the effects of an individual’s labour-market shocks on the partner, of AWE versus DWE, could be done in several ways. Haurin (1989) looked at the effects of partner’s income shocks which are due to partner’s hours changes on own hours. One could also look at the effects of partner’s income shocks on own income. In any case, a dynamic model which analyses changes seems to be appropriate.

I analyse the effects of partner’s income shocks on own hours, rather than the two other options just mentioned. I am mainly interested in the effects which income shocks have due to the income change as such, not due to the underlying hours change (moreover, a shock may also come about due to a change in the wage rate). This is the reason why I analyse income shocks. As far as the outcome variable is concerned, income is not something which people can readily choose—in most cases, the response will be working more hours, even though there may also be changes to higher wage jobs. This is why I analyse the effects on hours rather than on income.

The following section presents the model I use to analyse the effects of these income shocks to one member of a couple on his or her partner’s working hours.

3 Econometric model

A simple econometric model based on the theoretical background just introduced may take the form

$$h_{i,t} = \mathbf{w}_{i,t}\beta + \sigma_{P,t}\gamma + \eta_i + v_{i,t}, \quad (1)$$

where the dependent variable h is hours, \mathbf{w} the vector of explanatory variables excluding the shock variable, β the corresponding coefficient vector, σ partner’s income shock, and γ the coefficient of the shock variable. Finally, η and v are error terms (as the subscripts indicate, η is time-constant for each individual while v is the standard i.i.d. error term).

Equation 1 raises a number of questions. Which variables are important to be included in \mathbf{w} ? Are all elements of \mathbf{w} exogenous? What if some are not? Which sign does γ have, that is, are income shocks to one individual magnified or offset by his or her partner’s labour supply? Does γ have the same size for the effect of husband’s shock on wife’s hours as vice versa? Does γ vary depending on the cause of the income shock? Are typical hours reactions large enough to matter? Do only contemporaneous right-hand side variables matter or also lagged values? What about lagged values of the dependent variable?

A highly flexible framework which allows taking these issues into consideration is the dynamic panel data model by Arellano and Bond (1991). It starts from a generalised version of equation 1, viz.

$$h_{i,t} = \sum_{j=1}^n h_{i,t-j}\alpha_j + \sum_{k=0}^o \mathbf{x}_{i,t-k}\beta_{1k} + \sum_{l=0}^p \mathbf{y}_{i,t-l}\beta_{2l} + \sum_{m=0}^q \mathbf{z}_{i,t-m}\beta_{3m} + \eta_i + v_{i,t}, \quad (2)$$

where we now have three vectors of explanatory variables and three corresponding coefficient vectors rather than just \mathbf{w} and β . First, \mathbf{x} , the vector of strictly exogenous variables (incorporating, among others, σ), second, \mathbf{y} , the vector of non-endogenous predetermined variables, and third, \mathbf{z} , the vector of endogenous predetermined variables. The difference between these three vectors will be discussed shortly.

The three vectors of explanatory variables, as well as the dependent variable, may appear with different numbers of lags: n is the number of lags of the dependent variable while o , p , and q are the numbers of lags of the three vectors of explanatory variables. The model requires n to be larger than or equal to one while o , p , and q may also be zero.

Differencing yields

$$\Delta h_{i,t} = \sum_{j=1}^n \Delta h_{i,t-j} \alpha_j + \sum_{k=0}^o \Delta \mathbf{x}_{i,t-k} \beta_{1k} + \sum_{l=0}^p \Delta \mathbf{w}_{i,t-l} \beta_{2l} + \sum_{m=0}^q \Delta \mathbf{z}_{i,t-m} \beta_{3m} + v_{i,t}, \quad (3)$$

which removes the η term. Technically, the difference between strictly exogenous variables, non-endogenous predetermined variables, and endogenous predetermined variables is that while $\Delta \mathbf{x}$ are their own instruments, \mathbf{y}_{t-1} to \mathbf{y}_T are used as instruments for $\Delta \mathbf{y}$ and \mathbf{z}_{t-2} to \mathbf{z}_T as instruments for $\Delta \mathbf{z}$. In other words, ‘the more endogenous’ a variable, the further we go back in time to get our instruments.

The decision which variables belong to which group is entirely up to the researcher. Apart from theoretical considerations, the Sargan test (cf. Arellano and Bond, 1991) can be used to test for exogeneity of \mathbf{x} . The explanatory variables themselves as well as the numbers of lags are of course also chosen by the researcher. I will discuss my decisions in that respect in the following section of this paper, which presents the data and variables used, including a detailed presentation of the shock variables.

4 Data, sample selection criteria, and variables

4.1 Data

The data which I use are from the British Household Panel Survey (BHPS), a longitudinal survey of households with detailed socio-demographic and economic information. The individuals of a representative sample of 5,500 British households were first interviewed in 1991 and have been followed since then, with data from 14 waves (annual interviews) currently available (cf. Taylor 2006). In this paper, I use waves 1–13. The BHPS provides me with a large and reliable sample of older couples, interviewed between autumn 1991 and spring 2004 (since 6.4% of the interviews of wave 13 were carried out in spring 2004).

The analysis sample which I use for my regressions contains 974 couples and a total of 7,543 person-years (3,788 person-years for the influence of husbands on their wife, 3,755 for the opposite direction).⁴ Haurin (1989: 57) had a sample of 800 women (or 1,600 person-years).

4.2 Sample selection criteria

First, I only analyse couples where both partners are aged 40 to 70 since the focus of this paper is on older people. As mentioned before, I use age 40 as the lower bound since one can see a first increase in the exit rate out of employment between age 40 and 50, and age 70 as the upper bound since there is only very little labour market activity beyond this age.

Tables 2 and 3 summarise the partnership and work patterns in $t-1$ in pairs of subsequent BHPS waves. This shows that most people in the age group 40–70 do have a partner.

Table 4 shows work patterns among older couples using pooled data and confirms that the probability of working is much smaller if the partner does not work. In most couples,

⁴The difference in the number of person-years stems from different numbers of missing values in the health variable and the education variables across sexes, as well as from differential follow-up in the subsequent wave.

	partner present	no partner
respondent working	8,888	3,609
respondent not working	5,881	3,950

Table 2: Partnership and work patterns (in person-years) in $t - 1$ for subsequent wave pairs of female respondents (pooled person-wave data using BHPS waves 1–13).

	partner present	no partner
respondent working	10,121	1,732
respondent not working	4,982	1,560

Table 3: Partnership and work patterns (in person-years) in $t - 1$ for subsequent wave pairs of male respondents (pooled person-wave data using BHPS waves 1–13).

either both spouses work or neither of them. Moreover, we can see that most couples in this age group are couples where both spouses work. This is why I will focus on this group of the population in my analysis. (I focus on a single group since the change in working hours may follow a different pattern depending on whether or not somebody works in the first place.)

Second, there is a small number of observations where the person whom the respondent mentions as the partner does not mention the respondent as their partner. Closer investigation showed that these cases are due to different interview dates of the two spouses in question, with a partner change in between. I drop these observations since there are only very few of them and since it would not be clear how to handle them properly.

Third, I can of course only use those observations where all the variables of my analysis have non-missing values. To this end, I made sure to use only variables which have low numbers of missing values. One important variable which has an above average proportion of missing observations is health status. I interpolate and extrapolate year-long gaps in

	wife working	wife not working
husband working	10,936	3,981
husband not working	2,352	5,276

Table 4: Work patterns of older couples (pooled person-wave data using BHPS waves 1–13).

health status. Longer gaps are left missing.

One important consideration affecting sample size is the number of lags of the dependent and explanatory variables chosen for the econometric model. Due to these lags, a single missing value may remove several years from the analysis sample. This is particularly critical for some of the shock variables. For example when employing what turns out to be my preferred lag structure ($n = o = p = 2; q = 1$), there are only 20 divorce/separation events among women and 12 among men.⁵ Therefore, in addition to the just mentioned preferred lag structure, I also use a ‘minimal lag structure’ (i.e., $n = 1; o = p = q = 0$) to maximise the effective sample size. This increases the occurrence of marital separations by 50% for women (to 30) and by 83% for men (to 22).

The self-employed are treated in the same way as employees.

Summing up, I look at all shocks occurring between autumn 1992 or 1993 (due to the one or two lags of the dependent variable) and spring 2004 to couples where both partners are aged 40 to 70, where both partners were working in $t - 1$, and where all the required data are properly observed.

4.3 Variables

4.3.1 Dependent variable

The dependent variable is the natural logarithm of the sum of actual current working hours (including overtime) and one (adding one is done to deal with zero hours). I decided to use this specification rather than just hours in levels to reduce potential heteroskedasticity and since it provides a better goodness of fit. Using $\ln(h + 1)$ rather than any other $\ln(h + x)$ (where $x > 0$) is arbitrary, but assuming $x = 1$ should not generate systematic biases.

⁵The disparity is again for several reasons: a different prevalence of missing values for the health and education variables, differential follow-up in the subsequent wave, repartnering of one of the two former partners which means that he or she will not be treated as separated in my data.

Taking logs also reduces second-order autocorrelation of the residuals significantly which is important since a violation of this assumption would render the estimator inconsistent (cf. Arellano and Bond 1991: 278).

4.3.2 Explanatory variables

The explanatory variable of most interest to me in this paper is the shock variable which is constructed similarly to Haurin’s (1989: 56). The shock variable measures how different partner’s actual labour income is from partner’s predicted labour income, scaled by own labour income and household non-labour income to measure the importance of partner’s labour income for the couple as a whole.

More precisely, my shock variable σ is constructed as follows:

$$\sigma_{P,t} = \frac{y_{P,t} - \hat{y}_{P,t-1}^{corr}(1 - \hat{d}_{R,t})}{10000(y_{R,t} + w_t)}, \quad (4)$$

where R and P subscripts are used to refer to respondent and partner, respectively. Labour income is represented by y ; \hat{d} denotes the predicted separation probability, and w household non-labour income.

The numerator of the shock variable consists of actual labour income of the partner minus predicted labour income of the partner, where the latter takes the predicted separation probability into account.

The separation probability is predicted from simple logit regressions using the consolidated marital, cohabitation, and fertility histories for the BHPS derived by Pronzato (2007). The dependent variable equals ‘1’ if the respondent had a partner in t and no partner in $t + 1$ and ‘0’ if the respondent had a partner in t and $t + 1$. The explanatory variables include information on the age of the respondent and the partner, on the age difference of the spouses, on the wave of the BHPS, on the age of the respondent at the start of the relationship, on

the year at the start of the relationship, on the number of children of the respondent, and on the number of children present in the household (for details, cf. Appendix A). For these separation regressions it is important to use only explanatory variables which are available for almost everybody, since I do not want to restrict further the sample of my analysis.

Even though these regressions can only explain a small part of the variation in the conditional probability of separation, I argue that this approach is superior to just using the sex-specific separation probability observed in my regression sample, with which I also experimented. The results of my analysis are however robust to the choice of the approach.

The denominator scales this difference by the sum of respondent's own labour income and household non-labour income. The denominator also contains a scaling factor, 10,000, since this gives a reasonable range of coefficient sizes. The smaller the sum of own labour income and household non-labour income (i.e., the denominator) is, the larger will the relative effect of the shock be.

If the respondent does not have a partner in t , $y_{P,t}$ is set equal to zero, rendering $\sigma_{P,t}$ strictly negative.

This shock variable is different from the one used by Böheim and Ermisch (1999) who analyse the effects of financial shocks on partnership dissolution. Their shock variable compares the expectation about future changes in the financial situation expressed in t to the retrospective evaluation of changes in the financial situation in $t + 1$. Since both of these variables only have three categories each (better off, about the same, and worse off), their shock variable can only take five different values. Moreover, the retrospective evaluation may be subject to *ex post* rationalisation. Therefore, I do not use their approach.

Partner's predicted labour income $\hat{y}_{P,t-1}$ is constructed from a regression of the following type:

$$y_{R,t} = \beta \mathbf{s}_{R,t} + \epsilon_{R,t} \tag{5}$$

where $\mathbf{s}_{R,t}$ is a vector of explanatory variables composed of a set of seven education dummies, the regional unemployment rate for the respondent’s sex, the number of children under the age of 18 in the household, household size, respondent’s health status, and partner’s health status. The results of these regressions are reported in Table 10 in Appendix B.

I then add to the predicted values the average residual of the corresponding person *up to the corresponding wave*, i.e., $\sum_{k=1}^t \epsilon_{R,k}/t$ to yield the final, corrected, prediction $\hat{y}_{R,t}^{corr}$ which is used in the construction of the shock variable. I interpret this average residual as the overall influence of unobservables on R’s expected income which has been revealed up to point t . This is based on an idea by Weiss and Willis (1997: S306) who ‘construct a set of predictions of [earning capacity] for each partner conditional on available information about the person at each year’.

I run each regression model twice, once with the overall $\sigma_{P,t}$ and once with five disaggregated σ variables, each of which corresponds to a certain type of ‘event’:

1. R separated or divorced between $t - 1$ and t and no P present at t (I will from now on, for simplicity, always use the word ‘separation’, even though I refer to both separation and divorce)
2. R widowed between $t - 1$ and t and no P present at t
3. R remains partnered; P experienced health decline between $t - 1$ and t
4. R remains partnered; P become unemployed between $t - 1$ and t
5. none of the above four events (i.e., still with a partner—who may be somebody else than in $t - 1$ —who remains with unchanged health and in employment between $t - 1$ and t)

These five events are mutually exclusive with the exception of 3 and 4 which may occur simultaneously. This brings about the question of how to code cases where both of these

events occur at the same time. Essentially, there are four possible ways:

- use *three* mutually exclusive events generated from the two not mutually exclusive events: health decline only; unemployment only; health decline *and* unemployment
- code all simultaneous events as health decline only (artificially made mutually exclusive)
- code all simultaneous events as unemployment only (artificially made mutually exclusive)
- code all simultaneous events as both a health decline event *and* also as an unemployment event (not mutually exclusive)

Fortunately, there are surprisingly few overlaps between health events and unemployment events. This means that the choice between the four ways how to treat simultaneous events is not crucial: the key results were always the same when repeating my regression analysis with all four choices. I settled with the last choice since the first suffers from the problem of few overlaps while the second and the third are somewhat artificial.

The five event dummy variables are then interacted with $\sigma_{P,t}$ as defined above. The resulting five types of disaggregated shocks are called ‘separation shock’ $\sigma_{P,t}^{sep}$, ‘widowhood shock’ $\sigma_{P,t}^{wid}$, ‘health shock’ $\sigma_{P,t}^{hl}$, ‘unemployment shock’ $\sigma_{P,t}^{unem}$, and ‘no event shock’ $\sigma_{P,t}^{noev}$. From the last paragraphs it follows that only $\sigma_{P,t}^{hl}$ and $\sigma_{P,t}^{unem}$ can *both* be non-zero for a given observation.

The econometric model which I use implies that the explanatory variable used is in fact the *difference* between this year’s shock variable and last year’s shock variable. This could in principle lead to complications in the interpretation of the effects of the shocks. However, it is important to keep in mind that separation, death of the partner, partner’s health decline, and partner’s unemployment cannot occur twice after each other, implying that the difference

of each of these four shock variables will always be equal to the shock variable itself. Only the ‘no event’ shock can occur twice (or indeed more often) after each other.

In what follows, I will now go on to present the other explanatory variables used in my regression analysis.

- Age squared of respondent (in years)
- State pension age dummy for respondent (1 if respondent is of or above state pension age, 0 otherwise)
- Health dummy for respondent (1 if respondent has a health problem which limits the type or amount of work, 0 otherwise)
- Household size
- Number of children under the age of 18 in the household
- Home ownership (one dummy for outright owners and one for owners with a current mortgage or loan; base category are non-owners)
- Household non-labour income
- Shock variable(s) σ_P (as detailed before)

In terms of the classification into strictly exogenous variables, non-endogenous predetermined variables, and endogenous predetermined variables mentioned earlier on, all of the above-mentioned variables are assumed to be strictly exogenous, except for household size and number of children (both non-endogenous predetermined) as well as the two home ownership dummy variables and household non-labour income (all endogenous predetermined).

There are some theoretical arguments for this classification. The three age variables are clearly exogenous. The health variable could be subject to some ex post rationalisation, but

since strictly objective measures are not available in the BHPS and are subject to criticism, too, I assume my health variable to be exogenous as well.⁶ The shock variable(s) is (are) subject to the same assumption. Household size and the number of children are clearly not exogenous since they are subject to choice within the household, but can be taken as given at the beginning of any time period which is why I assume these variables to be non-endogenous predetermined. Home ownership and household non-labour income, on the other hand, are certainly endogenous since their value is a result of past labour supply and income. This classification is also supported by the results of the Sargan test.

I use the squared value of age, divided by 1000. Furthermore, I also use a state pension age dummy variable which equals 1 if age is larger than or equal to 60 (for women) or 65 (for men). This is due to the fact that the UK state pension can be drawn starting from this age and there is no employment protection or redundancy pay beyond that age, forming a strong incentive to withdraw from the labour market as shown by Haardt (2006). The state pension dummy therefore enables a shift of the age-profile of the dependent variable at age 65 (for men) or 60 (for women).

I also experimented with age in levels, and with the logarithm of age. The former has the problem that since the Arellano-Bond model is a difference model, $age_t - age_{t-1} = 1$ for approx. 88% of observations, and is only identified through observation pairs where the two interview dates (usually September to May) and the birthday interact in unusual ways. If, for instance, somebody who has his or her birthday in October is interviewed in September in wave $t - 1$ and in May in wave t , we will observe $age_t - age_{t-1} = 2$. Since age may therefore capture mere seasonality rather than a genuine age effect, I ran all the regressions twice, once with age in levels and once without age in levels. The key results, in particular the coefficients of the shock variables, were not too different but in general the

⁶Bound (1991) suggests that neither objective nor subjective health variables provide reliable results for the effects of health on labour market outcomes. However, his results also suggest that objective health variables provide a lower bound and subjective health variables an upper bound of the true effect.

model fared better without the age variable which is why I will, later on, only report those results. Experiments with $\ln(\text{age})$ were not very successful either.

The health dummy variable comes from the following question in the BHPS interview: *Does your health limit the type of work or the amount of work you can do?* I recode this variable so that 1 corresponds to yes and 0 to no. This variable has virtually no missing cases but, unfortunately, was not asked in wave 9 of the BHPS. Therefore, I use linear interpolation to fill gaps which are one wave long (which affects virtually only wave 9): if the same answer was given before and after the gap, this answer is imputed for the gap. If different answers were given, a value of 0.5 is imputed.

Household size and number of children under the age of 18 in the household are derived variables included in the BHPS release.⁷ The probability that a couple in this age group has children present in the household is only about one fifth but I still include the variable.

The home ownership dummy variables, one for outright ownership and one for mortgage-based ownership, are used as proxies for wealth. The base category are non-owners. My dummy variables are generated from a categorical variable on housing tenure which the BHPS provides.⁸

Household non-labour income is the same variable as used in the denominator of the shock variable(s). It is the sum of last month's household transfer income and household investment income, two derived variables present in the BHPS.⁹ These variables include approx. 15–35% imputed data. I divide it by 10,000 to rescale the variable.

Finally, the regional claimant count rate of the respondent's sex is used as an additional instrument; the underlying assumption is that the regional unemployment rate affects some

⁷Variables `wHHSIZE` and `wNKIDS` on the `wHHRESP` file.

⁸Variable `wTENURE` on `wHHRESP`.

⁹Variables `wFIHHMT` and `wFIHHMI` on the `wHHRESP` file. My variable is therefore *not* equivalent to the BHPS variable household non-labour income, `wFIHHMNL`, which also includes pension and benefit income. I do not consider pension and benefit income since my interest is only in the couple, not in others in the household who may receive pension or benefit income but who do not necessarily pool their income with the couple.

of the explanatory variables but not working hours directly. These data come from National Statistics for the 12 standard UK regions: East, East Midlands, London, North East, Northern Ireland, Northwest and Merseyside, Scotland, Southeast, Southwest, Wales, West Midlands, and Yorkshire and Humberside.¹⁰ Since information on the region of residence is available in the BHPS with the categories, I am able to merge these unemployment data into the BHPS. I use the sex-dependent time series without seasonal adjustment.

I also wanted to include other variables but was not able to do so for various reasons. First, I would have liked to include information about individuals' employment history (for instance the percentage of years working when the respondent was 15 to 40 years old), but since I am using differenced regressions the effects of time-constant variables are not identified. Second, I would have liked to include information on job tenure as Haurin did, but information on when the current job started is often missing. It would have been highly interesting to use information on the reasons for quitting a job to distinguish between voluntary and involuntary exits from or changes of employment, but these data are missing for approx. 35–40% of applicable cases which would have caused strong sample selection. Lastly, I also experimented with information on hours preferences (for similar reasons), but was not able to get reasonable results (the dummy variables for preferring more or less working hours were either insignificant or had the same sign).

In Table 5, I present the means of the dependent and explanatory variables for my four regression samples, first the two samples where I analyse the impact of husband's (partner's) shock on wife's (respondent) labour supply and then the two opposite samples. In both cases there is one column for the (smaller) sample with the preferred lag structure (PLS) and one

¹⁰The corresponding time series are DPAH (men) and DPAI (women) for the UK, ZMOL and ZMON for the East, ZMOP and ZMOR for London, ZMOT and ZMOV for the Southeast, ZMOX and ZMOZ for the Southwest, ZMPB and ZMPD for the East Midlands, ZMPF and ZMPH for the West Midlands, ZMPJ and ZMPL for the Northeast, ZMPV and ZMPX for the Northwest and Merseyside, ZMPZ and ZMQB for Yorkshire and Humberside, ZMQL and ZMQN for England, ZMQH and ZMQJ for Scotland, ZMQD and ZMQF for Wales, and ZMQP and ZMQR for Northern Ireland.

Variable	H→W PLS	H→W MLS	W→H PLS	W→H MLS
R hours	29.1934	29.3582	42.8156	42.8999
Household size	2.9392	2.9980	2.9474	2.9980
Number of children	0.2214	0.2816	0.2228	0.2798
Home owner (outright)	0.2717	0.2529	0.2756	0.2545
Home owner (mortgage)	0.6325	0.6499	0.6334	0.6485
HH non-labour income	145.4430	140.4280	146.1750	139.4450
R of state pension age (SPA)	0.0685	0.0627	0.0291	0.0280
R health problem	0.1149	0.1139	0.0938	0.0943
R's age (in years)	51.6330	50.9886	53.5922	52.9543
Person-years	3,788	5,032	3,755	4,987
Persons	974	1,257	985	1,248

Table 5: Means of the explanatory variables, excluding the shock variables, in the four regression samples (PLS: preferred lag structure; MLS: minimal lag structure). Household non-labour income is measured in January 2004 pounds per month.

for the (larger) sample with the minimal lag structure.

From Table 5 we learn that the women in our sample are on average working 29 hours per week and the men 43 (keep in mind that my analysis is restricted to couples in which both spouses were working in $t - 1$, and that these figures are actual total hours, including overtime). We can also see that people with less regular response patterns are more likely to have children in the household, to have a lower level of household non-labour income, and to be younger (since the PLS samples involve stronger conditioning on response in several subsequent years of the survey than the MLS samples). However, I did not test for inequality of the means.

Table 6 shows the means and medians of the shock variables. It can be seen that the average financial impact caused by wife's death unemployment is huge. This is due to one observation each in which the shock is very large and negative. Since these two observations look genuine, I do not drop them. Having said that, it is not surprising that the medians (in the lower panel) show much more regular patterns than the means. More than 50% (in fact, many more) of separations, of unemployment events, and of deaths are associated with

Variable	H→W PLS	H→W MLS	W→H PLS	W→H MLS
Means				
P's overall shock	-0.3978	-0.1936	-0.2241	-0.0155
P's separation shock	-3.1448	-2.3891	-0.0466	-0.0691
P's no event shock	-0.3827	-0.1733	0.6208	0.6308
P's health shock	-0.1186	-0.1669	0.0182	0.0250
P's unemployment shock	-0.7834	-0.6078	-34.6746	-28.7769
P's death (widowhood) shock	-0.1363	-0.1662	-284.6366	-243.9842
Medians				
P's overall shock	0.0113	0.0098	0.0042	0.0040
P's separation shock	-0.1833	-0.1638	-0.0423	-0.0463
P's no event shock	0.0121	0.0105	0.0043	0.0041
P's health shock	-0.0004	-0.0008	0.0026	0.0026
P's unemployment shock	-0.1713	-0.1551	-0.0485	-0.0410
P's death (widowhood) shock	-0.0742	-0.0930	-0.0555	-0.0698
Person-years	3,780	5,022	3,748	4,967
Persons	968	1,250	981	1,237

Table 6: Means (upper panel) and medians (lower panel) of the shock variables in the four regression samples; all values x1,000 (PLS: preferred lag structure; MLS: minimal lag structure).

negative income shocks. On the other hand, more than 50% of the ‘no event’ shocks and of the health shocks are associated with positive income shocks. This is also true for the aggregate shock measure. The fact that partner’s income is higher than expected when the partner experiences a health shock is however not necessarily surprising given that health is one of the predictors in the labour income regressions. This means that directly after experiencing a health shock the income shock has not yet reached its final level.

How does my specification compare to that of Haurin? Apart from the fact that Haurin analyses hours shocks while I analyse income shocks, he also uses city size dummy variables (which are not available in the BHPS) and assets (which I do not use because these data are not very detailed in the BHPS). I use information on home ownership and household non-labour income instead of assets which should be closely related. I include a state pension age dummy variable in the hours regressions (the ‘second stage’) while Haurin uses one in

the wage regressions (the ‘first stage’). As a side remark, I use household size rather than the number of others in the household (the latter is equal to the former minus two minus the number of children).

There are several differences as far as the auxiliary regressions (labour income regressions in my case, wage regressions in the case of Haurin) are concerned. These can be studied in more detail by comparing Table 10 in Appendix B to Table 2 in Haurin (1989: 58). Two differences worth mentioning are that I use education dummies rather than years of schooling (since the latter is not that meaningful in a UK context) and that I do not include race since there is only a rather small proportion of ethnic minorities in the BHPS and since there is a larger heterogeneity among ethnic minorities in the UK than in the US. Finally, since correcting for selection gave a slightly worse fit while complicating the model, my labour income regressions are not selection corrected. In my work as well as in his, the education variables serve to identify the auxiliary regressions as they are excluded from the hours regressions.

5 Results

5.1 Introductory comments

In this section, I present and discuss the results of my regression analysis. Table 7 shows the estimated effects of husbands’ shocks on wives, Table 8 the other way around.

5.2 Results for the shock variables

The aggregate shock variables, not distinguishing by the cause of the shock, are not very precisely estimated. If anything, we can say that there is a slight tendency towards synchronisation of labour supply (meaning a positive sign of the coefficient). This tendency towards

H's shock(s) → ΔW 's ln(hours)	Preferred lag structure		Minimal lag structure	
	Overall	Disaggr.	Overall	Disaggr.
LD.(Dep. Var.)	-0.1555***	-0.1513***	-0.1100***	-0.1084***
L2D.(Dep. Var.)	-0.0214	-0.0196		
D.(HH size)	-0.0326	-0.0402	0.0100	0.0078
LD.(HH size)	-0.0092	-0.0024		
L2D.(HH size)	-0.1082*	-0.1116*		
D.(No. of children)	-0.0410	-0.0473	-0.3940***	-0.3903***
LD.(No. of children)	-0.4992***	-0.5117***		
L2D.(No. of children)	0.0298	0.0483		
D.(OR home owner)	0.3213	0.4155	0.9248***	0.9692***
LD.(OR home owner)	1.1800***	1.0238***		
D.(MG home owner)	0.0753	0.0705	0.8163***	0.7823***
LD.(MG home owner)	1.5281***	1.4128***		
D.(HH NL income)	3.4095***	3.2819***	1.2048	1.1163
LD.(HH NL income)	0.6541	0.7013		
D.(W of SPA (60+))	-0.7100***	-0.7158***	-0.7772***	-0.7793***
D.(W health prob.)	0.0020	-0.0104	0.0033	-0.0066
LD.(W health prob.)	-0.1501***	-0.1674***		
L2D.(W health prob.)	-0.0490	-0.0525		
D.(W's squared age)	-0.6607	-0.6065	-0.8482**	-0.8134**
D.(σ_H)	3.3102***		0.1652	
LD.(σ_H)	-3.8406			
L2D.(σ_H)	-0.1844			
D.(σ_H^{sep})		68.0847***		73.2804***
D.(σ_H^{noev})		2.6797**		0.1222
LD.(σ_H^{noev})		-3.4973		
L2D.(σ_H^{noev})		-0.2399		
D.(σ_H^{hl})		289.8160***		185.3678***
LD.(σ_H^{hl})		343.0206+		
L2D.(σ_H^{hl})		325.6425+		
D.(σ_H^{unem})		145.7167***		146.0802***
LD.(σ_H^{unem})		-45.5160		
L2D.(σ_H^{unem})		4.3832		
D.(σ_H^{wid})		49.1681		-505.0716
Constant	-0.1385***	-0.1443***	-0.0934**	-0.0971**
Number of obs	3780	3780	5022	5022
Sargan test	0.5991	0.5139	0.6339	0.6618
AB test (order 1)	0.0488	0.0376	0.0000	0.0000
AB test (order 2)	0.4591	0.2816	0.4745	0.3715

Table 7: Regression coefficients for Husband's shock(s) → Δ Wife's ln(hours).
D = first difference; LD = lagged difference; L2D = second lag of the difference.
***: Stat. significant at 1% level; **: 5% level; *: 10% level; +: 15% level.

W's shock(s) → ΔH 's ln(hours)	Preferred lag structure		Minimal lag structure	
	Overall	Disaggr.	Overall	Disaggr.
LD.(Dep. Var.)	-0.2505***	-0.2534***	-0.1764***	-0.1777***
L2D.(Dep. Var.)	-0.0810***	-0.0819***		
D.(HH size)	-0.0750	-0.0470	-0.1588***	-0.1526***
LD.(HH size)	0.0443	0.0312		
L2D.(HH size)	-0.1012*	-0.1090*		
D.(No. of children)	0.0121	0.0184	-0.0320	-0.0361
LD.(No. of children)	0.3556**	0.3228**		
L2D.(No. of children)	-0.3872***	-0.3750***		
D.(OR home owner)	0.1194	0.2190	0.5201**	0.5549**
LD.(OR home owner)	0.6039+	0.5879+		
D.(MG home owner)	0.2206	0.3427	0.7089***	0.7560***
LD.(MG home owner)	0.6840**	0.6377*		
D.(HH NL income)	2.6112**	2.5114**	1.4142+	1.3841+
LD.(HH NL income)	-0.2511	-0.2965		
D.(H of SPA (65+))	-1.4989***	-1.5105***	-1.6191***	-1.6210***
D.(H health prob.)	-0.1744***	-0.1696***	-0.1609***	-0.1574***
LD.(H health prob.)	-0.2160***	-0.2103***		
L2D.(H health prob.)	-0.0417	-0.0370		
D.(H's squared age)	-1.1075**	-1.0733**	-1.4398***	-1.3901***
D. (σ_W)	0.1445		0.0561	
LD. (σ_W)	0.5050			
L2D. (σ_W)	-1.0691			
D. (σ_W^{sep})		-4523.8990		-4701.0700**
D. (σ_W^{noev})		0.5584		0.2013
LD. (σ_W^{noev})		0.8872		
L2D. (σ_W^{noev})		-0.6814		
D. (σ_W^{hl})		-426.8678**		-412.3610***
LD. (σ_W^{hl})		454.5213		
L2D. (σ_W^{hl})		405.2156		
D. (σ_W^{unem})		-0.1208		-0.1823
LD. (σ_W^{unem})		81.1431		
L2D. (σ_W^{unem})		24.9384		
D. (σ_W^{wid})		-0.0079		0.0517
Constant	-0.0556	-0.0600	-0.0192	-0.0243
Number of obs	3748	3748	4967	4967
Sargan test	0.5493	0.5463	0.6101	0.6107
AB test (order 1)	0.0000	0.0000	0.0000	0.0000
AB test (order 2)	0.8581	0.7902	0.2479	0.2227

Table 8: Regression coefficients for Wife's shock(s) → Δ Husband's ln(hours).
D = first difference; LD = lagged difference; L2D = second lag of the difference.
***: Stat. significant at 1% level; **: 5% level; *: 10% level; +: 15% level.

synchronisation is linked to Table 4 earlier on, which showed that there are more couples in which either both spouses work or no spouse works than couples in which only one spouse works.

The results become more pronounced and more interesting when disaggregating the aggregate shock variables into the five separate shock variables.

The coefficient of husband's separation shock variable is positive and highly statistically significant using both lag structures. This means that women who experience a negative income shock due to a separation decrease their labour supply. If a woman was working 29 hours per week (the rounded sample mean, as mentioned earlier on), then the hours decrease caused by the average separation shock size will be 6 hours (to 23) when using the preferred lag structure or 5 hours (to 24) when using the minimal lag structure.¹¹ Looking in the other direction, the coefficients are always negative and, in the case of the minimal lag structure, also statistically significant at the 5% level, implying that husbands upon separation tend to increase their labour supply. If we use the minimal lag structure, in which this coefficient is statistically significant, and consider a man who initially worked 43 hours per week (again, the rounded sample mean), then the hours increase caused by the average separation shock size equals 17 (to 60 hours per week).

The health shock variable is consistently positive for the effect of men on women, implying that wives reduce their working hours when their husband simultaneously experiences a negative income shock and a health decline. When looking again at a woman who initially worked 29 hours, the contemporaneous effect predicts an hours decrease caused by the average health shock size of approx. one hour regardless of the lag structure. However, even though this effect looks small, one should not forget that the adjustment process appears to

¹¹To obtain these and the following figures throughout this section, consider the following equations: $\exp[\ln(29 + 1) + (-0.0031448 \cdot 68.0847)] - 1 = 23.22$ and $\exp[\ln(29 + 1) + (-0.0023891 \cdot 73.2804)] - 1 = 24.18$. The addition of 1 when forming the logarithm as well as the subtraction of 1 at the end stem from the fact that I define my dependent variable in terms of $\ln(\text{hours}+1)$ to deal with zero hours.

take several years since the coefficients of both the first and second lags of the difference are also statistically significant. The total effect, therefore, is a reduction of labour supply by a bit more than three hours per week. Looking in the other direction, at the effects of wife's health shock on husband's hours, there seems to be an opposite tendency for husbands to increase rather than reduce their working hours when their wife simultaneously experiences income and health shocks. This can be seen from the negative and statistically significant coefficient when using the minimal lag structure. However, the average size of this shock is in fact actually positive, as discussed earlier on. The size of the effect is very small: using the average (positive) shock size, there is virtually no change in husband's labour supply. The asymmetry in the health shock effect, i.e., that the coefficients are of opposite sign, could for instance be explained by different patterns of caregiving (i.e., wives providing caregiving for husbands with health problems, but not vice versa). However, in this paper, I do not provide empirical evidence for such a potential explanation.

The unemployment shock appears to affect women similarly as the separation and health shocks: positive sign (possibly indicating, as discussed in the literature review in the introduction, a disincentive effect of the benefit system and/or a DWE) and not too different size. Applying the average unemployment shock on a woman working 29 hours leads to a predicted reduction of 3 hours in wife's hours when using the preferred lag structure and of 2.5 hours when using the minimal lag structure. In the other direction, there are no statistically significant effects, and the coefficient size is also very small.

The effects of partner's death are never statistically significant and do not show any clear pattern. The coefficient size is much larger for women than for men, implying that women's labour market reaction to widowhood is noticeable (but not well determined) while men's is virtually nonexistent. Of course the analysis also suffers from low case numbers since death of a partner is by far the most infrequent of the events used.

The effect of a 'no event' shock, that is an unexpected income change brought about

without separation, death, unemployment, or health change of the partner (this means that such a ‘no event’ shock could be for instance due to choice or due to a promotion) is hardly statistically significant but generally speaking positive (the only statistically significant ‘no event’ shock is the contemporaneous effect of the husband’s shock on wife’s hours in the preferred lag structure model). It is fair to say that the results for the no event shock are not too different from those for the overall shock variable discussed a couple of paragraphs ago. This can, as already mentioned, point in several directions: it could be that this phenomenon is due to choice and the complementarity of leisure, but it could also be that we are actually observing the disincentive effects of the benefit system and/or a discouraged worker effect. In any case the results for the no event shock are not very well determined, and small in size.

I also tested for equality of the coefficients of the disaggregated shock variables. In particular, the effects of the separation, health, and unemployment shocks on women’s hours appear to be rather similar. However, statistical tests indicate that only the effects of husband’s health and unemployment shocks on wife’s hours in the preferred lag specification are found to be equal to each other at a reasonable error margin (2% in this case). No other two shock variable coefficients are found to equal each other at a 20% or lower level. Therefore, the rather detailed disaggregation used is worthwhile.

Finally, I would also like to compare my findings about the effects of the shocks to those of Haurin (1989). The only statistically significant shock effect which Haurin found was an increase in wife’s labour supply after a divorce or separation. Recall that the size of this increase in Haurin’s paper, starting from an annual hours mean of 960, was 540 hours. Assuming two weeks off (since he uses US data), this translates into an increase by 10.8 hours per week from 19.2 to 30 hours per week. Looking at my results for the UK, the corresponding figures, as mentioned earlier on, are a *decrease* by 5–6 hours per week from 29 to 23–24 hours per week. This contrast in the direction of the effect can be seen as consistent

with the differences between Britain and the USA with respect to AWE versus DWE found in the more general literature on couples in which the husband becomes unemployed, as outlined in the introduction of this paper.

5.3 Results for the control variables

The number of children in the household shows a strong asymmetry: there is, over time, no well-determined effect in either direction on husband's working hours, but a clear negative effect on wife's working hours. In other words, other things being equal, women raise their labour supply after a child leaves the household (and reduce it after a child is born into the household, which is of course less important in this age group). The size of this effect is large: considering again a wife who worked 29 hours per week, the predicted hours increase after a child leaves the household is approx. 19.5 (to 48.5) when using the preferred lag structure and 14.5 (to 43.5) when using the minimal lag structure. However, average working hours among women with children are likely to be lower than among those without.

The coefficients of the home ownership variables reveal that one year after buying a house, both partners increase their working hours, other things being equal. As one may have expected, the effect is stronger for owners with a current mortgage or loan than for outright owners, and more pronounced for wives than for husbands. However, even though there are quite a lot of changes in ownership status (i.e., there is no problem of small case numbers), the effect sizes are implausibly large, especially for the effect on the wife. When becoming owners with a current mortgage or loan, a husband previously working 43 hours per week is predicted to increase his weekly working hours by 39 to 43 (to 82–86). When becoming outright homeowners, the predicted increase in husband's working hours is 35 to 36 hours (to 78–79). Looking at the wife, the predicted hours increase caused by becoming owners with a current mortgage or loan is 93 to 109 hours per week (to 122–138). When becoming outright homeowners, the effect on the wife is 53 to 68 hours (to 82–97). Again,

it may of course be that average working hours before such a change are lower than overall.

If household non-labour income increases, wives increase their labour supply. The source of this effect is not immediately clear, but the effect is small yet statistically significant (starting from its mean value, a 50% increase in household non-labour income will cause a woman who previously worked 29 hours per week to work approx. two thirds of an hour more). It should be kept in mind that a change in household non-labour income also affects the denominator of the shock variables.

Not very surprisingly, reaching state pension age is associated with a substantial downward shift of the age-hours schedule. For a man who worked 43 hours per week the effect of this variable alone predicts a decrease by 34 hours to 9 hours per week when turning 65 (using the preferred lag structure). Using the minimal lag structure the decrease is even larger: by 35 hours to just 8 hours. For a woman working 29 hours, the predicted hours reduction explained by turning 60 is 15.5 (to 13.5) when using the preferred lag structure or 16 (to 13) when using the minimal lag structure. These huge effects are in accord with research on the labour market transitions of older men and women in the UK (cf. Haardt 2006: Figures 2, 18, and 20 on pp. 19, 36, and 37).

An own health decline reduces working hours, but not by as much as one would have expected. The husband's own health effect is very well determined. Considering again a husband who worked 43 hours per week, the predicted hours reduction equals 7 (to 36 hours per week) when using the preferred lag structure or 6.5 (to 36.5 hours per week) when using the minimal lag structure. The wife's own health effect is only statistically significant when using the preferred lag structure and comes with a one-lag delay. If a wife working 29 hours per week experiences a health decline, she will reduce her working hours by 4 hours (to 25) when using only one shock variable or by 4.5 hours (to 24.5) when disaggregating the shock variable. However, it should be kept in mind that I do not use finely graded data on health in this paper. Larger effects may have been found if I had used separate variables for very

large health declines.

6 Summary and conclusions

In this paper, I analysed how spouses in older couples react to ‘shocks’ or ‘surprises’ in their partner’s labour income using data from the British Household Panel Survey, 1991–2004. To this end, I build upon the work of Haurin (1989) who used US data from 1981 and 1982 to analyse the effects of husband’s income shocks caused by underlying hours shocks on the labour supply of wives of all ages. Apart from the different shock measure, the fact that I use more recent British data, and the fact that I focus on people aged 40 to 70, I also look at the influence of wife’s shocks on husband’s hours. Furthermore, I am able to model dynamic adjustment processes in working hours in a more comprehensive way by using the Arellano-Bond (1991) GMM methodology which was not yet available when Haurin wrote his article.

As expected, I find that wives’ labour supply is much more sensitive to partner’s shocks than husbands’. In fact, husband’s labour supply seems to be affected by only two of the types of shocks considered, by a separation shock, and by a health shock of the partner. Other unexpected changes in wife’s income are not found to be statistically significant.

After a separation, wives reduce their labour supply while the effect on husbands’ labour supply is less well-determined (not statistically significant or positive). A woman whose initial labour supply equalled the regression sample mean (29 hours per week) is predicted to reduce her labour supply by 5–6 hours to 23–24 hours per week. This is opposite to Haurin’s results who found that for the US in the early 80s, divorce or separation lead to an increase in women’s labour supply. My results also predict that husbands who initially worked 43 hours per week (again the regression sample mean) will increase their labour supply by 17 hours to 60 hours per week upon separation. However, this effect is only

statistically significant in one of two lag structures used.

Wife's unemployment does not have a statistically significant effect on husband's labour supply while wives whose husband becomes unemployed reduce their labour supply, too. Here, the predicted reduction is by 2.5–3 hours to 26–26.5 hours per week.

Partner's health decline causes wives to reduce their working hours while husbands tend to increase theirs when facing the opposite situation. The contemporaneous effect on a woman who used to work 29 hours per week is a reduction by one hour, but the effect appears to be spread out over several years with a cumulative effect of a reduction by 3 or more hours (to 26 or less hours per week). If anything, negative income shocks due to wife's bad health appear to *increase* husband's labour supply.

The effects of widowhood and widowerhood are not very well determined and in the latter case also negligibly small. None of the coefficients is statistically significant at any reasonable level.

Negative (positive) income shocks of the partner due to other reasons (such as choice) tend to reduce (increase) labour supply, but only slightly. The coefficient size is very small.

Even though the divorce or separation shock was the only statistically significant shock type in Haurin's analysis, one can draw out broader implications of the comparison between the US and the UK: in the US, there seems to be a clear tendency towards income replacement when looking at the effect on wife's hours, whatever the cause of the negative income shock of the husband (i.e., an offsetting reaction), while in the UK, only the husband seems to respond according to this pattern (if at all) while the wife always 'follows' the direction of the husband's income shock regardless of its cause (i.e., a magnifying reaction).¹² This suggests that the household-level consequences of husband's income shocks are larger in the

¹²This is shown by the fact that all the statistically significant shock coefficients in my analysis are positive when looking at the effects on wives and negative when looking at the effects on husbands; when comparing my results to Haurin (1989), keep in mind that his dependent variable is defined in terms of leisure rather than in terms of work.

UK than in the US.

I am reluctant though to speculate about the possible consequences of the future increase of women's state pension age on husbands' labour supply. Such a policy change is substantial in magnitude as well as fully anticipated and permanent, and therefore may be very different from the kinds of shocks I analysed in this paper.

As far as the other explanatory variables are considered, a couple of results are worth reiterating. First, the presence of children reduces wives' labour supply considerably. Second, home ownership, especially ownership with a current mortgage or loan, increases the labour supply of both spouses substantially. Third, there is an enormous impact of reaching state pension age which is in line with research on older people's labour market transitions. Fourth and last, the presence of a health problem reduces one's own labour supply, but not by as much as one may have expected.

Naturally, a lot of work remains to be done. One particularly interesting aspect, as mentioned in the introduction of this paper, would be a decomposition of my income shock variable into the income shock caused by an hours change (as in Haurin) and the income shock caused by a wage change. When analysing the effects of separation, and, even more so, of widowhood and widowerhood, one cannot emphasise enough the importance of (even) larger panels. Even specialised data sets such as the English Longitudinal Study of Ageing (ELSA) would not be able to provide a larger sample size than I was able to use in this paper. The future UK Household Longitudinal Study (UKHLS) may provide a large enough sample size even for rare events such as death. Finally, it will remain important to investigate further the exact causal mechanisms behind the spousal interactions found in this paper.

Appendix A: Separation regressions

	R separated	R = male	R = female
R's age		1.4540	1.3832
R's age squared		0.0326	0.2104
P's age		0.6684	0.7135+
P's age squared		21.5021	12.3969
Husband at least 5 yrs older than wife		1.6820	1.3551
Wife at least 5 yrs older than husband		1.8511	1.9197
Wave		1.5517	1.6768
Wave ²		0.8474	0.8763
Wave ³		1.0250	1.0093
Wave ⁴		0.9988	0.9998
Age of R at start of relationship		0.9250	0.8075
Age of R at start of relationship squared		1.0001	1.0001
Year at start of relationship		1.0487	1.2158
R has one kid		4.8833 **	1.5013
R has 2 kids		3.3396*	1.4276
R has 3 kids		3.8883 **	1.4174
R has 4 or more kids		3.2986*	1.4661
Number of kids in the household		1.0377	1.0553
Number of observations		18,009	18,439
Pseudo R-squared		0.0791	0.0492
Log likelihood		-512.0820	-639.9328

Table 9: Odds ratios of the separation logit (dependent variable equals 1 if R separated between $t - 1$ and t and is without partner in t).

***: Stat. significant at 1% level; **: 5% level; *: 10% level; +: 15% level.

Appendix B: Labour income regressions

	Husbands	Wives
R has degree	1029.8730***	889.9460***
R has teaching qual.	200.3199***	548.0318***
R has other higher qual.	459.3972***	392.3119***
R has nursing qual.	112.4810	329.0929***
R has A levels	267.0934***	223.2863***
R has O levels	210.8050***	155.5519***
R has other vocational qual.	155.7274***	96.0080***
R's age	143.7684***	48.0894***
R's squared age/1000	-1779.8480***	-716.6486***
Regional unemployment rate for men	-39.6510***	-46.6171***
R has health problem	-583.7513***	-250.6256***
P has health problem	-131.9625***	-54.1034***
Number of children in HH	11.6350	-106.3363***
HH size	45.3694***	-23.3564***
Constant	-1253.0860***	105.5838
Number of observations	20,928	21,597
Adjusted R-squared	0.2254	0.2883

Table 10: Last month's labour income regressions, pooled BHPS data (base qualification: no qualification).

***: Statistically significant at the 1% level; **: 5% level; *: 10% level.

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