The Impact of Husbands' Job Loss on Partners' Mental Health

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1. Introduction

The principal aim of this paper is to investigate whether a relationship exists between job loss and family mental well-being. Economic literature on this issue is quite limited and has shown the negative impact of unemployment both on the consumption and production side, as well as negative consequences on returning to the labour market. Various studies have looked at the negative effects of parental unemployment on children, in terms of educational and labour market outcomes, but the impact on partners have received much less attention. Nevertheless, this issue is important for various reasons:

- Poor mental health causes direct costs on individuals, in terms of labour market status and productivity. If one partner's job loss decreases both partners' mental health, this means that economic consequences for both individuals should be taken into account. The same idea applies to economic consequences of poor mental health on the society as a whole (i.e. treatment, rehabilitation, etc.).
- Worsening in partners' mental health may result in increasing family conflicts and decreasing family stability.
- Negative consequences on both partners' psychological well-being certainly imply negative effects on children.

Job loss has a direct impact on well-being. A large empirical psychological literature[1] has investigated the impact of unemployment on the incidence of low life satisfaction, depression, low self-esteem, unhappiness, and even suicide. A British study by Clark and Oswald (1994) uses cross

[1] See Darity and Goldsmith (1996) for a review of psychological studies showing that unemployment has a negative impact on self-esteem.

sectional data from the first wave of the BHPS to show that unemployed people have much lower levels of mental well-being (measured through the GHQ) than those in work[2].

This paper also casts some light on the role of income and psychological effect. Results are consistent with previous literature (see for example Kassenboehmer S., Haisken-DeNew J.P. 2009**,** Carrol, 2007; Clark and Oswald, 1994, Clark, 2003; Clark et al., 2001; Winkelmann and Winkelmann, 1998; Lindeboom et al., 2002) and show that the income shock associated with job loss is unlikely to represent the major source of the effect on the individual's and partner's mental health. This has some important policy implications: policies aimed at reducing the earnings shock from job losses may alleviate the financial problem, but they will be less effective if the main impact comes from other factors, such as the incidence of low life satisfaction, depression and low self-esteem.

Medical and psychological literature presents some evidence of spillover effects of happiness and well-being in families and social network (see Strom, 2003 for a review and Fowler and Christakis, 2008), and also investigates cross over effects of unemployment in couples (see for example Jones and Fletcher, 1993; Westman et al. 2001; Westman et al., 2004), but most of these studies analyse small and unrepresentative samples, and do not directly address the potential endogeneity of unemployment.

This paper adds, in various ways, to the different strands of literature mentioned above. Firstly, the impact of husbands' job loss on the probability of partners' poor mental health is analysed. Results complement the limited evidence on partners presented by Winklemann and Winkelmann in 1995 (using the GSOEP), by using British (and more recent) data and focusing on mental health, rather than on happiness. Secondly, the estimation of the main model has been achieved using six different specifications, including two different fixed-effects model. Furthermore, I deal with the possible

[2] See also Flatau et al. (2000) for evidence from Australia.

endogeneity of job loss, focusing on involuntary displacements and results are stable across different models. Lastly, the existence of multiple transmission channels is analysed and I discuss the relevance of the income shock on individual's and partner's mental well-being.

The main results of this paper show that the mental health worsens for both partners following a husband's job loss, even controlling for a large set of individual and family characteristics and modelling the dynamics of past and initial mental health.

The rest of this paper is organized as follows. Section 2 provides a theoretical framework for the analysis, Section 3 analyses the data and briefly presents mental health indicators. Section 4 discusses the estimation methods and Section 5 presents the main results. Section 6 concludes.

2. Theoretical framework - The production of health

The main theoretical framework of this analysis is Michael Grossman seminal work on the demand of health and healthcare. As Grossman (2001) points out, the *New Home Economics*, introduced by Gary Becker (1965), in which households are simultaneously producing units and utility maximisers has profound impacts on the fields of health economics. Time is required to produce health and to obtain medical care; further, health (like knowledge) is a durable capital stock and investments in health increase the time available to produce money earnings and commodities by reducing morbidity and prolonging life (see Grossman, 1972). Health is demanded for two reasons: it enters the consumers' preference functions (sick days are source of disutility) and, as an investment commodity, it determines the total amount of time available for market and nonmarket activities.

The consumer typical utility function is:

$$U = u(H_t, Z_t) \tag{1}$$

The individual is assumed to derive utility from his own health and from the consumption of other commodities Z. The individual's stock of health will depreciate over time, but the individual can invest in health:

$$H_{i+1} - H_i = I_i - \delta H_i \quad (2)$$

Where I_i is the gross investment in health and δ is the rate of depreciation. The individual produces gross investment in health and other commodities according to a set of household production functions:

$$\begin{aligned} I_i &= I_i(M_i, TH_i, E_i) \\ Z_i &= Z_i(X_i, T_i, E_i) \end{aligned} \quad (3)$$

Where M is medical care, X is the goods input in the production of Z, TH and T are time inputs and E is human capital. It is assumed that a shift in human capital changes the efficiency of the production process in the nonmarket sector. Individuals face two constraints, because both market goods and time are scarce resources:

$$\sum \frac{P_i M_i + V_i X_i}{(1+r)^i} = \sum \frac{W_i TW_i}{(1+r)^i} + A_0 \quad (4)$$

Where P and V are prices of M and X, W is the wage rate, TW is hours of work, A is discounted property income and r is the interest rate. The time constraint requires that the total amount of time available in any period must be exhausted by all possible uses:

$$TW_i + TL_i + TH_i + T_i = \Omega \quad (5)$$

Where TL is time lost from market and nonmarket activities due to illness or injury and is inversely related to the stock of health. An individual will demand health capital up to the point where the costs of one additional unit of health capital is equal to the value of the additional time for productive use generated by the better health, plus the utility of being healthy per se that an additional unit of 'good health' creates (see Grossman, 1972 and 2000).

Jacobson (2000) provides an interesting development of this model from a family perspective including the influence that other family members have on an individual's health-related behaviour

and extends the Grossman model, assuming that it is the family that is the producer of health rather than the individual, and individual members of the family receive investment and consumption benefits from investing in other family members' health.

The analysis of the impact of husband's job loss on partners' mental health is motivated by this conceptual framework. Various studies in previous literature have applied the Grossman's framework to the production of mental health (see for example Williams and Doessel, 2003 and Frank and Koss, 2004). Partners j (j=male m or female f) invest in their mental health, according to a production function similar to (3), where investment in mental well-being depends on initial mental health status, time, and two vectors of individuals' (E_j) and partners' or family's characteristics (D_j). Further, mental health depends on psychological inputs related to the individual, which have been denoted PSI_j and include elements such as: self-confidence, perceived role in the society, self-esteem; and psychological inputs coming from the environment, which have been denoted $PS2_j$ and include general happiness or life satisfaction coming from factors such as: local unemployment rate, crime rate, perspectives on the labour market, general status of the economy in the local area, political tensions, etc. The production functions for partners' mental health are:

$$\begin{aligned} I_m &= I_m(H_m, Th_m, E_m, D_{f,} PS1_m, PS2_m) \\ I_f &= I_f(H_f, Th_f, E_f, D_m, PS1_f, PS2_f) \end{aligned} \tag{6}$$

where E_j includes individual's education, health and work status and D_j is a vector of partner's and household characteristics including: partner's work status, partner's health, household income and number of children. According to the Grossman model, a consumer's demand for health should be positively correlated with his wage rate. A consumer's wage rate measures his or her market efficiency (the rate at which he can convert hours of work into money earnings) and the higher a person's wage rate, the greater the value of an increase in healthy time. The rewards of being healthy

are greater for higher-wage workers, so increased wage will tend to increase their optimal health capital stock.

The effect of husband's job loss on the mental health of both partners depends on the form of the production function (6) and on the size of the effects of various inputs.

First, I expect a negative effect of husband's job loss on his mental health, as unemployment coincides with a decrease in wage rate (which may be equal to zero if there is no redundancy pay) which determines a decline in the demand for health, according to the Grossman model. Redundancies are expected to convey a strong income shock, and a limited effect on psychological inputs from the individual (*PS1)* (factors such as self-esteem and perceived role in the society should not be strongly affected, because these job losses are not due to individual characteristics), as well as an effect through psychological inputs from the environment (*PS2*), because redundancies are likely to be related to economic recessions, poorer perspectives on the labour market, and higher unemployment rates. On the other hand, person-specific dismissals are likely to affect the production of mental health both *via* income and psychological inputs from the individual (*PS1*), with a smaller effect from psychological inputs from the environment *(PS2).* The overall magnitude of these effects will depend on how income, *PS1* and *PS2* enter the production function of mental health.

The effect of husband's job loss on wife's mental well-being is also expected to be negative, according to the theoretical framework presented above. Redundancies are expected to cause a greater negative effect to partner's mental health, because of the decrease in family income, associated with negative conditions on local labour market which may have a negative effect on partner's psychological well-being, through *PS2*. On the other hand, a husband's person-specific dismissal will affect the wife only through the decrease in family income and possibly through a re-evaluation of some husband's characteristics but should not affect her self-esteem or self-confidence (*PS1*) and should not convey negative psychological inputs through the environment (*PS2*).

3 . Data

This analysis uses data collected in the first 14 waves of the British Household Panel Survey (BHPS), which is a nationally representative sample[3] of about 5,500 households, recruited in September 1991. A sample is constructed of all married or cohabitating couples in the first 14 waves of the BHPS, with male between 16 and 65[4]. The estimation sample consists of 4,454 couples and 22,085 observations. This paper analyses the impact of husband's job loss on both partners' mental health. In many households men are the primary earners and their job loss will cause the largest earnings shock hence we are more likely to find impacts through that channel. Secondly, female labour market mobility is much greater and due to a variety of reasons (e.g. child bearing and rearing). Lastly, women have been found to be more sensitive to husbands' working conditions and working hours (see for example Booth and Van Ours, 2008) as well as to partners' unemployment (see Clark, 2003).

If a union ends, the partners are subsequently dropped from the analysis sample. In a separate paper, Doiron and Mendolia (2012) analyse the consequences of job loss on the risk of family dissolution and find that the probability of divorce increases following a husband's job loss and the results are stronger and longer lasting for dismissals compared to redundancies. It is generally found that married people have higher levels of psychological well-being (Clark and Oswald, 1994). Therefore, the results are likely to have conservative lower bounds for the population at large since those with more serious effects are more likely to divorce.

Information on labour market behaviour and periods of unemployment is collected from different sources within the BHPS. At each interview, the individual is asked about his/her current

[3] Additional samples of 1,500 households in Scotland and another 1,500 in Wales were added to the main sample in 1999, and in 2001 a sample of 2,000 households was added in Northern Ireland, making the panel suitable for UK-wide research. The additional samples are included in this analysis.

[4] Those couples where the man reaches 65 during the survey period are dropped at the time the man reaches 65.

employment situation[5]. If there was a change in this situation since the last interview(e.g. change of job, transition in/out unemployment) individuals are asked about the reason for the change. This information was used to complement the work history data set elaborated by Paull (1997, 2002) containing all labour forces spells (with start and end dates) for each individual after leaving fulltime education until the time of the interview.

Mental health is assessed using the General Health Questionnaire Caseness score. Previous literature refers to the GHQ as one of the most reliable indicators of psychological distress or "disutility" (Argyle, 1989; Clark and Oswald, 1994). The GHQ Caseness score is constructed from the responses to 12 questions covering feelings of strain, depression, inability to cope, anxiety-based insomnia and lack of confidence. The twelve answers[6] are combined into a total GHQ score that indicates the level of mental distress, giving a scale running from 0 (the least distressed) to 12 (the most distressed)[7]. In this analysis, I used the GHQ Caseness score as a primary measure of mental well-being and I also used a more severe notion of mental illness, corresponding to the GHQ-12 score greater or equal to 6[8]. The cut-off for this more restrictive definition was chosen to yield an incidence similar to the proportion of people declaring that their mental health status limited their work activity in the Labour Force Survey (between 8 and 9 percent).

The model also includes a very rich set of other control variables, consistent to the previous literature on this topic (Clark and Oswald, 1994; Winkelman and Winkelman, 1998), such as: physical health, highest educational qualification attained, number of children and age of the youngest child in the

[5] The proposed alternatives are: self employed, in-paid employment (full time or part time), unemployed, retired from paid work, on maternity leave, looking after family or home, full time student/at school, long-term sick or disabled, on a government training scheme, or other situations.

[6] The 12 questions are the following. Have you recently: been able to concentrate on whatever you are doing; Lost much sleep over worry? Felt that you are playing a useful part in things? Felt capable of making decisions about things? Felt constantly under strain? Felt you couldn't overcome difficulties? Been able to enjoy your normal day to day activities? Been able to face up to your problems? Been feeling unhappy and depressed? Been losing confidence in yourself? Been thinking of yourself as a worthless person? Been feeling reasonably happy all things considered?

[7] An alternative is the GHQ Likert score, that is, a well-being score from 0 to 36. It is the sum of the responses to the twelve questions, coded so that the lowest well-being value scores 36 and the highest well-being value scores 0.

[8] Results are shown only for the second definition of poor mental health. Results from the first definition are very similar and are available on request.

household, age, year and region binary variables. Income is measured as lagged yearly labour household income and current yearly non-labour income. Labour income is lagged, in order to avoid spurious correlations with job loss. Nevertheless, a sensitivity analysis has been run including contemporaneous labour income and results are unchanged. The use of yearly income helps to smooth out effects of unusually high income receipt in any one month. Empirically, both yearly and monthly incomes produce very similar results. The complete list of independent variables is reported in Table 1. Table 2 provides descriptive statistics of the variables used in the analysis. Mental health is generally lower for women than men, as well as for people having long term health conditions or being unemployed.

Table 1 here

Table 2 here

In the estimation sample, there are 1300 displacements consisting of 835 redundancies, 101 dismissals and 364 temporary job endings. Generally, the percentage incidence of displacements decreases over the 14 waves (redundancies are about 5% of the estimation sample in wave 1 and drop to about 3% in wave 14) as the average age of the sample rises. Exceptions occur around the recession of 2000-01.

4. Estimation Methods

In this paper panel data methods are used in order to control for person-specific unobserved heterogeneity as well as for the observed heterogeneity captured by the explanatory factors. A primary motivation for using panel data is to solve the omitted variable problem. The underlying assumption is that there is an individual, unobserved, time-invariant component of mental health status that can be accounted for by using panel data estimation. In this study, I will use different methodologies in order to compare their influence on the results. OLS and logit regression are undertaken in a pooled and fixed-effect framework. For the fixed-effects logit model, the dependent variable is collapsed into a binary format with a threshold value of GHQ score greater or equal to 6.

The drawback of this approach is that the effect of job loss on mental health is only identified by individuals who change labour force and mental health status and this implies a significant data loss. This problem can be solved by the Frijters and Ferrer-i-Carbonell (2004) estimator and its approximation (see Kassenboehmer and Haisken-DeNew, 2009) which applies individual specific threshold to collapse the data into a binary format. I follow Kassenboehmer and Haisken-DeNew (2009) and use the individual's mean mental health as threshold and determine these values using a simpler approach.

The latent variable specification of the model estimated can be written as:

$$Y_{it}^{*} = \beta' x_{it} + c_i + \varepsilon_{it} \quad (7)$$

$$(i = 1, \ldots\ldots N, t = 1, \ldots\ldots T_i)$$

A binary variable y_{it} is generated as follows:

$$y_{it} = \begin{cases} 0 \; if \; Y_{it}^{*} \leq \overline{Y_i^{*}} \\ 1 \; if \; Y_{it}^{*} \geq \overline{Y_i^{*}} \end{cases} \quad (8)$$

Where $\overline{Y_i^{*}} = \frac{\sum_{i=1}^{T} Y_{it}^{*}}{T}$

The variable y_{it} is equal to 1 if individual's mental health is above the individual's threshold. On this variable, Chamberlain (1980) conditional logit estimator can be applied so that the coefficients are estimated conditional on the number of ones in the dependent variable. Following Chamberlain (1980), the joint probability function of each set of T observations of $y_{it} = s_{it}$ ones and zero leads to the following Log-Likelihood function which can be maximised by standard programmes:

$$LL = ln\left[\prod_{i=1}^{n} \frac{\exp\left(\beta' \sum_{i=1}^{T} x_{it} y_{it}\right)}{\sum_{d \epsilon Bi} \exp\left(\beta' \sum_{i=1}^{T} x_{it} d_i\right)}\right] = \sum_{i=1}^{n} ln\left[\frac{\exp\left(\beta' \sum_{i=1}^{T} x_{it} y_{it}\right)}{\sum_{d \epsilon Bi} \exp\left(\beta' \sum_{i=1}^{T} x_{it} d_i\right)}\right] \quad (9)$$

Where x_{it} represents a vector of explanatory variables, y_{it} the dependent mental health binary variables and $d = (d_1, \ldots.. d_T)$ indicates the alternative set B_i varying across the observations. This consists of combinations of s_i ones and T- s_i zeros so that $\sum_{i=1}^{T} y_{it} = s$.

Because the coefficients are estimated conditional on the number of ones, the heterogeneity term can be removed. Observations without variation across the individual threshold of mental health do not

contribute to the likelihood function and covariates that do not vary over time cannot be distinguished from the individual effect ci and are drop out.

4.1 The attrition correction

To allow for attrition, an inverse probability weighted (IPW) estimator has been calculated and this correction has been applied to the pooled logit models (Wooldridge, 2002b, 2002c). The underlying idea is to estimate (probit) equations for the probability of responding at each wave, with respect to a set of characteristics x_i measured at the first wave. This relies on "selection on observables" and implies that attrition can be treated as an ignorable non-response, conditional on individual characteristics at time zero. The x_i vector includes all the regressors of the model, including initial mental health. Then, the inverse of fitted probabilities $1/p_{it}$ from models of response for all waves, 2 to 14, are used as weights[9] in the estimation of the pooled logit model following:

$$LogL = \sum_{i=1}^{N} \sum_{i=1}^{T} (r_{it}/p_{it}) \, logL_{it} \qquad (10)$$

where r_{it} is a binary variable equal to 1 for the response of individual i at wave t and equal to zero otherwise. Wooldridge (2002b) shows that under the ignorability assumption[10] the IPW estimator is $\sqrt{n}$ consistent and asymptotically normal. It is also shown that using the estimated probabilities and ignoring the adjustments to the standard errors leads to "conservative inference" (the standard errors are larger than using the true probabilities). Therefore, the standard errors have not been adjusted for the presence of generated weights.

4.2 Exogenous job loss: the redundancy variable

An important issue is the possibility of endogenous job losses and the resulting difficulty in the identification of causal effects. Reverse causality (the increased likelihood of job loss due to poor mental health conditions) can be reduced by taking into account the relative timing of the events. Specifically, mental health is recorded at each interview and is related to all job losses occurring

[9] This estimator is implemented using the pweight option in STATA.
[10] $P(r_{it}=1|y_{it}, y_{it-1}, x_{it}, x_{i0})=P(r_{it}=1|x_{i0}), \; t=1,....T$

since the 1st September of the year prior to the interview. A second source of endogeneity is the omission of common important variables; the probability of job loss and poor mental health could be correlated due to a common trait of the individual or match not observed in the data.

The treatment of redundancies as uninformative about individual traits is based on the legal definition of redundancy. The British legislation is explicit and the term redundancy should not refer to a dismissal caused by an individual worker's behaviour. The possible reasons for individual or collective redundancy are: total cessation of the employer's business (whether permanently or temporarily), cessation of business at the employee's workplace and reduction in the number of workers required to do a particular job. Also, the distinction between types of displacements is supported by recent literature based on the BHPS.

Arulampalam (2001) finds that redundancies have less of a scarring effect than other job losses: the earnings loss due to redundancies is about one half of that due to other displacements and 81% of men made redundant found jobs without any spell of non-employment. In another study of the BHPS, Borland et al. (2000) also compare the earnings loss of workers based on the reasons for the termination of the employment spell. They distinguish displaced workers from industries with decreasing employment in order to separate exogenous variations in job losses[11]. Following the approach proposed by Borland et al. (2000), I constructed a more stringent definition of redundancy, taking into account information on the industry of the job which has been terminated[12]. Each employment spell has been linked with the relevant workforce growth rate[13] and redundancies from jobs in industries with declining employment are treated separately. The underlying assumption is that people with worsening mental health are not more likely to have jobs in declining industries than other people.

[11] Several studies of the effects of job displacements on earnings have used plant closures as exogenous displacements (Gibbons and Katz, 1991 for the US and Doiron, 1995 for Canada). In these studies, the use of large cross section surveys meant that rare events such as plant closures could be used in the analysis. Information on plant closures is not available in the BHPS.

[12] The BHPS contains the information according to the Standard Industrial Classification, until wave 10 and to the New Standard Industrial Classification 92 after wave 10).

[13] A three-years moving average workforce growth rate for every industry.

The model controls for the occurrence of other job changes (voluntary, retirement, etc.) and the impact of redundancy on mental health is observed, conditioning on not experiencing other job changes. The risk of job loss endogeneity is lower in the analysis of the partner's mental health. Nevertheless, there is a smaller chance that the partner's mental health status affects the individual's productivity within the labour market and therefore increases the probability of job loss.

Further, the effect of redundancies on individual's and partner's mental health may be different depending on whether job loss occurs in industries with declining or increasing employment: I expect that redundancies occurring in industries with increasing employment will have a stronger impact on individual self-esteem and perceived role in the society, as they will be perceived as extraordinary events, happening to a minority of people. At the same time, as Clark (2003) shows, unemployment has a smaller effect on psychological well-being when people around the individual (e.g. other family members or people living in the same region) are sharing the same negative experience and therefore we expect redundancies occurring in declining industries to have a smaller effect on mental health.

5. Results

The results from the separate estimation of the impact of job loss on husbands' and wives' mental health are presented in Tables 3 and 4[14]. The table presents the results of six different estimation methods:

1. Pooled ordinary least squares;
2. Linear fixed effects (within group estimator);
3. Pooled logit based on a fixed mental health threshold of GHQ ≥ 6;
4. Conditional logit (equivalent to fixed-effects logit) as in (3)

[14] The estimates of the standard errors in the pooled logit model allow for serial correlation within those errors, by using a robust estimator for the covariance matrix.

5. Pooled logit based on individual averages
6. Conditional logit (equivalent to fixed-effects logit) as in (5)

The sample comprises of 22,085 observations in 4,454 couples. The final sample is the result of excluding couples with: i) missing values in the mental health of one partner; ii) missing values in any of the independent variables for one or both partners. A sensitivity analysis has been conducted using different samples for men and women (i.e. not excluding all the individuals with missing mental health or missing covariates for their partners) and the results are unchanged.

Table 3 here

Table 4 here

Results show that mental health decreases following a husband's redundancy for both partners. The difference in the mean GHQ score for people with and without redundancy is about half point and this coefficient is significantly different from zero in both partners' equations. Interestingly, the effect of redundancy is notable in size and is higher than the effect of age and education, as well as the majority of other independent variables, with the exception of women's own unemployment status (difference in mean GHQ score equal to 0.85) and long term health conditions (difference in mean of GHQ score between 0.7 and 1 point). The sign and significance of the redundancy variable is stable across all the specifications of the model, including linear fixed-effects and logit fixed-effects (both with fixed and individual threshold).

As pointed out in the theoretical section, redundancies worsen individual mental health through a decrease in the wage rate as well as through psychological factors related to the economic environment (PS2) and, in a limited way, through a deterioration in individual self-esteem and perceived role in the society (PS1).

Partner's mental well-being may be affected through a variety of factors. First of all, job loss implies a negative income shock for the whole family (the model does not control for contemporaneous labour income, because of the risk of spurious correlation with job loss) and this is expected to have a strong effect on partners, especially if the husband's job was the main source of economic subsistence in the family. Second, wives may be sensitive to the pure psychological effect of job loss, even if we expect these factors (PS1) to be more relevant for the individual. As previous literature has shown, work is a source of social interaction and self-esteem and women's life satisfaction has been found to be very sensitive to their partners' job characteristics (see Both and Van Oeurs, 2008). Husband's job loss may lead to re-consider his role in the family and this may offset the psychological equilibrium of both partners. This may be especially true for job losses occurring in industries with increasing employment. Also, family conflicts may increase as a result of increased financial and emotional stress. Lastly, husband's job loss may be correlated with local labour market conditions and therefore reduce wife's well-being via lower wages, greater job insecurity or poorer prospects on the labour market (PS2).

Dismissals significantly worsen individual mental health and the coefficients are higher than the redundancy ones in all the six specifications of the model. This suggests that income shocks are only a partial explanation of the consequences of job loss on individual's mental health. As pointed out in the theoretical section, other factors, such as changes in the individual's perceived role in the society, self-esteem or self-confidence (PS1) deserve further consideration and have a strong effect. Some of these elements arise regardless of the income shock and because employment is a provider of social relationships, identity in society and individual self-esteem. One would expect a lower impact of these factors in the case of exogenous job loss (redundancy). In the partner's equation, dismissal do not significantly reduce mental health when fixed-effects are introduced.

Person's specific dismissals should only affect partners' mental health because of the re-consideration of the husband's suitability and reliability, but they will have no effect through economic conditions (PS2). We should also keep in mind that partners are dropped from the sample when they separate or divorce and it is possible that the dismissal's effect plays a significant role in this decision (See Doiron and Mendolia, 2012).

Temporary job endings do not significantly deteriorate mental health for both partners. This effect can be due to the fact that the end of the contract was pre-determined. For this reason, temporary job endings are likely to have a much smaller effect on individual self-esteem and psychological well-being. In some specifications of the model, temporary job endings seem to slightly improve partners' mental health. However, the effect is quite small and can be driven by those people who find a better job after a temporary contract.

My results are tested including redundancies from declining industries in the main model[15]. These are treated separately. Redundancies occurring in industries with declining employment significantly worsen individual mental health (both with linear and fixed effect with individual threshold). Partners mental health is also significantly affected but when fixed effects are introduced, the strongest effect comes from redundancies with increasing employment. This can be due to a stronger re-consideration of husband's characteristics and role in the society (and therefore a stronger effect through PS1).

I now turn to the discussion of the effects of the other independent variables in the main model. All the results are presented in Tables 5-6. Mental health decreases with age and is lower with higher levels of education. This result is consistent with previous literature based on BHPS data (Clark,

[15]Results from models including the redundancy in declining industry variable are not presented for parsimony and are available on request.

2003; Clark and Oswald, 2002) and may imply that higher education raises individual expectations and may induce some kind of comparison effect. Therefore, this could increase the probability of high distress. Household's labour and non-labour earnings are separately analysed and labour income is lagged, because this would confound the effect of job loss and income itself. All the income variables don't have a relevant effect on the GHQ score, but higher earnings seem to slightly deteriorate mental well-being. However, these effects are very small. Husband's job changes for promotion or better job improve the mental health status of both partners, but the size of the effects is not very big. According to previous results in the literature (see for example Winkelman, 1995 and Clark, 2003), I find that employment status is an important determinant of women's mental health and women who are unemployed tend to have lower mental well-being.

Tables 5-6 here

5.1 Sensitivity analysis

I run a sensitivity analysis is based on a sub-sample where the information about redundancy payments is available (results are available on request). Workers are eligible for redundancy payments after two years of tenure with the same employer. Unfortunately, the information about redundancy payments has been collected in the BHPS after 1995 (but not in 1996) only. Therefore, a smaller sample, based on 9 waves only (1995 and from 1997 to 2004), can be used to test the stability of the results. In this analysis, I separated redundancies with and without redundancy pay. This sample contains 295 redundancies with redundancy pay and 319 without pay. In the modelling of man's mental health, both types of redundancies significantly worsen mental well-being and the size of the effects is similar to previous models, even if redundancies with pay have a bigger effect. Partners seem to be more sensitive to redundancies with pay but the significance of these effects decrease when fixed effects are introduced. Redundancy payments certainly eases the transition to unemployment status and limits the income shock, so these results confirm the original hypothesis

that income is not the main source of negative effect. The psychological perception of the shock is very strong, even if the family receives partial compensation.

6. Conclusion and Discussion

In this study, I analyse the impact of job loss on family mental health, using the sample of all married and cohabitating couples in the first 14 waves of BHPS. Economists' interest in mental health promotion has recently increased, especially considering that mental disorders impose a large emotional and financial burden on ill individuals and their families, including indirect costs for the nation (lost productivity) and direct costs for medical resources used for care, treatment and rehabilitation. Previous literature has not directly addressed the causal effect of exogenous job loss on individual and family mental well-being and when panel data have been used, data sets were small or based on a sub-population.

My results show that both partners' mental health decreases following a husband's redundancy and the results are stable across all the various specifications of the models, including two different fixed-effects models.

Results have been discussed and analysed in order to consider the specific channels through which job loss affects individual and family distress. The income shock plays a relevant role, especially on partner's mental health, but it is unlikely to be the major source of the shock. Other psychological elements, such as low self-esteem and individual perceived role deserve further consideration.

This analysis could be expanded by considering the role of social support and distinguishing the impact of job loss on family well-being in high unemployment areas. A further development of this study will consider the impact of job loss on children's well-being and will focus on the impact of women's job loss on men's mental health.

In conclusion, I believe this analysis underlines the strict link between employment conditions and individual and family psychological well-being. Further study and research should be devoted to these consequences of job loss, which could be included in a discussion of the cost or consequences of involuntary job displacement.

Appendix

Table 1 – Variable definition

Breathing Disease	1 if yes
Heart Disease	1 if yes
Stomach or digestion health problems	1 if yes
Diabetes	1 if yes
Degree	1 if highest academic qualification is a degree or a higher degree (omitted group)
HND/A	1 if highest academic qualification is HND (including teaching qualification, nursing or other higher qualification) or GCE A level (Upper high school graduate)
O/CSE	1 if highest academic qualification is GCE O level or CSE (lower high school graduate)
No qualification	1 if no academic qualification
Age Age squared	Age in years at 1st December of current wave Age in years squared
Household labour income	Lagged household labour income (divided by 10,000)
Household non labour income	Current household non labour income (divided by 10,000)

Table 2

	Men		Women	
	Mean	**SD**	**Mean**	**SD**
GHQ score	1.4	2.5	1.9	3.02
Age	42.5	11.1	40.64	11,18
Number of dependent children in the household	0.86	1.07	0.86	1.07
Household labour income	27,187	20,170	27,187	20,170
Education - Degree	0.17	0.37	0.13	0.34
Education – High school	0.45	0.49	0.37	0.48
Lower or no education	0.38	0.39	0.5	0.42
Physical health problems (heart, breathing, digestion or diabethes)	0.26	0.23	0.27	0.24

Table 3 – Effect of husband's job loss on wife's mental health

	Continuous		Fixed threshold GHQ ≥6		Individual Threshold	
	OLS	**OLS - FE**	**LOGIT**	**CLOGIT**	**LOGIT**	**CLOGIT**
Redundancy	0.429**	0.359**	0.355**	0.311**	0.256*	0.303*
	(0.125)	(0.102)	(0.087)	(0.087)	(0.113)	(0.133)
Dismissal	0.953*	0.285	0.174	0.132	0.780**	0.468
	(0.395)	(0.303)	(0.231)	(0.249)	(0.252)	(0.361)
Temporary job ending	-0.183	-0.194	0.011	-0.020	-0.288+	-0.409+
	(0.151)	(0.162)	(0.128)	(0.142)	(0.174)	(0.240)
Observations	22,085	22,085	22,085	18,212	22,085	9,344
Number of couples		4,454		2,784		1,315

Note: All models control for year and region binary variables and for all variables listed in Appendix table 1. Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 4 – Effect of husband's job loss on husband's mental health

	Continuous		Fixed threshold GHQ ≥6		Individual Threshold	
	OLS	**OLS - FE**	**LOGIT**	**CLOGIT**	**LOGIT**	**CLOGIT**
Redundancy	0.530**	0.397**	0.284**	0.397**	0.505**	0.451**
	(0.136)	(0.084)	(0.088)	(0.091)	(0.130)	(0.154)
Dismissal	2.009**	1.017**	0.889**	0.715**	1.393**	0.762*
	(0.426)	(0.251)	(0.225)	(0.270)	(0.272)	(0.365)
Temporary job ending	0.282	0.080	0.181	0.201	0.368*	0.078
	(0.175)	(0.134)	(0.130)	(0.146)	(0.185)	(0.245)
Observations	22,085	22,085	22,085	18,212	22,085	9,344
Number of couples		4,454		2,784		1,315

Note: All models control for year and region binary variables and for all variables listed in Appendix table 1. Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 5 –Wife's mental health – Other variables

	Continuous		Fixed threshold – GHQ ≥6		Individual Threshold	
	OLS	**OLS - FE**	**LOGIT**	**CLOGIT**	**LOGIT**	**CLOGIT**
Age	0.096**	0.115*	0.018	0.026	0.108**	0.111
	(0.017)	(0.053)	(0.013)	(0.047)	(0.020)	(0.076)
Age squared	-0.001**	-0.001**	-0.000*	-0.000	-0.001**	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Number of children 0-4	-0.141*	-0.117	0.016	-0.019	-0.118+	-0.202+
	(0.070)	(0.085)	(0.049)	(0.074)	(0.069)	(0.120)
Number of children 5-10	-0.156+	-0.167+	-0.080	-0.114	-0.089	-0.199
	(0.081)	(0.092)	(0.054)	(0.082)	(0.078)	(0.128)
Number of children 11-15	0.005	-0.035	0.041	-0.045	-0.013	-0.033
	(0.082)	(0.089)	(0.057)	(0.079)	(0.076)	(0.120)
Lagged labour income	-0.032	0.027+	0.007	0.016	-0.018	0.056*
	(0.013)	(0.014)	(0.008)	(0.012)	(0.015)	(0.024)
Non labour income	0.083*	-0.032	0.013	-0.013	0.079**	-0.068
	(0.036)	(0.041)	(0.025)	(0.039)	(0.028)	(0.077)
HND/A level	-0.041	-0.261	-0.071	0.067	0.038	-0.517
	(0.073)	(0.277)	(0.052)	(0.242)	(0.074)	(0.395)
O/CSE	-0.272**	-0.351	-0.147**	-0.009	-0.148+	-0.679
	(0.077)	(0.308)	(0.056)	(0.269)	(0.079)	(0.440)
No qualification	-0.088	-0.442	-0.129*	-0.045	0.030	-0.462
	(0.092)	(0.360)	(0.065)	(0.316)	(0.092)	(0.512)
Husband changed job for a better job	-0.173**	-0.072	-0.090+	-0.072	-0.175*	-0.102
	(0.067)	(0.060)	(0.051)	(0.053)	(0.071)	(0.082)
Husband retired	-0.193	-0.059	-0.010	-0.006	-0.323	-0.236
	(0.168)	(0.184)	(0.157)	(0.176)	(0.240)	(0.304)
Breathing disease	0.708**	0.386**	0.202**	0.208*	0.440**	0.292*
	(0.084)	(0.104)	(0.052)	(0.089)	(0.064)	(0.129)
Heart disease	0.591**	0.430**	0.241**	0.263**	0.388**	0.321**
	(0.090)	(0.096)	(0.057)	(0.083)	(0.075)	(0.119)
Stomach or digestion problems	1.075**	0.278**	0.297**	0.268**	0.683**	0.141
	(0.111)	(0.102)	(0.065)	(0.087)	(0.076)	(0.124)
Diabetes	0.613**	-0.130	-0.036	0.041	0.298+	-0.203
	(0.214)	(0.320)	(0.138)	(0.283)	(0.158)	(0.370)
Retired	-0.097	-0.187	-0.097	-0.248+	-0.165	-0.394+
	(0.111)	(0.140)	(0.092)	(0.128)	(0.135)	(0.214)
Out of the labour market	0.569**	0.450**	0.230**	0.288**	0.429**	0.381**
	(0.069)	(0.074)	(0.044)	(0.065)	(0.060)	(0.097)
Unemployed	0.857**	0.827**	0.407**	0.450**	0.490**	0.542**
	(0.201)	(0.161)	(0.126)	(0.133)	(0.144)	(0.193)
Constant	0.445	-0.637	-1.058**		-3.727**	
	(0.350)	(2.152)	(0.257)		(0.380)	
Observations	22,085	22,085	22,085	18,212	22,085	9,344
Number of couples		4,454		2,784		1,315

Note: Dummy variables for year and region are omitted for parsimony. Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%

Table 6 – Probability of poor mental health – Man - Other variables

	Continuous		Fixed threshold – GHQ ≥6		Individual Threshold	
	OLS	**OLS - FE**	**LOGIT**	**CLOGIT**	**LOGIT**	**CLOGIT**
Age	0.098**	0.154**	0.044**	0.108*	0.112**	0.288**
	(0.015)	(0.045)	(0.014)	(0.051)	(0.026)	(0.097)
Age squared	-0.001**	-0.002**	-0.001**	-0.002**	-0.001**	-0.003**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Number of children 0-4	0.111*	0.031	0.101*	0.030	0.146+	-0.026
	(0.055)	(0.069)	(0.049)	(0.078)	(0.081)	(0.144)
Number of children 5-10	0.052	-0.039	0.010	-0.031	0.091	-0.071
	(0.063)	(0.076)	(0.054)	(0.086)	(0.087)	(0.152)
Number of children 11-15	0.060	0.060	-0.003	0.023	0.146	0.091
	(0.069)	(0.073)	(0.059)	(0.083)	(0.091)	(0.145)
Lagged labour income	-0.019	0.028*	0.005	0.020	-0.026	0.071**
	(0.009)	(0.012)	(0.009)	(0.013)	(0.018)	(0.027)
Non labour income	0.039	-0.045	-0.049	-0.038	0.055+	-0.059
	(0.026)	(0.034)	(0.031)	(0.039)	(0.031)	(0.067)
HND/A level	-0.191**	0.365	-0.085+	0.365	-0.207**	0.714
	(0.056)	(0.240)	(0.049)	(0.280)	(0.074)	(0.438)
O/CSE	-0.423**	0.311	-0.242**	0.217	-0.507**	0.621
	(0.063)	(0.266)	(0.059)	(0.308)	(0.093)	(0.498)
No qualification	-0.389**	0.141	-0.199**	0.149	-0.482**	-0.122
	(0.066)	(0.291)	(0.063)	(0.340)	(0.097)	(0.609)
Job changed for a better job	-0.230**	-0.148**	-0.099+	-0.089	-0.283**	-0.172+
	(0.052)	(0.049)	(0.054)	(0.055)	(0.086)	(0.100)
Retired	-0.248+	-0.279+	-0.020	-0.076	-0.863*	-1.273*
	(0.128)	(0.152)	(0.177)	(0.195)	(0.408)	(0.525)
Breathing disease	0.643**	0.282**	0.291**	0.221*	0.628**	0.454**
	(0.077)	(0.090)	(0.057)	(0.097)	(0.080)	(0.158)
Heart disease	0.394**	0.113	0.179**	0.077	0.513**	0.075
	(0.075)	(0.085)	(0.061)	(0.096)	(0.093)	(0.159)
Stomach or digestion problems	0.862**	0.268**	0.450**	0.301**	0.634**	0.166
	(0.099)	(0.087)	(0.069)	(0.093)	(0.096)	(0.145)
Diabetes	-0.215*	-0.425+	-0.115	-0.501+	-0.297	-0.641
	(0.109)	(0.236)	(0.124)	(0.297)	(0.200)	(0.491)
Constant	-0.387	-2.297	-1.793**		-4.487**	
	(0.315)	(1.904)	(0.296)		(0.535)	
Observations	22,085	22,085	22,085	16,702	22,085	6,623
Number of couples	4,454		2,545		906	

Note: Dummy variables for year, region and change of employment status are omitted for parsimony. Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%

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