

# Household Negotiation and Labor Supply: Evidence from the BHPS

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**Abstract.** In this paper, we estimate a collective model of household labour supply *à la* Chiappori on British two-earner couples, using data from the British Household Panel Survey (BHPS). We find that family members do not pool their resources: the unitary model is rejected. We estimate a sharing rule representing the negotiation process inside the household, introducing a number of original distribution factors, such as political and religious involvement and parents' occupational level. We do not find any significant impact of marriage market opportunities on the balance of power inside the couple. We emphasise that the sharing rule should be interpreted carefully when analysing intra-family inequality issues.

**Keywords:** Labour Supply, Collective Model, Sharing Rule, Marriage Market.

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## 1. Introduction

This research has two main goals. First, to provide rigorous estimates of the effects of wages, income and other factors on hours of work supplied. Second, to re-evaluate the household's leisure choice as a measure of intra-family inequality. We concentrate on the labour supply of British two-earner couples.

Household labor supply studies are important to understand the design of policies that change work incentives. In Britain, policy makers have long been concerned by the "working poor" phenomenon. In 1971, the Family Income Supplement was introduced with a requirement of full-time work . A subsequent reform introduced Family Credit in 1988, with an initial requirement of 24 hours of work per week, later reduced to 16 hours per week. The recent reform in 1999 introduced the more generous Working Families Tax Credit.

One of the goals of our research is to help understand the impact of intra-household negotiation on the likely outcome of social policies. In Britain, for instance, income tax is calculated at an individual level, whereas the old family allowance, Family Credit, was allocated by default to mothers. Currently, the Working Families' Tax Credit is paid to the household. When there is intra-family negotiation, as represented by a Sharing Rule, each household member does not necessarily benefit equally from such an allowance. In particular, individual behaviour is not independent of the identity of the allowance recipient. The WFTC reform obviously changed the balance of bargaining power within the family. We therefore expect this reform to have consequences on the sharing rule, and, more generally, on labour supply and intra-household inequality.

Household decision-making is often considered using the unitary model: the household being modelled as a single agent, maximising utility subject to constraints. This approach has been criticised both at the theoretical and empirical levels. First, the theoretical foundations of the unitary model seem open to criticism. If the utility function is considered as some kind of social choice function (Samuelson, 1956), then issue of the aggregation of preferences (Arrow, 1951) is obviously pertinent. Alternatively, the single utility function could be that of a (benevolent ) dictator, who determines the optimal allocation of leisure time amongst household members (Becker, 1981).

On the empirical front, the symmetry of the Slutsky matrix and the income-pooling property that the unitary model implies are often rejected by the data: see, amongst others, Kooreman and Kapteyn (1987), Thomas (1990), Schultz (1990), and Fortin and Lacroix (1997). The

implication is that family members do not have the same marginal rate of substitution between work and leisure, and that they will react differently to a rise in non-labour income depending on whose non labour income rises. Lundberg, Pollak and Wales (1997) present the results of a robust income-pooling test based on a natural experiment<sup>1</sup>.

An alternative approach has relocated the centre of decision within a household to the individuals who form it, using game theory to obtain bargained outcomes: see Manser and Brown (1980), Horney and McElroy (1981), and Lundberg and Pollak (1993). These models allow the unitary model, which is nested within them, to be tested. They are, however, not without difficulty in terms of their empirical implementation, as the threat point needs to be explicitly determined (McElroy, 1990).

Somewhat more recently, household labour supply has been modelled by emphasising the Pareto-efficiency of the resulting outcome: see Chiappori (1988, 1992, 1997), Bourguignon and Chiappori (1992), Browning et al. (1994), and Browning and Chiappori (1998). This approach has the advantage of being more empirically tractable, and allows the derivatives of the "sharing rule" to be recovered using only observations on leisure for household members. The sharing rule describes the process of intra-household negotiation.

In this article, following the recent work of Chiappori, Fortin and Lacroix (2001), we estimate a collective model of household labour supply using British Household Panel Survey (BHPS) data. We show that the income-pooling property is rejected in this data. We deduce some fiscal consequences of the introduction of the WFTC, emphasizing intra-family redistribution issues. The sharing rule is estimated using relatively novel distribution factors, such as involvement in politics and religion. The sex-ratio is not significant in the negotiation process, whereas bargaining power may have been expected to tilt in favour of the spouse who has better marriage market opportunities in the case of separation. Finally, we reconsider the sharing rule as an intra-household inequality indicator, urging some caution in its interpretation.

The paper is organised as follows. Section 2 presents the collective model of household labour supply, and the model that we will use in this paper. Section 3 then describes our econometric specification, followed by the results in Section 4. Section 5 concludes.

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<sup>1</sup>They find a significant effect of the identity of the allowance recipient on household consumption behaviour in Great Britain.

## 2. Collective Models of Household Behaviour

### 2.1. Collective Framework

#### 2.1.1. Efficient Negotiation Outcome and Distribution Function

A household is composed of two members, say a female and a male. Each has a utility function depending on leisure time (assignable and observed) and consumption of a composite good (unobserved). We make the key assumption that the bargained outcome is Pareto-efficient<sup>2</sup>. Then, final consumptions are solutions of the following program:

$$\text{Max}_{L^f, L^m, C^f, C^m} \quad \mu u^f(L^f, C^f) + (1 - \mu)u^m(L^m, C^m) \quad (\text{P})$$

$$\text{s.t.} \quad C^m + C^f \leq (T - L^f)w_f + (T - L^m)w_m + y$$

where  $y$ , household non-labour income (the sum of each member's non-labour income:  $y = y_f + y_m$ ),  $T$  is total time available, and  $\mu(\cdot)$  is the distribution function, which places the bargained outcome on a point on the Pareto-efficient frontier.

In comparison to the Nash-bargaining model, the negotiation process is not specified. Thus, the threat point estimation problem is avoided. The Nash Solution is one of the many feasible negotiation outcomes<sup>3</sup>. One drawback is that we have to be careful when choosing the arguments of the distribution function as these entirely determine the negotiation process. Browning and Chiappori (1992) propose the following simple distribution function:

$$\mu = \mu(w_f, w_m, y)$$

The only factors influencing the negotiation here are wages and household non-labour income. Chiappori, Fortin and Lacroix (2001) introduce a more general distribution function:

$$\mu = \mu(w_f, w_m, y, s_1, s_2)$$

Here  $s_1$  and  $s_2$  are external variables, independent of preferences and prices. They are similar to the "extra-environmental parameters" (EEP) in Nash-bargaining models (McElroy and Horney,

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<sup>2</sup>This makes sense if we consider that individuals are playing a repeated game with complete information. This assumption allows a wide variety of negotiation outcomes.

<sup>3</sup>The outcome corresponds to the generalized Nash Solution without threat point.

1981). Chiappori, Fortin and Lacroix estimate this distribution function on 1988 PSID data, using the sex-ratio and divorce legislation as distribution factors. These latter are supposed to reflect the utility gain or loss in case of disagreement between spouses: respectively the marriage market opportunities and financial gain or loss associated with divorce. We suspect that they effectively influence what we can interpret as the threat point.

Other factors may influence the negotiation process, either through the outside option or bargaining power. These may be socio-cultural and correspond to the type of the negotiating partners. One aim of this paper is to identify observable variables which play a role in the underlying household negotiation process. The BHPS database provides a number of such potential distribution factors.

### 2.1.2. An Interpretation of the Negotiation Process: the Sharing Rule

The second theorem of welfare economics proves that a Pareto-efficient outcome can result from a decentralised process with appropriate redistribution of initial resources. Thus, (P) can be separated in two distinct programs:

$$\begin{aligned} & \text{Max}_{C^i, L^i} \quad u^i(C^i, L^i) \\ \text{s.t.} \quad & C^i \leq (T - L^i)w_i + \phi^i \quad , i = f, m. \end{aligned} \tag{P'}$$

with  $\phi^i = \phi()$  if  $i = f$  and  $\phi^i = y - \phi()$  if  $i = m$ . The arguments introduced in the  $\phi$  function are the same as those introduced in the  $\mu$  function. Intra-household negotiation can then be viewed as a two-step process: first the two partners decide on a share  $\phi$  of exogeneous income; second each individual maximises his own utility, through the choice of labour supply and consumption, subject to a budget constraint that reflects their share of exogenous income from the first step. The individual's share can be expressed as a part of total income -  $(w_f + w_m)T + y$  - or as a part of non-labour income,  $y$ . In the latter case, the share may be negative.

Observed household labour supply allows us to infer the shape of the sharing rule, up to a constant. The estimated sharing rule can then be used to throw light on inequality and the complex redistribution game within the household.

## 2.2. Empirical Specification

We consider that utility is increasing and concave in leisure and consumption. The  $z$  factors reflect the heterogeneity of preferences:  $u^i(C^i, L^i; z)$ . The distribution function depends on prices, each member's non-labour income,  $L$  distribution factors and  $K$  preference heterogeneity factors<sup>4</sup>:

$$\mu = \mu(w_f, w_m, y_f, y_m, s_1, \dots, s_L; z_1, \dots, z_K)$$

We are able to observe  $y_f$  and  $y_m$  separately, which is an advantage: there is no theoretical reason why bargaining power should depend only on the sum of non-labour incomes ( $y_f + y_m$ ) but not on their distribution. We will explicitly test the income-pooling property.

Individual labour supply results from the following program:

$$\text{Max}_{C^i, h^i} \quad u^i(C^i, T - h^i; z) \quad (\text{P}'')$$

$$\text{s.t.} \quad C^i \leq h^i w_i + \phi^i \quad , i = f, m.$$

with  $\phi(w_f, w_m, y_f, y_m, s_1, \dots, s_K; z_1, \dots, z_K)$  and hours of work  $h^i = T - L^i$ .

The derivatives of the sharing rule with respect to its arguments are given by equations (6.11) to (6.15) in the Mathematical Appendix:

Setting  $A = h_{w_m}^f/h_{y_f}^f$ ,  $B = h_{w_f}^m/h_{y_f}^m$ ,  $C = h_{y_m}^f/h_{y_f}^f$ ,  $D = h_{y_m}^m/h_{y_f}^m$ ,  $E_l = h_{s_l}^f/h_{y_f}^f$  and  $E_l = h_{s_l}^m/h_{y_f}^m$  for  $l = 1 \dots L$ , it can be shown that:

$$\phi_{w_f} = \frac{B(C-1)}{D-C} \quad (2.1)$$

$$\phi_{w_m} = \frac{A(D-1)}{D-C} \quad (2.2)$$

$$\phi_{y_f} = \frac{D-1}{D-C} \quad (2.3)$$

$$\phi_{y_m} = \frac{C(D-1)}{D-C} \quad (2.4)$$

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<sup>4</sup>To identify the derivatives of the sharing rule, the distribution factors must be independent of the preference heterogeneity factors.

$$\phi_{s_l} = \frac{E_l(D-1)}{D-C}, \text{ for } l = 1...L \quad (2.5)$$

Holding the negotiation effect constant, the Slutsky restrictions require the following conditions (see the Mathematical Appendix):

$$h_{w_f}^f - h_{y_f}^f \left( h^f + \frac{B(C-1)}{D-C} \right) \left( \frac{D-C}{D-1} \right) \geq 0 \quad (2.6)$$

$$h_{w_m}^m - h_{y_f}^m \left( h^m + 1 - \frac{A(D-1)}{D-C} \right) \left( \frac{D-C}{C(D-1)} \right) \geq 0 \quad (2.7)$$

Moreover, the following second-order conditions must be satisfied:

$$\frac{\partial^2 \phi}{\partial x_i \partial x_j} = \frac{\partial^2 \phi}{\partial x_j \partial x_i}, \text{ with } x_{i,j} \in \{w_f, w_m, y_f, y_m, s_1, \dots, s_L\} \quad (2.8)$$

Last, there is a restriction for the inclusion of distribution factors:

$$\frac{E_l}{F_l} = \frac{E_1}{F_1} \quad (2.9)$$

### 3. Econometric Approach

#### 3.1. Data

The data come from Wave 7 of the British Household Panel Survey (BHPS). This general survey covers roughly 10 000 people in 5 500 different households per year, and includes a wide range of demographic, health, employment and income information. In particular, we have wage and work hours information (see Table 1 for descriptive statistics). All adults in the same household are interviewed separately. The sample of couples who both work yields roughly 1000 observations. The BHPS allows novel research questions to be addressed as it includes a certain number of subjective variables. In particular, we will use distribution factors which have hitherto been under-exploited, such as parents' labour market participation, and the individual's political and social opinions. The regional sex-ratio is also incorporated as a distribution factor.

Figure 1 shows partners' distribution of work hours. The size of each bubble represents the number of households with each specific pair of work hours. Work hours are higher for men than for women (most bubbles are under the 45°line). We attempt to explain this pattern using

the model of household negotiation.

The first panel of Table 1 shows the evolution of hours of work and hourly wages in the BHPS (between 1992 and 1997). Hours of paid work are higher for men (these data come from couples where both partners work). In terms of changes over time, there is some slight movement towards equality in terms of this measure of weekly hours.

### 3.2. Econometric Methodology

The Collective model requires the estimation of a joint system of labour supply equations on the sub-sample of couples where both members work. Here we are just interested in interior solution of the household bargaining problem. Our estimates can be biased because of the selection of working couples. We do not take into account this bias in order to stay consistent with the collective model used. Blundell et al. (1998) give further developments of the collective model in the case of non participation.

Labour supply are semi-logarithmic (cf. 3.1). The explanatory variables include hourly wages, non-labour income, age, education, marital status (legally married or not), number of children and other factors that we suspect play a role in the bargaining process. As there are reasons to suspect misspecification<sup>5</sup> when a couple has young children, we estimate the same model on the sub-sample of couples without children under 5.

$$\begin{aligned} h^f &= f_0 + f_1 \ln w_f + f_2 \ln w_m + f_3 y_f + f_4 y_m + b_1^f s_1 + \dots b_L^f s_L + z_1^f \beta_1 + \dots z_K^f \beta_K + \varepsilon^f \\ h^m &= m_0 + m_1 \ln w_m + m_2 \ln w_f + m_3 y_f + m_4 y_m + b_1^m s_1 + \dots b_L^m s_L + z_1^m \beta_1 + \dots z_K^m \beta_K + \varepsilon^m \end{aligned} \quad (3.1)$$

As usual, we suppose that household  $i$  makes its decisions independently of all other households. Thus, the error terms between households are independently distributed:  $E(\varepsilon_i^j \varepsilon_{i'}^{j'}) = 0, \forall j, j'$  and  $i \neq i'$ . The hourly wage series is produced by dividing monthly wages by monthly hours of work. Measurement errors in the hours of work and monthly wages can generate both an endogeneity bias and heteroscedasticity. We allow for heteroscedasticity by using the White estimator (1980). As individuals choose hours of work and wages simultaneously, it is likely that wages will be endogenous:  $E(w_i/\varepsilon_i) \neq 0$ . We also suspect that non-labour income is simultaneously chosen with hours of work (because, for example, benefits or net income depend

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<sup>5</sup> Expenditures in term of non labour market time on children, especially young children can be viewed as a public good. In this case, these are part of a first step negotiation, which changes the total income to be shared, and which can affect the sharing rule. See Lundberg (1988) for the impact of young children on labour supply.

on the number of hours worked). We instrument endogenous variables using the following instrument set: non-labour income lagged one year, region, job tenure, social class, the regional unemployment rate, and interactions between age, education and these instruments. Hausman's specification test rejects the exogeneity of non-labour income and hourly wages.

Finally, the joint model suggests that errors between household members are correlated:  $E(\varepsilon_i^f \varepsilon_i^m) \neq 0$ . We estimate the model using GMM. The covariance between couples' labour supply is estimated using the residuals of the labour supply equations when couples' labour supply is considered to be independent. An iterative procedure is used until convergence is reached. White's heteroscedasticity test is not rejected at the 5% level.

## 4. Results

### 4.1. Impact of Heterogeneity Factors on Joint Labour Supply

Table 2 shows the regression results, as well as the estimated elasticities. The well-known negative impact of the number of children on female labour supply is found, especially if the child is under five. The number of children is not significantly correlated with male labour supply, except in the absence of young children. In this case, male labour supply falls with the number of children. The disincentive impact of the number of children likely partly results from childcare costs. Marriage significantly reduces female labour supply, even controlling for male wages and non-labour income. We attempt to explain this negative correlation in section 4.3, as there is no good *a priori* reason to suppose that married women have a greater taste for leisure than unmarried women,

The index of opinions regarding women's role in the family is strongly negatively correlated with female labour supply. This index is higher for "traditional" couples, and lower for "progressive" couples. The opinion variable may play a role either in determining women's preferences (representing a stronger preference for leisure), or on the way in which couples negotiate their share of labour time (a division with the woman at home and the man at work being more likely in traditional families).

Ignoring the negotiation process, the estimated uncompensated wage elasticities indicate that the substitution effect is stronger than the income effect: a 10% rise in the hourly wage would increase women's labour supply in couples by about 3%, which accords with the range usually found in the literature. The male wage elasticities are insignificant.

## 4.2. Do Family Members Pool Their Resources? Some Fiscal Consequences

The collective model encompasses a form of the unitary model. In particular, we can test whether, as the unitary model predicts, family members pool their resources in the sense that utility is maximised subject to a family budget constraint reflecting the incomes of all family members. If this is the case, then the individual labour supply consequences of a rise in a household member's non-labour income will be the same regardless of whose non-labour income increased. Such a property does not necessarily hold in the collective model, where there is bargaining and intra-household transfers. The BHPS allows us to distinguish between spouses' non-labour incomes, so we can test the income-pooling property. The coefficient estimates (all couples) of labour supply income effects and elasticities clearly reject income-pooling and the unitary model<sup>6</sup>.

The implication is that the effect of a 500£ allowance, say, will depend critically on the identity of the beneficiary. If the woman receives the allowance, she will lower her labour supply by around 10 hours per week, whereas the man will increase his labour supply by around 3 hours per week. On the contrary, if the man receives the allowance, the woman will reduce her labour supply by only 2 hours a week, and the man will reduce his by 2.5 hours per week.

In this section, we interpret non rigorously our results in term of potential impact of the recent reform of Britain's work incentive policy. As Family Credit was essentially paid to mothers, the disincentive effect on women's hours of work was at its largest for women; on the contrary, there was an incentive effect for male labour supply. The new WFTC reform will both change the beneficiary (by default, it is the household, not the woman) and increase generosity (the allowance is higher and covers a larger range of income). The beneficiary change will change the balance of bargaining power within the couple to the detriment of women, whereas the second effect will increase the aggregate impact on hours of work. For couples above the hours requirement, the female disincentive effect on hours of work persists (if her husband receives the allowance, she reduces her labour supply), but the effect will be smaller. As the allowance is more generous, the total effect on hours of work is ambiguous. Men in couples will gain a greater part of an allowance that has increased, so both effects imply reduced male labour supply (compared to Family Credit).

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<sup>6</sup>The Slutsky Matrix is not symmetric.

Our estimates can not directly reveal poverty trap effects as we do not model non-participation. However, as for couples above the hours requirement, the beneficiary change will induce intra-household transfers towards males, and increased generosity induces higher labour supply. The net effect is then to encourage male employment, with an ambiguous effect for women depending on the way in which spouses share the WFTC.

### **4.3. The Impact of the Negotiation Process on Labour Supply - Looking for Distribution Factors**

#### **4.3.1. Collective Model Estimates**

Table 3 presents estimates of the collective model with a simple sharing rule:  $\mu(w_f, w_m, y_f, y_m; z_1, \dots, z_K)$ . The estimated sharing rule is similar both for the whole sample and for the sub-sample without young children (except for the males wage effect which becomes insignificant). Labour supply behaviour seems coherent with microeconomic theory: the labour-leisure substitution effect is positive for women and insignificant for men. The income effect is negative and close to estimates obtained for single individuals. All these effects are obtained after controlling for the effect of household negotiation on behaviour.

#### **4.3.2. Looking for Distribution Factors**

Table 4 presents a number of results in the search for distribution factors to correctly specify the sharing rule. We introduce one by one the distribution factors that we suspect may influence either the threat point or bargaining power. Some of them are dichotomic. As often in the litterature, we ignore the difficulty of interpretation of these variables in term of marginal effect. The impact of a potential distribution factor on the sharing rule can be identified only if it is orthogonal to the  $Z$  variables measuring preference heterogeneity. To see if the variable influences preferences, we estimate, in a first step, the impact of the distribution factor for single individuals (where there is no negotiation in the labour supply decision).

We first test the impact of marriage market opportunities on intra-household negotiation . With the threat point interpretation of the bargaining process, each spouse's *status quo* is his expected utility in the case of separation. This depends on the chances of finding another partner, which can be approximated by the ratio of men to women in the region by age cate-

gory<sup>7</sup>. The sex-ratio turns out to be insignificant in the income sharing equation. This result therefore does not agree with that of Chiappori, Fortin and Lacroix (2001)<sup>8</sup>.

We may imagine that parents' sociological status variables, as measured by the Cambridge or Goldthorpe scales, might influence the share of work in the household, because of social reproduction or because we expect more equality in some social categories. These variables, which are sometimes significant for individual labour supply, are not significantly correlated with the negotiation process. This may be due to the difficulty of capturing a complex sociological effect with continuous variables.

Physical or psychological health variables could either represent the dependency of one spouse on the other in the case of divorce, or greater agreement amongst family members. In this case, health variables are supposed to only affect the labor supply decision making only through the bargaining process, which is such a strong assumption. However, these health variables do not attract significant estimates in the sharing rule equation.

The degree of interest and involvement in politics and religion may also reveal information about the negotiating power. These variables do not seem to be affect preferences (as they are insignificant in single labour supply estimates). The husband's involvement in politics and the wife's interest in religion seem to play a role in the negotiation process: they reduce the wife's share of income and increase her labour supply. The labour supply effect of these variables is open to a number of different interpretations, and these results should be confirmed on other datasets.

Finally, we test marital status as a distribution factor. We find a positive significant effect on the sharing rule. As there is no particular reason why marital status should influence leisure preferences, we consider it as a distribution factor: the choice of marriage reveals information on the negotiation process<sup>9</sup>.

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<sup>7</sup>We tried a number of different sex-ratios, depending on the way in which the marriage market is supposed to be segmented: all individuals or only those living on their own; 5-year or 10-year age categories; age categories with reference to the woman's age or to the partner's age.

<sup>8</sup>Other potential variables such as sex mix at work are linked to hours of work, and therefore cannot be used.

<sup>9</sup>As we suspect that this variable may be endogenous, we carried out a Hausman test. This test does not reject exogeneity.

## **4.4. Intra-household Inequality and Collective Labour Supply**

### **4.4.1. Final Sharing Rule**

We estimate the final sharing rule (see Table 5) by incorporating all the distribution factors detected in the last section. We then test the introduction of those factors (See 2.9 in the Mathematical Appendix). We find that the share of non-labour income accruing to the woman before her labour supply decision increases with man's wage (there is more total income to share, and the woman obtains a greater part of total income), her non-labour income, her spouse's non-labour income (due to a denominator effect, even though her bargaining power falls), and marital status. Her share decreases with male political involvement and her own interest in religion. The variable measuring opinions regarding women's role in the family is not used in the sharing rule as it may well be linked with preferences, but we suspect that gender role opinions are nonetheless important determinants of household negotiation.

### **4.4.2. Intrahousehold Inequality Interpretation**

The sharing rule can be used as a tool to analyse intra-household inequality. A greater share of non-labour income obtained by the woman can be interpreted as an improvement in her household bargaining position (because the threat point increases, for example). We can thus interpret marriage as a step towards male-female equality. This increase in equality is represented by positive intra-household transfers towards woman. But, as the labour supply effect of income is negative, greater equality implies a greater division of tasks inside the family: women at home and men at work. This is a direct implication of the collective model of labour supply: non-labour time is interpreted as leisure , and thus the less the woman works, the better we interpret her position to be in the family. The sharing rule represents a fundamental innovation for the analysis of intra-household decision-making. Nevertheless, we need to be cautious in its interpretation for intra-household inequality, due to the strict division of time into market work and leisure. Apps and Rees (1997) and Chiappori (1997) propose an extension of the collective model to domestic production. Application of this model requires the merging of both time-use and labor force survey, which has recently been implemented on swedish data by Aronsson, Daunfeldt and Wikstrom (2001).

## 5. Conclusion

The joint estimation of British couples' labour supply allows us to take into account explicitly household decision-making. The resulting income and wage elasticity estimates are consistent with those found in other empirical studies (e.g. Blundell and MaCurdy, 1999). We also find the usual negative correlation between number of children and female labour supply, particularly for young children.

The Income-pooling property is rejected, suggesting that models explicitly accounting for individuals' utility within the family describe the data better. This has consequences for the evaluation of fiscal policies. As an illustration, the 1999 WFTC reform changed the balance of bargaining power within the household in defavor of women, by transferring income from women to men. The increased generosity of the new allowance could compensate women for the weakening of their position. Thus, the final impact of the reform on female hours of work supply is ambiguous. However, men in couples who are above the hours requirement will reduce their desired hours of work. If the sharing rule is consistent with corner solutions, we can suspect that men in couple under the hours requirement have a bigger incentive to work, because they benefit both from a more generous allowance and a larger share of this allowance.

The collective estimate show that the share of non-labour income obtained by the woman before her labour supply decision is positively correlated with the man's wage and non-labour income. Her bargaining position is also stronger (in this sense) if she is married, if she has greater non-labour income herself, or if she is not interested in religion. On the other hand, women's bargaining power is lower in households where the man is involved in politics. These results with respect to political and religious activity are novel, and likely merit further investigation. We find that marriage market measures are insignificant in our sharing rule estimates, contrary to the hypothesis that the threat point depends positively on the chances of finding another partner in the case of separation.

The sharing rule is a useful tool for the re-examination of intra-family inequality. In the collective model of labour supply household inequality results uniquely from the share of leisure, where leisure is considered as total time minus market work. However, any inequality conclusions will likely change if we split leisure up into pure leisure and household production (cf. Apps and Rees, 1997). The current specification of collective labour supply models, with its dichotomous time use, yields limited policy conclusions. More general models, taking household production into account, will help to explain the mechanisms of household decision-making.

## References

- [1] Apps, P.F. and R. Rees (1997), “Collective Labor Supply and Household Production”, *Journal of Political Economy*, 105, 178-190.
- [2] Aronsson, T., S. Daunfeldt and M. Wikstrom (2001), “Estimating intra-household allocation in a collective model with household production”, *Journal of Population Economics*, 14, 569-584.
- [3] Arrow, K. J. (1951), *Social Choice and Individual Values*, New York, Wiley & Sons.
- [4] Becker, G. (1981), *A Treatise of the Family*, Cambridge, Mass.: Harvard University Press.
- [5] Bergström, T.C. (1996), “Economics in a Family Way”, *Journal of Economic Literature*, Vol XXXIV, December, 1903-1934.
- [6] Blundell R., P.-A. Chiappori, T. Magnac and C. Meghir (1998), “Collective Labor Supply: Heterogeneity and Nonparticipation”, Mimeo, UCL.
- [7] Blundell R. and T. MaCurdy (1999), “Labor Supply: A Review of Alternative Approaches”, in O.C. Ashenfelter and D. Card, eds., *Handbook of labour Economics*, Vol. 3A (North-Holland, Amsterdam).
- [8] Bourguignon, F. and P.-A. Chiappori (1992), “Collective Models of Household Behavior”, *European Economic Review*, 36, 355-364.
- [9] Browning, M., F. Bourguignon, P.-A. Chiappori and V. Lechene (1994), “Income and Outcomes: A Structural Model of Intra-Household Allocation”, *Journal of Political Economy*, 102, 1067-1096.
- [10] Browning, M. and P.-A. Chiappori (1998), “Efficient Intra-Household Allocations: A General Characterization and Empirical Tests”, *Econometrica*, 66, 1241-1278.
- [11] Chiappori, P.-A. (1988), “Rational Household Labor Supply”, *Econometrica*, 56, 63-89.
- [12] Chiappori, P.-A. (1992), “Collective Labor Supply and Welfare”, *Journal of Political Economy*, 100, 437-467.

- [13] Chiappori, P.-A. (1997), “Introducing Household Production in Collective Models of Labor Supply”, *Journal of Political Economy*, 105, 191-209.
- [14] Chiappori, P.-A., B. Fortin and G. Lacroix (2001), “Marriage Market, Divorce Legislation and Household Labor Supply”. Typescript, CREFA Université Laval.
- [15] Fortin B. and G. Lacroix (1997), “A Test of the Unitary and Collective Models of Household Labour Supply”, *Economic Journal*, 107, 933-955.
- [16] Horney M.J and M.B. McElroy (1981), “Nash-Bargained Household Decisions: Towards a Generalization of the Theory of Demand”, *International Economic Review*, 22, 333-349.
- [17] Kooreman P. and Kapteyn A. (1987), “A Disaggregated Analysis of the Allocation of Time Within the Household”, *Journal of Political Economy*, 95, 2, 223-249.
- [18] Lundberg, S.J and R. Pollak (1993), “Separate Spheres Bargaining and the Marriage Market”, *Journal of Political Economy*, 10, 987-1010.
- [19] Lundberg, S.J, R. Pollak and T. Wales (1997), “Do Husband and Wives Pool Their Resources ? Evidence from the United Kingdom Child Benefit.”, *Journal of Human Resources*, 32(3), 463-480.
- [20] Manser, M. and M. Brown (1980), “Marriage and Household Decision Making: A Bargaining Analysis”, *International Economic Review*, 21, 31-44.
- [21] McElroy, M.B (1990), “The Empirical Content of Nash-Bargaining Household Behavior”, *Journal of Human Resources*; 25, 559-583.
- [22] Samuelson, P. (1956), “Social Indifference Curves”, *Quarterly Journal of Economics*, 70, 1-22.
- [23] Schultz T.P.(1990), “Testing the Neoclassical Model of Family Labor Supply and Fertility”, *Journal of Human Resources*, 25, 599-634.
- [24] Thomas D (1990), “Intra-Household Resource Allocation: An Inferential Approach”, *Journal of Human Resources*, 25, 635-664.
- [25] White H. (1980), “A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity”, *Econometrica*, 48, 817-838.

## 6. Appendix:

### 6.1. Symmetry Test:

Assuming income-pooling, the Slutsky matrix is:

$$S = \begin{pmatrix} \frac{\partial h_f^c}{\partial w_f} & \frac{\partial h_f^c}{\partial w_m} \\ \frac{\partial h_m^c}{\partial w_f} & \frac{\partial h_m^c}{\partial w_m} \end{pmatrix} \quad (6.1)$$

$$\text{with } \frac{\partial h_i^c}{\partial w_j} = \frac{\partial h_i}{\partial w_j} - \frac{\partial h_i}{\partial(y_f + y_m)} h_j = \frac{\partial h_i}{\partial w_j} - \frac{\partial h_i}{\partial(y_m + y_f)} h_j$$

Testing for symmetry implies the following:

$$\begin{aligned} H_0 & : \frac{\partial h_f}{\partial w_m} - \frac{\partial h_f}{\partial(y_m + y_f)} h_m - \frac{\partial h_m}{\partial w_f} + \frac{\partial h_m}{\partial(y_m + y_f)} h_f = 0 \\ H_1 & : \frac{\partial h_f}{\partial w_m} - \frac{\partial h_f}{\partial(y_m + y_f)} h_m - \frac{\partial h_m}{\partial w_f} + \frac{\partial h_m}{\partial(y_m + y_f)} h_f \neq 0 \end{aligned} \quad (6.2)$$

Applied to a semi-log joint labour supply model,  $H_0$  becomes:

$$H_0 : \frac{f_2}{w_m} - \widetilde{f}_3(h_m + h_f) - \frac{m_2}{w_f} + \widetilde{m}_3(h_m + h_f) = 0 \quad (6.3)$$

With  $\widetilde{f}_3$  and  $\widetilde{m}_3$  being the coefficients associated with  $(h_m + h_f)$  in the restricted model.

### 6.2. The Income-Pooling Test:

$$\begin{aligned} H_0 & : \frac{\partial h_i}{\partial y_f} - \frac{\partial h_i}{\partial y_m} = 0 \\ H_1 & : \frac{\partial h_i}{\partial y_f} - \frac{\partial h_i}{\partial y_m} \neq 0 \end{aligned} \quad (6.4)$$

for  $i = f, m$ .

In our case this becomes:

$$\text{female} : H_0 : f_3 - f_4 = 0 \quad (6.5)$$

$$\text{male} : H_0 : m_3 - m_4 = 0 \quad (6.6)$$

### 6.3. Labour Supply Income Elasticities:

$$\begin{aligned}
 e_{h_f/y_f} &= \frac{f_3 y_f}{h_f} \\
 e_{h_f/y_m} &= \frac{f_4 y_m}{h_f} \\
 e_{h_m/y_f} &= \frac{m_3 y_f}{h_m} \\
 e_{h_f/y_m} &= \frac{m_4 y_m}{h_m}
 \end{aligned} \tag{6.7}$$

### 6.4. Uncompensated Wage Elasticities:

$$\begin{aligned}
 e_{h_f/w_f} &= \frac{f_1}{h_f} \\
 e_{h_f/w_m} &= \frac{f_2}{h_f} \\
 e_{h_m/w_f} &= \frac{m_2}{h_m} \\
 e_{h_m/w_m} &= \frac{m_1}{h_m}
 \end{aligned} \tag{6.8}$$

### 6.5. Derivatives of the Sharing Rule:

The derivatives of the sharing rule are calculated in the general case without income pooling. Let  $H$  be the Marshallian labour supply function. Given the sharing rule, this function satisfies the following properties:

$$\begin{aligned}
 h^f &= H^f(w_f, \phi(w_f, w_m, y_f, y_m, s; z); z) \\
 h^m &= H^m(w_m, y_f + y_m - \phi(w_f, w_m, y_f, y_m, s; z); z)
 \end{aligned} \tag{6.9}$$

We therefore have:

$$\begin{aligned}
 A &= \frac{\phi_{w_m}}{\phi_{y_f}} \\
 B &= -\frac{\phi_{w_f}}{1 - \phi_{y_f}}
 \end{aligned} \tag{6.10}$$

$$\begin{aligned} C &= \frac{\phi_{y_m}}{\phi_{y_f}} \\ D &= \frac{1 - \phi_{y_m}}{1 - \phi_{y_f}} \\ E_l &= \frac{\phi_{s_l}}{\phi_{y_f}} \end{aligned}$$

Solving the system, we obtain the derivatives of the sharing rule, which depend on A, B, C and D.

$$\phi_{w_f} = \frac{B(C - 1)}{D - C} \quad (6.11)$$

$$\phi_{w_m} = \frac{A(D - 1)}{D - C} \quad (6.12)$$

$$\phi_{y_f} = \frac{D - 1}{D - C} \quad (6.13)$$

$$\phi_{y_m} = \frac{C(D - 1)}{D - C} \quad (6.14)$$

$$\phi_{s_l} = \frac{E_l(D - 1)}{D - C}, \text{ for } l = 1 \dots L \quad (6.15)$$

Where  $A = h_{w_m}^f/h_{y_f}^f$ ,  $B = h_{w_f}^m/h_{y_f}^m$ ,  $C = h_{y_m}^f/h_{y_f}^f$ ,  $D = h_{y_m}^m/h_{y_f}^m$ ,  $E_l = h_{s_l}^f/h_{y_f}^f$  and  $E_l = h_{s_l}^m/h_{y_f}^m$  for  $l = 1 \dots L$ .

We also have the restriction:

$$\frac{E_l}{F_l} = \frac{E_1}{F_1} \quad (6.16)$$

For our particular labour supply function, we obtain:

$$A = \frac{f_2}{f_3 w_m}, \quad B = \frac{m_2}{m_3 w_f}, \quad C = \frac{f_4}{f_3}, \quad D = \frac{m_4}{m_3}, \quad E_l = \frac{b_l}{f_3} \quad (6.17)$$

In this case, the derivatives of the sharing rule are:

$$\phi_{w_f} = \frac{m_2(f_4 - f_3)}{w_f \times (m_4 f_3 - f_4 m_3)} \quad (6.18)$$

$$\begin{aligned}
\phi_{w_m} &= \frac{f_2(m_4 - m_3)}{w_m \times (m_4 f_3 - f_4 m_3)} \\
\phi_{y_f} &= \frac{f_3(m_4 - m_3)}{m_4 f_3 - f_4 m_3} \\
\phi_{y_m} &= \frac{f_4(m_4 - m_3)}{m_4 f_3 - f_4 m_3} \\
\phi_{s_l} &= \frac{b_l^f(m_4 - m_3)}{m_4 f_3 - f_4 m_3}
\end{aligned}$$

Equation 2.9 therefore becomes:

$$b_1^f b_l^m = b_l^f b_1^m \quad (6.19)$$

### 6.6. The Slutsky Matrix for a given Sharing Rule is:

$$S/\phi = \begin{pmatrix} \frac{\partial H_f^c}{\partial w_f} \geq 0 & \frac{\partial H_f^c}{\partial w_m} = 0 \\ \frac{\partial H_m^c}{\partial w_f} = 0 & \frac{\partial H_m^c}{\partial w_m} \geq 0 \end{pmatrix} \quad (6.20)$$

with:

$$\begin{aligned}
\frac{\partial H_f^c}{\partial w_f} &= \frac{\partial H_f}{\partial w_f} - \frac{\partial H^f}{\partial Y} h^f \geq 0 \\
\frac{\partial H_m^c}{\partial w_m} &= \frac{\partial H_m}{\partial w_m} - \frac{\partial H^m}{\partial Y} h^m \geq 0
\end{aligned} \quad (6.21)$$

If Y is non-labour income after sharing:

$$\begin{aligned}
\frac{\partial H_f^c}{\partial w_f} &= h_{w_f}^f - \frac{\partial H^f}{\partial Y} (h^f + \phi_{w_f}) \\
\frac{\partial H_m^c}{\partial w_m} &= h_{w_m}^m - \frac{\partial H^m}{\partial Y} (h^m + 1 - \phi_{w_m})
\end{aligned} \quad (6.22)$$

$\frac{\partial H^f}{\partial Y} = \frac{h_{w_m}^f}{\phi_{w_m}}$  and  $\frac{\partial H^m}{\partial Y} = -\frac{h_{w_f}^m}{\phi_{w_f}}$ , therefore:

$$\begin{aligned}
\frac{\partial H_f^c}{\partial w_f} &= h_{w_f}^f - h_{y_f}^f \frac{(h^f + \phi_{w_f})}{\phi_{y_f}} \\
\frac{\partial H_m^c}{\partial w_m} &= h_{w_m}^m + h_{y_m}^m \frac{(h^m + 1 - \phi_{w_m})}{1 - \phi_{y_m}}
\end{aligned} \quad (6.23)$$

In our case, the diagonal terms of the Slutsky matrix, given the sharing rule, are:

$$\begin{aligned}\frac{\partial H_f^c}{\partial w_f} &= \frac{f_1(m_4 - m_3) - h_f w_f (m_4 f_3 - f_4 m_3) + m_2(f_4 - f_3)}{w_f \times (m_4 - m_3)} \\ \frac{\partial H_m^c}{\partial w_m} &= \frac{m_1}{w_m} + m_4 \frac{w_m (m_4 f_3 - f_4 m_3) (h_m + 1) - f_2(m_4 - m_3)}{w_m \times (m_4 f_3 - f_4 m_4)}\end{aligned}$$

### 6.7. Compensated Wage Elasticities for a given Sharing Rule:

$$\begin{aligned}e_{H_f/w_f}/\phi &= \frac{\partial H_f^c}{\partial w_f} \times \frac{w_f}{h_f} = \frac{f_1(m_4 - m_3) - h_f w_f (m_4 f_3 - f_4 m_3) + m_2(f_4 - f_3)}{h_f \times (m_4 - m_3)} \quad (6.24) \\ e_{H_m/w_m}/\phi &= \frac{\partial H_m^c}{\partial w_m} \times \frac{w_m}{h_m} = \frac{m_1}{h_m} + m_4 \frac{w_m (m_4 f_3 - f_4 m_3) (h_m + 1) - f_2(m_4 - m_3)}{h_m \times (m_4 f_3 - f_4 m_4)}\end{aligned}$$

### 6.8. Uncompensated Wage Elasticities for a given Sharing Rule:

$$e_{h^i/w_i}/\phi = \frac{\partial H_i}{\partial w_i} \times \frac{w_i}{h_i} \quad , \text{pour } i = f, m. \quad (6.25)$$

$$\begin{aligned}e_{h^f/w_f}/\phi &= \left[ h_{w_f}^f - h_{y_f}^f \times \frac{\phi_{w_f}}{\phi_{y_f}} \right] \times \frac{w_f}{h_f} \\ e_{h^m/w_m}/\phi &= \left[ h_{w_m}^m - h_{y_m}^m \times \frac{1 - \phi_{w_m}}{1 - \phi_{y_m}} \right] \times \frac{w_m}{h_m}\end{aligned} \quad (6.26)$$

**Table 1. Descriptive Statistics, Working Couples, BHPS**

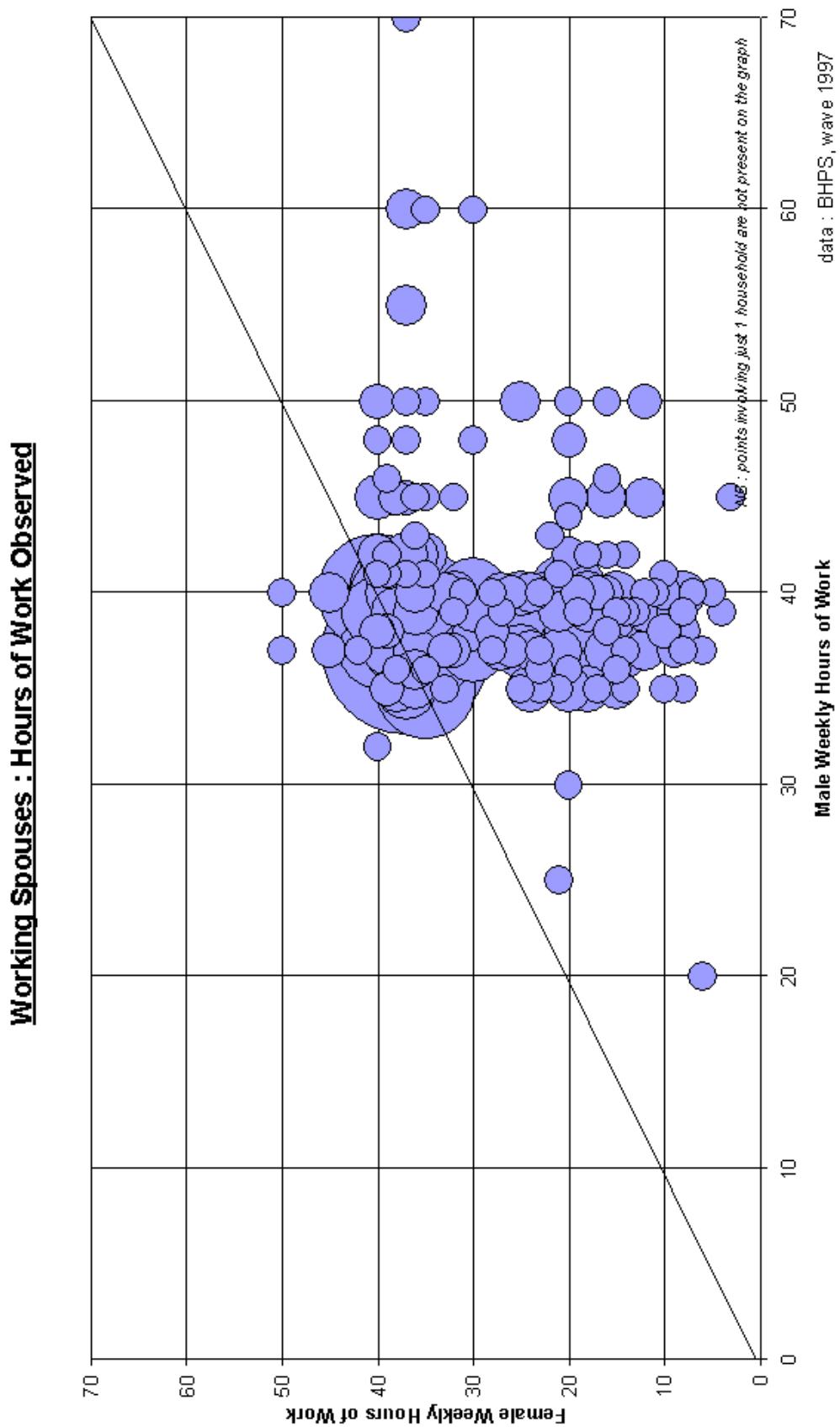
Hours of Work, Hourly Wages, Evolution 1992 – 1997.

	Mean (Standard Deviation)				Male - Female Difference (Standard Deviation)	
<b>Weekly Hours of Work</b>	1992	Men	39.7	(11.0)	12.18	(13.39)
		Women	27.5	(7.51)		
<b>Hourly Wages (in £)</b>	1992	Men	9.26	(5.48)	3.03	(5.93)
		Women	6.22	(2.74)		
	1997	Men	39.7	(7.05)	10.72	(12.94)
		Women	28.9	(5.69)		
	1997	Men	10.8	(5.69)	2.83	(7.20)
		Women	7.93	(6.81)		

Other Variables, BHPS 1997.

Variable	Title	Females	Males
<b>Y</b>	Monthly Non Labour Income (£'000's)	0.070 (0.11)	0.047 (0.14)
<b>AGE</b>	Age	37 (9.76)	39 (9.87)
<b>MARIES</b>	Married couple	76.25%	
<b>NCH04</b>	Number of children under 5	0.16 (0.41)	
<b>NCH518</b>	Number of children over 5	0.59 (0.89)	
<b>SR</b>	Sex-Ratio (number of men / number of women)	50.36% (0.013)	
<b>JBMIX</b>	As many Women as Men in the workplace	34.71%	32.70%
	More Women than Men in the workplace	57.54%	3.93%
<b>OPFAM</b>	Index of opinions on the woman's role in the family (+ = more traditional)	19.31 (4.24)	20.18 (4.17)
<b>PACSSM</b>	Cambridge Scale, social level of the father	20.51 (20.25)	17.31 (19.30)
<b>MACSSF</b>	Cambridge Scale, social level of the mother	13.81 (18.47)	12.35 (17.60)
<b>MACSS0</b>	Mother not in work (when respondent was aged 14)	32.48%	28.87%
<b>MAJU0</b>	Mother not in work (when respondent was aged 14): (alternative indicator)	31.10%	27.18%
<b>VOTE1</b>	Involved in a political party (1=yes, 2=no)	67.52%	60.83%
<b>VOTE6</b>	Level of Interest towards politics (1=high, 4=not at all)	2.67 (0.83)	2.39 (0.85)
<b>AMIH</b>	Closest friend is a man	62.36%	17.68%
<b>OPRLG2</b>	Level of interest in religion (1=high, 5=low)	3.93 (1.30)	4.20 (1.12)

**Figure 1. Hours of Work of British Couples (BHPS, 1997)**



**Table 2. Joint Labour Supply Estimates for British Couples<sup>1</sup>**

	ALL COUPLES		WITHOUT CHILDREN < 5	
	Women	Men	Women	Men
Constant	34.88 **	41.81 **	35.37 **	41.45 **
Woman's Hourly Wage ( $W_f$ ) (£) – instrumented	9.58 **	-1.22 *	7.49 **	-0.66 NS
Man's Hourly Wage ( $W_m$ ) (£) – instrumented s	-3.63 **	0.68 NS	-1.41 NS	0.07 NS
Woman's Non-Labour Income ( $Y_f$ ) (£000's per month) – instrumented	-19.09 **	6.47 *	-13.81 **	9.76 **
Male Non Labour Income ( $Y_m$ ) (£000's per month) – instrumented	-4.33 *	-5.32 **	-4.32 *	-6.35 **
Age	-0.11 **	-0.02 NS	-0.12 **	-0.01 NS
Married	-2.02 **	-0.074 NS	-1.73 **	0.06 NS
Number of Children under 5	-5.92 **		-3.02 **	-0.60 **
Number of Children over 5	-2.20 **			
Total Number of children		-0.31 NS		
Education: Medium	1.43 **	-1.49 **	0.89 NS	-1.25 **
Education: High	0.41 NS	-1.14 **	-0.60 NS	-1.16 **
Woman's Role in the Family (opinion: + = more traditional)	-0.33 ***		-0.37 ***	
Objective Function	0.11		0.15	
Number of Observations	956		800	

### Testing the Unitary Model (all couples)

Slutsky – Compensated Wage Elasticities (Hicksian)	Woman's Hourly Wage		Man's Hourly Wage	
Female Labour Supply	204.29	***	277.29	***
Male Labour Supply	19.95	NS	27.64	NS

Symmetry of the Slutsky Matrix. H0:  $e_{hf/wf}^c - e_{hm/wm}^c = 0$  t-statistic = 4.72 REJECTED \*\*\*

Income Pooling Test (See equations (6.5) and (6.6) in the Appendix):

Women. H0:  $f_3 - f_4 = 0$  t-statistic = -1.88 REJECTED \*  
 Men. H0:  $m_3 - m_4 = 0$  t-statistic = 2.58 REJECTED \*\*

### Labour Supply Elasticities

	All Couples		Without Children < 5	
	Woman's Income	Man's Income	Woman's Income	Man's Income
<b>Income Elasticities</b>				
Female Labour Supply	-0.053 **	-0.010 **	-0.039 (**)	-0.009 (*)
Male Labour Supply	NS	-0.007 **	0.018 (**)	-0.010 (**)
<b>Uncompensated Wage Elasticities</b>	<b>Woman's Wage</b>	<b>Man's Wage</b>	<b>Woman's Wage</b>	<b>Man's Wage</b>
Female Labour Supply	0.326 **	-0.136 **	0.249 (**)	-0.482 (NS)
Male Labour Supply	-0.036 *	NS	-0.016 (NS)	-0.001 (NS)

<sup>1</sup> \* = significant at the 10% level ; \*\* = significant at the 5% level ; \*\*\* = significant at the 1% level..

**Table 3. Collective Labour Supply Estimates**

**A Simple Sharing Rule<sup>\*</sup>**

	All Couples	Without Children < 5
Sharing Rule	Coefficient	Coefficient
Constant (Z)	Not estimated	Not estimated
W <sub>f</sub>	-0.017 NS	-0.006 NS
W <sub>m</sub>	0.0313 **	0.016 NS
Y <sub>f</sub>	1.704 ***	1.714 **
Y <sub>m</sub>	0.420 *	0.536 *

**Compensated Wage Elasticities, Given the Sharing Rule**

	All Couples		Without Children < 5	
	Female Wage	Male Wage	Female Wage	Male Wage
Female Labour Supply	100 **		71.03 **	
Male Labour Supply		NS		-134.73 NS

**Income Effect of Marshalian Labour Supply: dH<sup>i</sup>/dY**

	All Couples	Without Children < 5
Female Labour Supply	Non-Labour Income	Non-Labour Income
Male Labour Supply	-12.65 **	-9.02 **
	NS	12.15 (NS)

**Uncompensated Wage Elasticities, given the Sharing Rule**

	All Couples		Without Children < 5	
	Female Wage	Male Wage	Female Wage	Male Wage
Female Labour Supply	2.52 **		1.94 (**)	
Male Labour Supply		NS		-0.015 (NS)

\* The Sharing Rule describes the non-labour income that the woman is supposed to possess just before her labour supply decision. This share is determined by negotiation between spouses, and can be negative. This is, of course, only an interpretation of the real negotiation process.

**Table 4. Sharing Rule Specifications**

Distribution Factor	Marriage Market Provis						Mother Didn't Work					
	sex-ratio	t-stat	woman's job mix	Man's Job mix	t-stat	Sex of Woman's Closest Friend	t-stat	Wife's Mother	t-stat	Husband's Mother	t-stat	
Single Women Estimate	68.06	1.87	*	-0.70	-1.68	*	0.19	0.24	NS	0.71	0.90	NS
Single Men Estimate	60.02	1.39	NS	-0.87	-2.40	**	0.28	0.33	NS	-1.49	-1.87	*
Joint Labour Supply Coefficient (woman)	0.20	0.01	NS	-0.25	-0.77	NS	-0.63	-1.92	*	0.40	0.66	NS
Joint Labour Supply Coefficient (man)	1.17	0.08	NS	-0.19	-1.01	NS	-0.19	-0.88	NS	-0.33	-0.92	NS
Sharing Rule Coefficient	-0.02	-0.01	NS	0.02	0.76	NS	0.06	1.65	*	-0.04	-0.65	NS
Father Socioeconomic Level (Cambridge Scale)												
Distribution Factor	Wife's Father	t-stat	Husband's Father	t-stat	Wife's Mother	t-stat	Husband's Mother	t-stat	Wife's Mother	t-stat	Husband's Mother	t-stat
Single Women Estimate	0.02	0.87	NS		-0.01	-0.33	NS		0.34	2.01	**	
Single Men Estimate	0.02	0.99	NS		0.06	2.88	**		-0.22	-1.54	?	
Joint Labour Supply Coefficient (woman)	0.02	1.08	NS	0.02	1.08	NS	0.02	1.55	?	-0.01	-0.72	NS
Joint Labour Supply Coefficient (man)	-0.02	-1.77	*	0.00	-0.04	NS	-0.01	-0.50	NS	-0.01	-0.58	NS
Sharing Rule Coefficient	0.00	-1.05	NS	0.00	-1.06	NS	0.00	-1.42	NS	0.00	0.71	NS
Other Beginning Variables												
Distribution Factor	Joint Bank Account	t-stat	Difference in CSP levels	t-stat				Married Couple	t-stat			
Joint Labour Supply Coefficient (woman)	-0.88	-1.32	NS	-0.02		-1.26	NS	-2.21		-2.66	**	
Joint Labour Supply Coefficient (man)	0.33	0.77	NS	0.01		0.54	NS	-0.07		-0.16	NS	
Sharing Rule	0.07	1.33	NS	0.00		1.09	NS	0.2		2.13	**	

**Table 4 (continued) : Finding A Sharing Rule Specification**

Distribution Factor	Physical Health Variables						Psychological Health Variables					
	Health Level (Woman)	t-stat	Health Level (Man)	t-stat	Capital Health Difference	t-stat	Health Level (Woman)	t-stat	Health Level (Man)	t-stat	Capital Health Difference	t-stat
Single Women Estimate	0.61	1.00	NS				0.21	1.77	*			
Single Men Estimate	0.11	0.18	NS				-0.06	-0.32	NS			
Joint Labour Supply Coefficient (woman)	-0.06	-0.15	NS	0.20	0.48	NS	0.09	1.03	NS	0.10	0.70	NS
Joint Labour Supply Coefficient (man)	0.28	1.13	NS	-0.10	-0.42	NS	-0.23	-1.25	NS	-0.02	-0.39	NS
Sharing Rule Coefficient	0.01	0.15	NS	-0.02	-0.47	NS	-0.01	-0.47	NS	-0.01	-1.01	NS
<i>Religious Variables</i>												
Distribution Factor	vote1	t-stat	svote1	t-stat	vote6	t-stat	svote6	t-stat	svote6	t-stat	Level Interest in Religion (Woman)	Level Interest in Religion (Man)
Single Women Estimate	-0.53	-0.65	NS		0.72	1.43	NS				0.07	0.26 NS
Single Men Estimate	-0.60	-0.69	NS		-0.48	-0.91	NS				0.34	0.87 NS
Joint Labour Supply Coefficient (woman)	-0.03	-0.05	NS	-1.30	-2.24	*	0.01	0.03	NS	0.10	0.31	NS
Joint Labour Supply Coefficient (man)	-0.23	-0.56	NS	0.37	1.01	NS	-0.30	-1.29	NS	0.11	0.49	NS
Sharing Rule Coefficient	0.00	0.05	NS	0.11	2.00	*	0.00	-0.03	NS	-0.01	-0.31	NS
<i>Religion Variables</i>												

**Table 5. Sharing Rule: Preferred Specification**

	All Couples	Couples Without Children < 5
Sharing Rule	Parameter	Parameter
Constant (Z)	Not estimated	Not estimated
Female Wage ( $W_f$ )	-0.014 (NS)	-0.004 (NS)
Male Wage ( $W_m$ )	0.032 (**)	0.016 (NS)
Female Non-Labour Income ( $Y_f$ )	1.610 (***)	1.625 (***)
Male Non-Labour Income ( $Y_m$ )	0.487 (**)	0.585 (**)
Married	0.159 (*)	0.177 (*)
Male not Involved in a Political Party	0.118 (**)	0.117 (*)
Female Interested in Religion	-0.042 (*)	-0.041 (NS)

**Table 6. Single Individuals' Labour Supply Estimates**

	ALL SINGLES		WITHOUT CHILDREN < 5	
	Females	Males	Females	Males
<b>Constant</b>	25.164 **	29.537 **	27.329 **	32.969 **
<b>Hourly Wage</b> (£)	7.311 **	4.389 **	7.098 **	3.207 **
<b>Non-Labour Income</b> (£000's per month)	-5.931 **	-11.863 **	-3.533 NS	-10.112 **
<b>Age</b>	-0.073 (NS)	0.063 NS	-0.124 **	0.052 NS
<b>Number of Children (under 5)</b>	-3.963 (NS)	16.395 NS		
<b>Number of Children (over 5)</b>	-0.357 (NS)	-7.041 **	-1.423 NS	0.639 NS
<b>(Number of children)<sup>2</sup></b>	-0.610 (NS)	1.882 NS	-1.501 **	-0.211 NS
<b>Education: Medium</b>	3.455 **			
<b>Education: High</b>	2.068 (NS)			
<b>Woman's Role in the Family</b> (opinion + = more traditional)	-0.276 **			
Number of Observations	688	387	640	379
Objective Function	0.06	0.06	0.06	0.09

### Single Labour Supply Elasticities (All Couples)

	All Couples	Without Children < 5
<b>Income Elasticites</b>	<b>Non-Labour Income</b>	<b>Non-Labour Income</b>
Female Labour Supply	-0.027 **	-0.015 NS
Male Labour Supply	-0.022 **	-0.019 **
<b>Compensated Wage Elasticities</b>	<b>Hourly Wage</b>	<b>Hourly Wage</b>
Female Labour Supply	43.38 **	26.11 NS
Male Labour Supply	110.10 **	94.47 **
<b>Uncompensated Wage Elasticities</b>	<b>Hourly Wage</b>	<b>Hourly Wage</b>
Female Labour Supply	0.242 **	0.232 **
Male Labour Supply	0.118 **	0.086 **