MEANS TESTING DISINCENTIVES AND THE LABOUR SUPPLY OF THE WIVES OF UNEMPLOYED MEN: RESULTS FROM A FIXED EFFECTS MODEL

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Abstract

Women married to unemployed men in Britain have lower participation rates than those married to employed men. Possible reasons include unfavourable local labour market conditions affecting both, their both having poor labour market characteristics, and the means testing of benefits, which creates a disincentive for the wife to work. Using a British panel survey of unemployed men and their families, the means testing effect is estimated; unobservable characteristics are accounted for by using a fixed effects model. The results show no effect of means testing on the labour supply of the wives.

Keywords: Labour Supply, Disincentives, Benefit System.

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1. Introduction

It has often been noted that the wives of unemployed men work significantly less than the wives of employed men in many countries for which data are available, as illustrated in Table 1.

Table 1 about here

The table shows that, with the exception of Italy, the wives of unemployed men work less than the wives of employed men, even though a text-book account of labour supply would predict a woman's husband becoming unemployed to have an 'added-worker effect' (AWE) on her labour supply, and indeed on the labour supply of other household members.

There are several explanations as to why the AWE might be absent, outweighed, or fail to translate into an increase in the employment of wives of unemployed men. These include:

- Spouses live in the same place, so the shock to the local labour market that caused the husband's unemployment may also make it less likely that his wife is in work, either by constraining her labour supply, or by making it more likely that she is a discouraged worker.
- There may be 'assortative mating',[1] whereby marriage sorts individuals according to characteristics that are relevant to their labour supply, such as level of education and taste for labour market work. If similar characteristics are important, then the type of man who is more likely to be unemployed is also likely to be married to the type of woman who is unlikely to be employed.

[1] In support of the hypothesis of assortative mating, Maloney (1991) reports that the correlation in cognitive ability between spouses is 0.9, which is higher than the correlation between siblings, or between parents and children.

- Leisure times of husband and wife may be complements rather than substitutes, so that the AWE may be outweighed. This may be particularly relevant for older couples, if they regard a husband's unemployment as early retirement, albeit unplanned.
- Women may be very reluctant to take over the role of the 'breadwinner' in the household. McKee and Bell (1985) report that, in their interviews with couples in which the husband was unemployed, both husbands and wives mentioned, and indeed became emotional at the prospect of wives becoming the chief breadwinner, with stereotypes of the 'kept man' often mentioned.
- Women may take their decisions according to dynamic rather than just static considerations. It may be reasonable for a woman to continue not to participate in the labour market if she believes that her husband's unemployment will not last long enough to justify the transactions costs associated with finding a job, only to give it up again when he returns to work and the household situation is back to normal.
- Also in a dynamic context, there may be delays in putting into effect changes in desired labour supply, since it usually takes time to find a job, particularly if it is also necessary to make alternative child-care arrangements.
- The provision of Unemployment Insurance (UI), which insures individuals against the loss of income in the case of their becoming unemployed, replaces income, thus reducing the AWE.
- Social security systems that provide benefits in the case of unemployment which are means tested against family income may generate disincentives to work for a spouse that are unrelated to the benefit's function of replacing lost income.

It is this last explanation of the absence of an AWE which has been the focus of the attention of much of the literature that exists to date on the labour supply of the

wives of unemployed men, because of the policy implications. The possibility that the administrative rules governing the entitlement to benefit income may discourage women from entering the labour market in order to offset the loss of household income, or, worse, encourage working women to leave the labour market, is an unhappy one, suggesting that these rules may increase the likelihood that a spell of unemployment entails long-term poverty.

The British case is particularly interesting for two reasons. First, the difference in the labour supply of wives according to the labour supply status of their husbands is particularly high in Britain. The 14 point difference shown in Table 1 is actually in the lower range of employment gap estimates. Thus, for example, Labour Force Survey data from 1985 indicate a difference of 27 points and Pudney and Thomas (1992, 1993) note an employment difference of 43 points in the 1989 General Household Survey, with 71% of women married to employed men in work, compared to just 28% of wives of unemployed men.

A second reason why Britain is interesting is because of its benefit system. First, the degree of means testing that has applied in Britain has always been high. Moreover, the system has recently been changed according to proposals which came into force in late 1996 in a way that extends the means testing of benefits further. If it is the case that means testing has been an important disincentive to work for the wives of the unemployed in the past, then these changes to the system, described below, can be expected to widen the gap in employment between these two groups of women even further. The implications of the further concentration of unemployment and non-

participation in the labour force into particular households, in a country where income inequality has been increasing since the 1980's, are clear.[2]

The remainder of the paper proceeds as follows. Section 2 outlines the British benefit system and the results of the existing literature on the importance of the means testing of benefits in explaining the participation gap. Section 3 describes the Living Standards During Unemployment survey used to analyse the issue in this paper, and provides some preliminary evidence of the reactions of women to their husbands' unemployment. Section 4 introduces the econometric framework used to analyse the data, the multinomial Fixed Effects Conditional Logit model proposed by Chamberlain (1980). Since this model has rarely been applied in the literature, it is discussed in some detail. Section 5 reports and discusses the econometric results obtained. Section 6 concludes.

2. The British Benefit System

The system as it operated in 1983-84 is first described, as this is the period during which the data used later in the paper were collected. Changes that have been introduced since are then outlined.

The social security system had two tiers. On the first tier, Unemployment Benefit (UB) was received by those who had built up an entitlement to it by making insurance contributions during previous periods of working. UB was paid only for a

[2] Gregg and Wadsworth (1996) document the increasing polarization between workless households and other households in OECD countries and conclude that, for the UK, most of this polarization can be attributed to the increasing numbers of household types with an incidence of worklessness that is typically high, such as single parent families. Nonetheless, a higher than average proportion of increased polarization was found to be due to increases *within* household types in the UK.

year, after which time the unemployed person dropped to the second tier of the system, Supplementary Benefit (SB, subsequently Income Support), which did not depend on insurance contributions.

The budget constraint associated with UB is shown in fig. 1. UB was not means-tested except that an addition for a dependant spouse was paid only if she was earning less than the amount of the addition. This meant that there was a region on the household budget constraint where family income was lower if the wife worked than if she did not, between *b* and *c* in fig. 1. In effect, this rule introduced an element of means testing into the scheme, resulting in the normal distinction between Insurance- and Assistance-based programmes being blurred to some extent.

Figures 1 and 2 about here

SB was means-tested, so that earnings of other family members caused a reduction in benefits paid[3] one-for-one with those earnings, beyond a £4 disregard. This meant that the benefit to a wife's working was just £4 unless she was earning more than the family's SB entitlement; the marginal tax rate on her earnings was effectively 100% between the level of the earnings disregard and the amount of benefit entitlement, between *b* and *c* in fig. 2. The disregard operated over the short range of hours between points *c* and *d*.

It can be seen by comparing figs. 1 and 2 that the range of hours over which there was no gain from working an extra hour was greater for the wife of an SB recipient than for the wife of a UB recipient. It is also clear that the effective *average* tax rate was generally higher for a woman whose husband was on SB.

If the needs of a household receiving UB were judged to be above its resources, including UB, then SB could be received in conjunction with UB. The level

[3] Ownership of more than £2,000 of financial assets also reduced entitlement to benefits.

of UB was unrelated to the level of previous earnings and the rate of payment was low, so many households received 'top-up' SB. The budget constraint that was relevant to many households whose head qualified for UB when unemployed was, in these cases, that illustrated in fig. 3. Although this figure resembles fig. 2, it is notable that the flat region of the budget constraint, from *b* to *c*, extends over a smaller range of hours in fig. 3 than in fig. 2.[4] Moreover, the absolute level of household income is higher at all hours of work of the wife beyond *b*.

Figure 3 about here

A third benefit that was means-tested was Housing Benefit (HB). If the household qualified for SB, then rent and rates were automatically paid by HB, but if the household did not qualify for SB, a comparison of needs and resources was made that resulted in a payment that was typically less than the amount of the rent, so ineligibility for SB affected household income also through its effect on the basis on which HB was calculated.

This system was changed in 1996 in a way that extends the means testing of benefits further. UB and SB have been abolished and replaced with contributory Job Seekers Allowance (JSA) and means-tested JSA respectively. These benefits are the same as the benefits they replace except in the following important details:

- The duration for which UB is payable has been reduced from a year to six months, so the higher degree of means testing associated with SB applies to the income of many more unemployed people.
- The dependant's allowance paid with UB has been abolished, resulting in a fall in the amount of UB payable and thus, a higher proportion of households qualifying for top-up SB as well as UB, so that more wives face the budget constraint shown

[4] 12 hours compared to 23 hours in the examples shown.

in fig. 3, rather than that shown in fig. 1. Of course, the discontinuity in the budget constraint of fig. 1 is also nullified.

- A 'Back to Work' bonus has been introduced, specifically with the aim of reducing the disincentive to re-enter the labour market of both claimants and their spouses. Whereas previously, for every £1 earned beyond a £5 disregard, SB was reduced by £1, now a credit of 50p is built up for every £1 earned by either a claimant or his spouse in part-time work and, on finding a full-time job, the amount of credit built up is re-paid in a lump sum.

The results of studies that have been conducted to date on the subject have been mixed. Davies et al. (1992) and Elias (1997) both attempt to measure the means-testing effect by estimating the effect of the husband's unemployment lasting for more than twelve months on his wife's labour supply, since UB exhaustion indicates a shift in the means-testing regime. The difficulty with this approach is that, as mentioned above, many households receive SB during the first twelve months, either alone or together with UB, so for many households moving past the twelve month point does not entail being means tested for the first time, a fact which is likely to blur any twelve month effect and make it more difficult to detect. Despite this blurring effect, both papers report that there is a means-testing effect, explaining 8 and 12 points of the difference in participation between the wives of the employed and unemployed in Davies et al. and Elias respectively.

Other studies that have attempted to model the household budget constraint explicitly have found smaller effects. Garcia (1989) reports a small response to increases in SB entitlements, a 10% increase causing a less than 1% decrease in participation. Kell and Wright (1990) report significant negative effects of means-testing, with women married to men entitled to SB 19 points less likely to participate than those married to UB-entitled men, although this may be due to differences in

characteristics between SB and UB receivers. Bingley and Walker (1996) also found a small effect, a shift from UB to SB entitlement reducing the probability of participation by about 3.5 points. On the other hand, Pudney and Thomas (1992, 1993) do not find any significant effect of means testing at all, and nor do Giannelli and Micklewright (1995), when using German data.

3. Data

The Living Standards During Unemployment Survey (*LSUS*) surveyed the unemployed and their families directly. The individuals included were randomly selected from those starting to register as unemployed between July 21 and August 20 1983 in Britain, subsequently discarding all those whose unemployment ended within three months.

The structure of the survey is as follows. At the first interview, held about three months into the unemployment spell, questions concerning the date at which the interview was held and the 'key date', one month before the unemployment spell began, were asked. The second interview was held a year after the first, and hence fifteen months after the sampled unemployment spell began and sixteen months after the key date.[5] Thus, all sampled individuals were still unemployed at the three month stage, whereas some had obtained employment again by the time of the second interview. Moreover, because of the length of the survey period, the exhaustion of UB entitlement is also observed. Thus, between principal dates, women may be expected to react to their husband's unemployment, but also to their re-employment and/or the

[5] Throughout the paper, the key date, first interview and second interview are referred to collectively as the 'principal dates', and where appropriate, the key date is referred to as $t = -1$, the date of the first interview as $t = 3$ and the date of the second interview as $t = 15$.

exhaustion of UB. Table 2 summarizes the extent of transitions made by husbands to which their wives may react.

Table 2 about here

At the first interview, detailed information was collected about the situation of the household at that date and at the key date, one month before the unemployment spell began. The data collected included information for both husband and wife on wage and property income, savings and debts, occupation and industry and on labour supply in four discrete hours ranges (full-time work, part-time work of more than ten hours per week, part-time work of less than ten hours per week, and no paid work). Similarly detailed questions were asked at the second interview a year later.

In this paper, a sub-sample of the *LSUS* which includes only households headed by men who were married to the same woman throughout the sample period was used, yielding a sample size of 1727 households.

It is one of the major advantages of these data that they comprise a relatively large sample of the population of interest – the unemployed. This allows us to focus on the question of how the wives of men who are likely to become unemployed react to their husband's unemployment.

A first step in the analysis of the data is to examine the transitions made by the wives in the sample. The tabulations of Tables 3 and 4 show the patterns of movement between the key date and the first interview, and between the first interview and the second. In these tabulations, the highlighted figures on the diagonal indicate individuals who are in the same state at both dates; those to the left of the diagonal are working more at the second date than at the first, while those to the right of the diagonal are working less at the second date than previously.

Tables 3 and 4 about here

The first point that can be made about the information in these tabulations is that the employment rate of these women before their husband's unemployment began was 36%. According to the 1983 General Household Survey, the rate of employment prevailing among all married women in the UK in that year was 57%, so the participation rate of the wives surveyed in the *LSUS* was clearly lower than average even prior to their husbands' unemployment. As to the transitions themselves, Table 3 indicates that, initially at least, the forces inducing the women concerned to work fewer hours - which may be because of disincentive effects or a labour market shock affecting both partners - seem to be stronger than the added-worker effects. 135 women (8%) are working fewer hours at $t = 3$ than they were at $t = -1$, while 58 (3%) are working more hours.

The cross-tabulation of the states occupied at $t = 3$ and $t = 15$ given in Table 4 shows a reversal of this pattern, however. More individuals have changed state, as would be expected given the longer time available. But the number of transitions towards fewer hours of work is very similar to that between the key date and the first interview, despite there being more time available: a further 122 women (7%) work fewer hours at the second interview than at the first interview, compared to 135 (8%) working fewer hours at the first interview than at the key date. Movement towards working more hours shows a much greater increase, however; at the date of the second interview, 184 (11%) are working more than they were at the first interview, compared to the 58 at the date of the first interview working more than previously. It may be that adjustment towards paid work is slower than from work to non-work, as is likely if it takes more time to find than to quit a job.

Notably, however, the pattern does not appear to support a conclusion that the increased means testing applicable after a year of unemployment increases the

disincentive effect. These are, of course, just head-count figures, and it may be that for those women to whose income the means test began to apply at this stage, the disincentive effect did indeed have an effect, but that this was counteracted by a move back to work by those whose husbands became employed before the second interview.

In order to illustrate the importance of similar characteristics in husbands and wives to labour supply behaviour, the women may be divided according to characteristics of their husbands and their transition matrices examined. Tables 5 and 6 allow a comparison of women whose husbands are unemployed for more than 15 months with those whose husbands have returned to work by the second interview.

The first point that should be made about these tables is that even before their husbands' sampled unemployment spells began, just 25.5% of women whose husbands were still unemployed at the second interview worked, as opposed to 43.2% of those whose husbands were employed again by the second interview. The most obvious explanation for this is that the couple share characteristics which make both his re-employment and her doing paid work at any stage less likely, as suggested above.

Tables 5 and 6 about here

An alternative explanation, that men who tend to have longer unemployment spells may also have more frequent spells, so that the wife's non-participation prior to the sampled spell is a long-term response to her husband's labour market behaviour, is not supported by the data. Those men who exit their sampled unemployment spell before the second interview are actually slightly more likely to have been unemployed in the previous five years and to have had more spells of unemployment during that time.

A second point that can be made about these tables is that women whose husbands are longer-term unemployed are more likely to stay in the same state throughout the sample period; 83.4% of women whose husbands are still in their sampled unemployment spell fifteen months after it began are stayers, compared to 74.4% of women whose husbands are not.[6] This is consistent with the pattern that women who are not employed prior to the start of their husbands' spells also tend to be stayers to a greater extent than those who are employed.

Thirdly, women whose husbands have exited the sampled spell by the second interview are substantially more likely to be added workers; 13.8% of these women work more hours at the second interview than initially, compared to just 5% of women whose husbands are longer-term unemployed. About the same proportions of each work less hours than initially, which means that the lower level of movement among those whose husbands are unemployed for longer comes almost entirely from a lower level of added-worker behaviour. A difference in the extent of movement *away* from work might be expected to hold between these two groups, since all of those whose husbands did not exit unemployment are subject to means-tested benefits by the time of the second interview. The fact that this is not the case suggests that the disincentive effect arising from means testing may not be very important.

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[6] Of course, not all men who exit their sampled unemployment spell do so to full-time employment; of the 1038 men who did exit, 79% of them did so to full-time work. For the remainder who exited, but not to full-time work, 8% did so to 'sick and out of work', 4% did to 'part-time work, more than ten hours' and 3% left to 'government schemes'. Interestingly, the proportion of women whose husbands exited to full-time work and who are stayers is lower again: 69% of them never change status, further supporting the 'similar characteristics' hypothesis.

Similarly disaggregated cross-tabulations between states at the key date and the first interview, when all husbands are unemployed, show no statistically significant difference in the transition matrices according to the eventual length of the husband's unemployment spell: 90.9% of those whose husbands' spells last over fifteen months are in the same states at $t = -1$ and $t = 3$, compared to 86.9% of those whose husbands' spells are eventually shorter. Moreover, the levels of movement towards and away from work are similar for both groups. Thus, the wives of men with shorter unemployment spells have a higher level of added-worker behaviour between the first and second interviews, but not in the first three months of unemployment, which fact militates against an explanation of the differences that is based on the importance of similarities between spouses, since in this case, the differences would be expected to be observable even before the exit from the sampled unemployment spell occurred, although it is possible that adjustment delays are responsible for this result.

A similar exercise was carried out in comparing those women whose husbands were eligible for UB at the first interview and those whose husbands were not. UB might be expected to be an indicator of a man's type, since only those with reasonably stable employment histories qualify for it. Again it was noted that 40% of women whose husbands were eligible for UB when they became unemployed were working at the key date, while only 27% of those whose husbands did not qualify for UB worked, indicating a difference in a woman's type according to her husband's UB eligibility.

On the other hand, the proportions of both groups who stay in the same state during the sample period, and the proportions moving towards both more and fewer hours of work are very similar. This is interesting because here, similar characteristics do not seem to affect whether the wives are movers or stayers, which may be due to the lower level of means testing associated with UB receipt.

The transition matrices both of those aged over 50[7] and under 50 were also examined for significant differences in patterns, but none could be found, the raw data thus failing to support the hypothesis that older women are more likely to drop out of the labour market in response to their husbands' unemployment.

The differences that arise between the wives of men with long unemployment spells and those with short spells, and between wives of UB receivers and others do, however, emphasize the importance of accounting for unobservable characteristics in assessing the means testing effect.

4. Econometric Framework

The wife's utility, U_{tj}, may be specified as

$$U_{tj} = U(y_{tj}, l_{tj}^{w}, l_{t}^{h}; \mathbf{z}_{t}) \qquad (1)$$

where U_{tj} is the utility of the wife at time t and in labour market state j, y_{tj} is total household income at time t and in state j of the wife, l_{tj}^{w} is the leisure of the wife in state j, l_{t}^{h} is the number of hours of leisure of the husband, and $\mathbf{z}_t$ is a vector of personal and household demographic characteristics. U_{tj} is not observable, but the probability of individual i being observed in state j at time t may be given by

$$\Pr[v_{it} = j] = \Pr[U_{tj} > U_{tk}] \quad \forall \quad j \neq k \qquad (2)$$

The possible states are full-time work, high hours part-time work, low hours part-time work and no paid work, these being the hours ranges in which labour supply data were collected. The appropriate econometric model is, therefore, a discrete choice one.

The elements of the utility function require some comment. Firstly, it should be noted that the husband's leisure time is not subscipted for the labour market state

[7] Other age cut off points were also tried, with no success.

of the wife, implying an assumption that the husband's labour force status is exogenous to the wife's. This is a strong assumption, although one that is often supported in empirical work (Pencavel, 1986). Two justifications for the assumption are offered. Firstly, the poor state of the labour market at the time of the survey, illustrated by the fact that unemployment in early 1984 was almost 12%, and had been rising since the late 1970's, makes it more likely that the incidence and duration of unemployment was in fact due to pure rationing. And secondly, while it would be interesting to model the labour supply of husbands and wives jointly, and test the assumption, this would be demanding too much of the present data set.

Any effect of means testing on labour market behaviour will come through the effect on the utility of a particular labour market state of income in that state, y_{tj}. The construction of household income used here is based on simulations for different labour market states of the wife. For each household, potential net wage income and benefit entitlement – UB, SB and HB – are simulated for the four alternative hours of work ranges of the wife outlined above and at each of the three principal dates, and added to husband's wage income and non-labour income to give twelve total potential household income variables for each household.

Several previous studies in this area have used such total household income variables to test for an effect of means testing. However, I would argue that to use such a variable is effectively to assume that means-tested benefit income has the same importance in determining labour supply as own labour income. This may appear to be an uncontroversial assumption at first glance. But if there is incomplete pooling of household income, either in the literal sense, or in the sense that women do not feel the same entitlement to spend income received by their husbands as that they earn themselves, then women's utility may not be affected greatly, or at all, by the income received by their husbands. And evidence does exist that income pooling is an

unrealistic assumption (see Pahl, 1989; Lundberg et al., 1997). Therefore, using the elasticity of total household income to estimate the means testing effect practically guarantees finding some effect.

For example, a woman's preferences may be such that she is likely to work more hours the higher her market wage, but is indifferent to the level of her husband's benefit income when making her labour supply decision. A decrease in potential full-time household income may be the result of either a decrease in her offered full-time wage or the reduction in her husband's benefit income on exhausting UB entitlement, but only the former can cause her to make a labour market transition. A model that does not distinguish between the sources of household income will, in simulations, predict a reduction in the probability of her working full time when an increase in the degree of means testing is introduced, when in fact only a fall in her offered wage could produce this result.

To attempt to isolate the effect of means testing on a wife's labour supply, it is therefore necessary to allow a distinction to be drawn between the income received by the husband and that received by the wife. Household income is decomposed as:

$$y_{tj} = y_{tj}^{end} + y_{t}^{ex} \tag{3}$$

where y_{tj} is total household income at time *t* and in labour market state *j* of the wife, y_{tj}^{end} is that part of household income which is endogenous to the wife's labour supply, and y_{t}^{ex} is the household income exogenous to the wife's labour supply. y_{tj}^{end} can then be further divided into the part of endogenous income that the wife receives, $y_{tj}^{end(w)}$, essentially her wage income in state *j* plus any unemployment payments to which she is entitled if not working, and the part that the husband receives, $y_{tj}^{end(h)}$, which amounts to any means-tested benefit income paid to him, including the UB dependant's allowance, SB and HB, where receivable. The advantage of this decomposition of endogenous income is that it allows a focus on means-tested

income. If there is complete intra-household income sharing, then $y_{tj}^{end(h)}$ and $y_{tj}^{end(w)}$ should have equal effects on a wife's labour supply, but the possibility that there is not is allowed for.

The income components which are exogenous to the wife's labour supply may also be decomposed further in order to allow a focus on the effects of benefits, and, by using a comparison with $y_{tj}^{end(h)}$, on any difference between the effects of means-tested and non-means-tested benefits:

$$y_t^{ex} = y_t^{ex(ben)} + y_t^{ex(nly)} \tag{4}$$

where $y_t^{ex(ben)}$ is exogenous income coming from unemployment payments, which amounts to the part of UB that does not depend on the wife's labour supply and $y_t^{ex(nly)}$ is other exogenous income, which includes the husband's wage income, if any, and other household non-labour income such as interest from savings, child benefit and Family Income Supplement. Thus, some benefit income – that which is not related to the husband's unemployment – is included in $y_t^{ex(nly)}$. The components of y_t^{ex} are defined in this way so that $y_t^{ex(nly)}$ is comparable with the definition of the wife's non-labour income that is usually used in studies of female labour supply.

Clearly, however, the issue of whether there is sufficient variation in the data to identify these various income effects arises, particularly when it is considered that among the variables included in $\mathbf{z}_t$ are household composition variables such as number and ages of children, variables that are used in the calculation of benefit entitlements. Moreover, both $y_{tj}^{end(h)}$ and $y_t^{ex(ben)}$ are positive only if the husband is unemployed, i.e. only if l_t^h is high. However, there are sources of exogenous variation in the variables. Firstly, family composition can change entitlements over time as children are born, but more importantly because the amount paid for child dependants varies substantially with age, so the amount of means-tested benefit entitlement can change between the first and second interviews. Secondly, variation in the

replacement rates of the two benefit types and hence in the total benefit entitlement of households arises because UB increased by about 8% in 1984, compared to 4% for SB. Thirdly, husband's labour force status changes over time, and these changes are exogenous, by assumption. Finally, husband's benefit status changes over time, because of the twelve month UB exhaustion rule. Further exploration of the identifiability of the variables in the model is included in the next section.

Given the evidence from Section 3 that similar characteristics are important in determining the labour supply behaviour of the wives in the *LSUS* sample, it is appropriate to think of $\mathbf{z}_t$ as including both $\mathbf{x}_t$, observable characteristics, and α, unobservable individual characteristics. These latter individual effects may be specified as being fixed over time for each individual, and included in the econometric model,[8] as described below.

In the case of a model with a continuous dependent variable, fixed effects can be accounted for by including a dummy variable, α_i, for each individual, with linear regression yielding consistent estimates of the parameters of interest, $\boldsymbol{\beta}$, as the number of individuals $N \to \infty$ for a fixed number of time periods, T.[9] However, it is not the case for discrete choice models of the form

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[8] The alternative of specifying the individual-specific effects as being random is problematic, both because of the assumptions that must be made about the form of any correlation between the individual effects and the explanatory variables and because the multinomial probit model appropriate to a random effects model with multiple choices presents well-known estimation difficulties.

[9] In fact, where the dependent variable is continuous, the necessity of estimating the fixed effects can be eliminated by regressing $v_{it} - \bar{v}_i$ on $\mathbf{x}_{it} - \bar{\mathbf{x}}_i$, where $\bar{v}_i$ and $\bar{\mathbf{x}}_i$ are the average values of the dependent and independent variables for the individual. For $T = 2$, this is equivalent to first differencing the variables.

$$\Pr[v_{it} = j] = F(\boldsymbol{\beta}\mathbf{x}_{itj} + \alpha_i),$$

where F is a cumulative distribution function such as the unit normal or the logistic, that the inclusion of individual-specific dummies will yield consistent estimates of the $\boldsymbol{\beta}$, since the α_i are not independent of the $\boldsymbol{\beta}$ (Chamberlain, 1980, pp. 227; Hsiao, 1986, pp. 161).

Chamberlain's (1980) method of eliminating fixed effects, α_i, in discrete choice models, which yields consistent estimates for a fixed T, is based on the maximization of the joint density of the v_i conditional on sufficient statistics $s_i,..,s_N$ as well as $\boldsymbol{\beta}$ to give consistent estimates of the $\boldsymbol{\beta}$ parameters, where

$$s_{ij} = \sum_t w_{itj},$$

and $w_{itj} = 1$ if $v_{it} = j$, $w_{itj} = 0$ otherwise, v_{it} being the dependent variable for individual i at time t and the individual being observed in one of states $j = 1,..,J$. The conditional likelihood does not depend on the incidental parameters, so the α_i do not have to be estimated.

The two period, binomial case of the Fixed Effects Conditional Logit model (FECL) is well known (see, eg. Greene, 1997, pp. 899-901).[10] To illustrate the formation of the likelihood function in the more general multinomial and multi-period case, take the example of three time periods, $t = 1,2,3$ and three states, $j = a,b,c$. In this case, an observed sequence of (a,b,b) implies that $w_{i1a} = 1$, $w_{i1b} = 0$, $w_{i1c} = 0$,

[10] The binomial version of the FECL model has been applied in several cases in the literature, by Björklund (1985) to mental health, by Cecchetti (1986) to price increases and by Giannelli and Micklewright (1995) to the labour force participation of married women. The multinomial model has not yet been applied to labour supply issues, although it has been used in Börsch-Supan (1990) and Börsch-Supan and Pollakowski (1990) in specifying housing choices in terms of size and tenure. Rosenzweig and Wolpin (1994) report results based on the model but do not discuss the model or its application.

$w_{i2a} = 0$, $w_{i2b} = 1$, $w_{i2c} = 0$, $w_{i3a} = 0$, $w_{i3b} = 1$ and $w_{i3c} = 0$. Hence, $s_{ia} = 1$, $s_{ib} = 2$, $s_{ic} = 0$. Then

$$\Pr[(a,b,b)|s_{ia}=1, s_{ib}=2, s_{ic}=0] = \Pr[(a,b,b)|(a,b,b) \text{ or } (b,a,b) \text{ or } (b,b,a)]$$ [11]

$$= \frac{\Pr[w_{i1a}=1]\cdot\Pr[w_{i2b}=1]\cdot\Pr[w_{i3b}=1]}{\left[\begin{array}{r}\Pr[w_{i1a}=1]\cdot\Pr[w_{i2b}=1]\cdot\Pr[w_{i3b}=1] + \Pr[w_{i1b}=1]\cdot\Pr[w_{i2a}=1]\cdot\Pr[w_{i3b}=1] \\ + \Pr[w_{i1b}=1]\cdot\Pr[w_{i2b}=1]\cdot\Pr[w_{i3a}=1]\end{array}\right]}$$

$$= \frac{\exp[\boldsymbol{\beta}(\mathbf{x}_{1a}+\mathbf{x}_{2b}+\mathbf{x}_{3b})]}{\exp[\boldsymbol{\beta}(\mathbf{x}_{1a}+\mathbf{x}_{2b}+\mathbf{x}_{3b})]+\exp[\boldsymbol{\beta}(\mathbf{x}_{1b}+\mathbf{x}_{2a}+\mathbf{x}_{3b})]+\exp[\boldsymbol{\beta}(\mathbf{x}_{1b}+\mathbf{x}_{2b}+\mathbf{x}_{3a})]} \tag{5}$$

Similarly,

$$\Pr[(b,a,b)|(a,b,b) \text{ or } (b,a,b) \text{ or } (b,b,a)] = \frac{\exp[\boldsymbol{\beta}(\mathbf{x}_{1b}+\mathbf{x}_{2a}+\mathbf{x}_{3b})]}{\exp[\boldsymbol{\beta}(\mathbf{x}_{1a}+\mathbf{x}_{2b}+\mathbf{x}_{3b})]+\exp[\boldsymbol{\beta}(\mathbf{x}_{1b}+\mathbf{x}_{2a}+\mathbf{x}_{3b})]+\exp[\boldsymbol{\beta}(\mathbf{x}_{1b}+\mathbf{x}_{2b}+\mathbf{x}_{3a})]} \tag{6}$$

and so on. This log likelihood function can be written as follows:

$$L = \sum_i \ell n\left(\frac{\exp\left(\boldsymbol{\beta}\sum_{t,j}\mathbf{x}_{itj}w_{itj}\right)}{\sum_{d\in B_i}\exp\left(\boldsymbol{\beta}\sum_{t,j}\mathbf{x}_{itj}d_{tj}\right)}\right) \tag{7}$$

where $$B_i = \left\{\boldsymbol{d} = (d_{11},\ldots,d_{TJ}) | d_{tj} = 0 \text{ or } 1;\ \sum_j d_{tj} = 1;\ \sum_t d_{tj} = s_{ij}\right\}$$

is the set of sequences with the same s_{ij} as the one chosen by the individual. The maximization of this expression yields consistent estimates of the $\boldsymbol{\beta}$ parameters.

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[11] The possible sequences with $s_{ia} = 1$ are: (a,b,b), (a,c,c), (b,a,b) (c,a,c), (b,b,a), (c,c,a), (a,b,c), (a,c,b), (b,a,c), (c,a,b), (b,c,a) and (c,b,a). Those with $s_{ib} = 2$ are: (a,b,b), (c,b,b), (b,b,a), (b,b,c), (b,c,b) and (b,a,b). Those with $s_{ic} = 0$ are: (a,b,b), (b,a,b), (b,b,a), (b,a,a), (a,b,a) and (a,a,b). Thus, the sequences that satisfy all three conditioning requirements are (a,b,b), (b,b,a) and (b,a,b).

The above description of the fixed effects conditional logit model is useful for understanding some limitations of the model. First, it should be noted that only those who make a transition contribute to the likelihood function, so that information on those who make no transition is not used. Thus, if there is no heterogeneity, the estimator is inefficient. The appropriate test for heterogeneity is the Hausman test, discussed in Section 5.

Secondly, time invariant variables are differenced out, so that their effects cannot be estimated. This turns out to be an important restriction on the variables which may validly be included in the model.

Third, the model excludes the possibility of true state dependence; this can be seen using the example of the multinomial FECL described by equations 5 and 6.

$$\Pr[(b,a,b)|(a,b,b) \text{ or } (b,a,b) \text{ or } (b,b,a)] =$$

$$\frac{\exp[\boldsymbol{\beta}(\mathbf{x}_{1b}+\mathbf{x}_{2a}+\mathbf{x}_{3b})]}{\left[\exp[\boldsymbol{\beta}(\mathbf{x}_{1a}+\mathbf{x}_{2b}+\mathbf{x}_{3b})]\right]+\left[\exp[\boldsymbol{\beta}(\mathbf{x}_{1b}+\mathbf{x}_{2a}+\mathbf{x}_{3b})]\right]+\left[\exp[\boldsymbol{\beta}(\mathbf{x}_{1b}+\mathbf{x}_{2b}+\mathbf{x}_{3a})]\right]}$$

$$= 1 - \Pr[(a,b,b)|(a,b,b),(b,a,b) \text{ or } (b,b,a)] - \Pr[(b,b,a)|(a,b,b),(b,a,b) \text{ or } (b,b,a)]$$

This means that the effect of a variable on the probability of having a particular sequence of transitions is constrained by its relationship with other transition sequences which entail the same s_{ij}, rather than being determined by the initial state.[12]

[12] The problem with estimating a model that accounts both for fixed individual effects and state dependence is that no independent variables can be used (Maddala, 1987).

5. Estimation Results

Table 7 presents the descriptive statistics for the variables used, including information on the extent of variation in the variables, necessary to allow their effects to be identified.

Table 7 about here

Between-group standard deviation is calculated as the standard deviation of $\bar{x}_i$, the average of x_{it} over time for each woman, and the within-group measure is the standard deviation of $(x_{it} - \bar{x}_i + \bar{\bar{x}})$, where $\bar{\bar{x}}$ is the average over all observations; thus, it gives the variation of each woman's deviation from her mean.[13] The means given in Column 2 are for the individuals used in the estimation of the FECL model, all of whom make at least one transition between principal dates, whilst those given in Column 1 are for all individuals in the *LSUS* data. Thus, a comparison of these columns indicates any differences between the whole sample and the estimation sample.

The table raises several interesting points. First, for each hours range, there is relatively little within-group variation in $y_{tj}^{end(w)}$.[14] This is because the wage variable is, for those women not working at a particular date, constructed using information on wage inflation to extrapolate the gross wage rate from dates at which a woman worked to dates at which she did not work. Since most women in the sample used in the estimation of Chamberlain's fixed effects model make transitions between working and not working rather than between working states, the within-group variation in wages is the same for many women, the variation having been generated

[13] $\bar{\bar{x}}$ is added to make the results comparable.

[14] Its value for zero hours of work might be regarded as an exception; this is because of the addition of any unemployment payments received by the wife for this status.

using the rate of wage inflation. The genuine variation over time in the wage variables comes from the fact that, of the 420 women who make transitions of some kind between the key date and the second interview, 99 (24%) make transitions between working states.

For $y_t^{ex(ben)}$ the between-group standard deviation is low, and the within-group measure accounts for much of the overall variation, as this variable is very nearly a dummy: apart from some small amount of allowances for children, and the fact that some recipients are entitled to only half or three-quarter rates of payment, it is identical for all those entitled to receive it.

Apart from the income variables, it is also notable that the age variable has no within-group deviation. Although time-varying, age varies to exactly the same extent for each individual in the sample. Each individual is obviously one year older at the second interview than at the first, and has the same age at the first interview as at the key date. Age-squared does have some small degree of within-group variation, since its relationship with calendar time is non-linear, but this is a small component of the overall variation in the variable. Clearly, age is not suitable for inclusion as a variable in an FECL model.

The results for the FECL model are shown in Table 8. In this model, choice-specific variables are interpreted as having a direct effect on utility, where significant. Non-choice-specific variables, on the other hand must be multiplied by dummies for each of the choices; the resultant estimates are interpreted as the effect of the variable on the probability of occupying the relevant state. The results of a pooled model, with no account taken of unobservable individual-specific effects, are included in Table A1 in the Appendix, for the purposes of comparison.

It is the income variables which are of primary interest. $y_{tj}^{end(w)}$ has a positive coefficient which is significant at all usual levels of confidence.

The marginal effect of $y_{tj}^{end(w)}$ on the probability of a woman choosing any of the hours ranges indicates that a £3-£4 rise in weekly income will increase a woman's probability of choosing full-time or high part-time hours by around 1 percentage point. The rise in weekly income necessary to increase a woman's probability of working low part-time hours is much higher – about £10, which entails a very large increase in hourly income. Note that this conclusion is a result of the construction of the model, in particular the assumption implicit in the use of one choice-specific variable for wage within a conditional logit structure that income and leisure are separable. Finally, a £2 payment for not working will increase a woman's probability of choosing that state by about 1 point.

Table 8 about here

However, the benefit income that is received by the husband but endogenous to the wife's labour supply, $y_{tj}^{end(h)}$, has an insignificant coefficient. There is no evidence here that women take the benefit income that their husbands receive into account at all when making their labour supply decisions. It should be emphasized how surprising this result is. The most likely explanation is that there is less than full income pooling within the household.

To check whether the lack of significance of $y_{tj}^{end(h)}$ is due to collinearity with wage rates and household composition variables, the latter were dropped, but the *t*-statistic of the variable of interest remained very low, suggesting that such collinearity is not generating the unexpected result.

Non-labour income, $y_t^{ex(nly)}$, has a negative effect on the probability of working in any of the positive hours categories, with statistically indistinguishable coefficients for all three hours of work ranges.

As regards other income variables, $y_t^{ex(ben)}$ is omitted because of its lack of significance. Taken together with the insignificant result for $y_{tj}^{end(h)}$, the results suggest

that the income her husband receives when unemployed is not a significant determinant of a woman's labour supply, perhaps because of expectations of the duration of the husband's unemployment.

One of the more interesting results of the FECL model is that the effect of the presence of pre-school children in the household is actually larger when fixed effects are taken into account than in the pooled model. The marginal effect of the presence of small children is such that this dummy decreases the probability of working full-time by almost 15 points, of working low part-time hours by about 20 points, and of working high part-time hours by about 1 point.

It might be expected that accounting for unobserved persistent effects would decrease the estimated effect of children, since women with low taste for labour market work may also have a high taste for having children. However, this result is one that is often obtained using fixed effects models, as discussed in Chamberlain, (1984, pp. 1304) and Maddala (1987, pp. 323). One possible explanation is that much of the within-group variation in the variable comes from the birth of children, as well as from children moving from the pre-school age group into the next age group, and the probability of observing a woman in the labour force is certainly much lower around the time of childbirth than for other mothers of young children. However, when the dummy for children aged up to four years old is split into dummies for children aged less than a year and another for those aged between one and four years, the results, which are not reported here, show that the effect of children aged between one and four years is still much stronger that that found in the pooled model.

The effect of the presence of children of school-going age becomes insignificant for high hours of work, and significantly positive for low part-time hours in the FECL model. This must be because controlling for unobservable taste for work effects allows the 'income effect' of the cost of raising children to dominate the

negative effect of the costs of working when children are of school age, costs which are lower than for pre-school children.

The local rate of unemployment has a negative effect on the probability of working high part-time hours that is significant at the 90% confidence level. The marginal effect for this hours range is also quite large, a 1% increase in the unemployment rate decreasing the probability of choosing this hours range by nearly 3 points. This supports, at least partially, the hypothesis that local labour market conditions are important in determining the response of wives to their husbands' unemployment.

Finally, the role of the husband's employment status in determining the labour supply of the wife is surprising. The results suggest that, even after accounting for the possibility that a husband being out of work indicates unfavourable labour market characteristics which his wife may share and which may, in turn, determine her labour supply, the fact of a husband's being out of work makes his wife less likely to work. In fact, 'switching on' this dummy makes her about 13 points more likely to work either full-time or low part-time hours, indicating a remarkable degree of complementarity of leisure times between husbands and wives.

In order to examine the meaning of this result, the variable for the husband being at work was dropped from the FECL model and the consequences examined. The results, which are not reported here, show that the coefficient on $y_{tj}^{end(h)}$ becomes statistically significantly positive at the 99% level of confidence and that $y_t^{ex(ben)}$ shows a significant negative effect on both full-time and high part-time hours of work, as would be expected. However, the coefficient on the local rate of unemployment is left virtually unaffected, so that the possibility that the husband being in work is strongly correlated with the wife's being in work because of local labour market conditions is not supported by the data. This leaves the complementarity of leisure

times as the most plausible explanation for the result, a finding that echoes that of Pudney and Thomas (1992, 1993). This outcome may be due to women who did not work prior to their husbands' unemployment being reluctant to become the family breadwinner, rather than because of women dropping out of the labour market to spend more time with their husbands when they become unemployed, a point that is supported by the lack of any strong difference in the transition matrices of older women from those of younger women, reported in Section 3, even though it might be expected that older women would form the group most likely to drop out of the labour market for complementarity reasons.

In assessing the validity of the above results, the question arises as to whether a fixed effects model is appropriate for these data. Although finding that unobserved heterogeneity is unimportant would not change the conclusion regarding the importance of means testing – this result is repeated in the pooled model – it might affect the validity of the other results, since, as mentioned in Section 4, if there is no unobserved heterogeneity, the results from the pooled model are more efficient.

Hausman (1978) established that the variance of the vector of differences between the coefficients of an inefficient and an efficient estimator is given by

$$V[\boldsymbol{\beta}_{FE} - \boldsymbol{\beta}_P] = V(\boldsymbol{\beta}_{FE}) - V(\boldsymbol{\beta}_P) \tag{8}$$

so the Wald test statistic for the difference of the estimators is

$$\chi^2_K = [\boldsymbol{\beta}_{FE} - \boldsymbol{\beta}_P]' [V_{FE} - V_P]^{-1} [\boldsymbol{\beta}_{FE} - \boldsymbol{\beta}_P] \tag{9}$$

where $\boldsymbol{\beta}_P$ is the $K \times 1$ vector of common coefficient estimates from the pooled model, $\boldsymbol{\beta}_{FE}$ that from the FECL model, V_P and V_{FE} are the variance matrices from the two models and *K* is the number of variables that are common to both models. The calculated test statistic for the hypothesis of no difference in the estimators, and hence no heterogeneity, is $\chi^2_{17} = 57.41$, while the tabulated values are $\chi^2_{17,0.05} = 27.59$ and $\chi^2_{17,0.01} = 33.41$, which implies firm rejection of the hypothesis of homogeneity at all

usual levels of confidence. Clearly, accounting for fixed individual effects is important.

6. Conclusions

This paper has analysed the impact of the means testing of benefits on the labour supply of the wives of unemployed men, using data from the 1983-84 Living Standards During Unemployment Survey, a longitudinal survey of the unemployed in Britain.

A preliminary analysis of these data indicated that similarities in characteristics between husbands and wives were potentially very important in explaining labour supply behaviour. This fact motivated the choice of an econometric model – the FECL – that accounts for any individual-specific effects that persist over time in order to abstract from the differences in labour market behaviour that result from unobservable differences in tastes for labour market work.

The variable used to capture any means testing effect was simulated income in four different labour market states of the wife. Household income that depended on a wife's labour market behaviour but received by the husband as benefit income was separated from the wife's wage income, in order to allow for the possibility that the utility gained by a wife from income received personally might differ from that gained from income received by her husband, particularly if household income was not pooled. Apart from the work cited above by Pudney and Thomas (1992, 1993), this has not been done in other studies that used income simulations to model the labour supply of wives.

The results indicate that the means testing of benefits is not important in determining the labour supply reactions of women to their husbands' unemployment, despite clear disincentives to work inherent in the benefit system. One possible

explanation for the unimportance of benefits is that income pooling within households is not complete, although this seems to be contradicted by the fact that husband's wage income has a direct effect on utility. An alternative explanation is that dynamic considerations counteract the means testing effect, so women do not change state because they believe their husbands' unemployment spells will be too short to justify the transaction costs associated with changing state, only to change back again once the spell has ended, or because of adjustment delays. Future work will investigate the possibility of accounting for unobservable heterogeneity, which is clearly very important, in a dynamic context.

The results obtained suggest that the factors that do determine the labour supply reactions of wives to their husbands' unemployment include the presence and ages of children, potential earnings in different labour market states, and, for part-time work, the local unemployment rate. It also appears that husbands' and wives' leisure times are strongly complementary. The possibility that this is due to women who had not been working prior to their husbands' unemployment not wishing to become the family breadwinner was mentioned, but this can only be tested within a dynamic model.

Appendix: Table A1

Results for the pooled conditional logit model.

Non-Choice-Specific Variables	Full-Time		Part-Time > 10 Hours		Part-Time < 10 Hours	
	Coefficient (*t-Stat.*)	Marginal Effect	Coefficient (*t-Stat.*)	Marginal Effect	Coefficient (*t-Stat.*)	Marginal Effect
$y_t^{ex(ben)}$	0.0100 (*2.10*)	0.0010	0.0179 (*3.94*)	0.0021	0.0201 (*2.86*)	0.0008
$y_t^{ex(nly)}$	-0.0092 (*-6.42*)	-0.0013	-0.0039 (*-3.58*)	-0.0003	-0.0008 (*-0.61*)	0.0001
Wife's Age	0.2644 (*7.88*)	0.0308	0.3220 (*8.52*)	0.0370	0.1613 (*2.97*)	0.0038
(Wife's Age)^2 ÷ 100	-0.3771 (*-8.61*)	-0.0457	-0.3759 (*-8.03*)	-0.0418	-0.1968 (*-2.85*)	-0.0044
Number Children Aged < 1	-2.4002 (*-8.02*)	-0.2940	-2.1862 (*-5.18*)	-0.2379	-1.3595 (*-3.41*)	-0.0346
Number Children Aged 1-4	-1.8498 (*-13.59*)	-0.2503	-0.7497 (*-6.70*)	-0.0633	-0.2351 (*-1.84*)	0.0063
Number Children Aged > 4	-0.7660 (*-12.43*)	-0.1086	-0.0943 (*-2.02*)	0.0020	0.0218 (*0.32*)	0.0069
Husband at Work	1.4901 (*9.05*)	0.1288	1.1689 (*7.87*)	0.1006	0.8647 (*4.25*)	0.0258
Husband's Bad Unemp. History	-0.0695 (*-2.62*)	-0.0089	-0.0596 (*-2.25*)	-0.0067	0.0056 (*0.16*)	0.0011
Constant	-6.1533 (*-10.13*)	–	-8.7105 (*-11.87*)	–	-6.2500 (*-6.23*)	–
Choice-Specific Variables	Coefficient	*t-Statistic*	Marginal Effects × 10^2			
			F-T	P-T > 10	P-T < 10	None
$y_{tj}^{end(w)}$	0.0274	(*13.31*)	0.3376	0.3178	0.1252	0.6018
$y_{tj}^{end(h)}$	0.0004	(*0.12*)	0.0043	0.0041	0.0016	0.0077

No. Observations: 5111 *Pseudo-R^2*: 0.398 *Log Likelihood*: -4214.3

Notes: Asymptotic t-statistics in brackets. All money amounts are in pounds. Husband's bad unemployment history defined as the number of spells of unemployment in previous five years. Marginal effects are calculated at the sample probability of occupying the relevant state; here, $\Pr(FT) = 0.144$, $\Pr(PT > 10) = 0.134$ and $\Pr(PT < 10) = 0.048$.

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Tables

Table 1
Employment rates of married women in various countries, percentages.

Country	Employed Husband	Unemployed Husband
Australia (1985)*	62	23
Canada (1987)*	66	46
France (1981)*	55	44
Netherlands (1983)	31	27
Germany (1983)	53	52
Israel (1986)*	49	30
Italy (1986)	37	41
Norway (1979)*	68	43
Switzerland (1982)*	44	26
UK (1979)*	61	47
USA (1986)**	67	59

Notes: * Significant at the 1% level. ** Significant at the 5% level.

Source: Giannelli and Micklewright (1995), from Luxembourg Income Study data.

Table 2

Husbands' transitions to which wives may react.

Event	Number	%
Change labour market state: Key date to first interview	1077	62.4
First interview to second interview	725	42.0
Stop receiving UB:	1108	64.2
Because exit unemployment	586	33.9
Because exhaust entitlement	522	30.0

Table 3

Wives' Transitions between key date and first interview.

	Job status at $t = 3$				
Job Status at $t = -1$	Full-Time	Part-Time, > 10 hours	Part-Time, < 10 hours	None	Total
Full-Time	**227**	17	1	54	299
	(13.5)	(1.0)	(0.1)	(3.2)	(17.8)
Part-Time, > 10 hours	2	**181**	12	42	237
	(0.1)	**(10.8)**	(0.7)	(2.3)	(13.9)
Part-Time, < 10 hours	1	6	**56**	9	72
	(0.1)	(0.4)	**(3.3)**	(0.5)	(4.3)
None	12	24	13	**1023**	1072
	(.7)	(1.4)	(0.8)	**(60.9)**	(63.8)
Total	242	228	82	1128	1680
	(14.4)	(13.6)	(4.9)	(67.1)	(100.0)

Note: Percentage of total sample in brackets.

Table 4

Wives' transitions between first and second interviews.

	Job status at $t = 15$				
Job Status at $t = 3$	Full-Time	Part-Time, > 10 hours	Part-Time, < 10 hours	None	Total
Full-Time	**201**	8	1	37	247
	(11.7)	(0.5)	(0.1)	(2.2)	(14.4)
Part-Time, > 10 hours	24	**156**	14	35	229
	(1.4)	**(9.1)**	(0.8)	(2.0)	(13.4)
Part-Time, < 10 hours	5	17	**34**	27	83
	(0.3)	(1.0)	**(2.0)**	(1.6)	(4.8)
None	38	62	38	**1016**	1154
	(2.2)	(3.6)	(2.2)	**(59.3)**	(67.4)
Total	268	243	87	1115	1713
	(15.6)	(14.2)	(5.1)	(65.1)	(100.0)

Note: Percentage of total sample in brackets.

Table 5

Transitions between the key date and the second interview for women whose husbands had not left the sampled unemployment spell by the second interview.

	Job status at $t = 15$				
Job Status at $t = -1$	Full-Time	Part-Time, > 10 hours.	Part-Time, < 10 hours.	None	Total
Full-Time	**36**	9	2	21	68
	(5.4)	(1.4)	(0.3)	(3.2)	(10.2)
Part-Time, > 10 hours.	2	**38**	7	26	73
	(0.3)	**(5.7)**	(1.1)	(3.9)	(10.9)
Part-Time, < 10 hours.	0	4	**12**	13	29
	(0.0)	(0.6)	**(1.8)**	(1.9)	(4.3)
None	7	9	11	**470**	497
	(1.1)	(1.3)	(1.7)	**(70.5)**	(74.5)
Total	45	60	32	530	667
	(6.8)	(9.0)	(4.8)	(79.5)	(100.0)

Note: Percentage of total sample in brackets.

Table 6

Transitions between the key date and the second interview for women whose husbands had left the sampled unemployment spell by the second interview.

	Job status at $t = 15$				
Job Status at $t = -1$	Full-Time	Part-Time, > 10 hours.	Part-Time, < 10 hours.	None	Total
Full-Time	**167**	16	2	44	229
	(16.6)	(1.6)	(0.2)	(4.4)	(22.8)
Part-Time, > 10 hours.	18	**103**	12	30	163
	(1.8)	**(10.2)**	(1.2)	(3.0)	(16.2)
Part-Time, < 10 hours.	5	11	**12**	15	43
	(0.5)	(1.1)	**(1.2)**	(1.5)	(4.3)
None	26	50	29	**466**	571
	(2.6)	(5.0)	(2.9)	**(46.3)**	(56.8)
Total	216	180	55	555	1006
	(21.5)	(17.9)	(5.5)	(55.2)	(100.0)

Note: Percentage of total sample in brackets.

Table 7

Descriptive statistics for variables used in the fixed effects conditional logit model.

Variable		Mean (All)	Mean (FECL)	Standard Deviation	Between Group Standard Dev.	Within Group Standard Dev.
$y_{tj}^{end(w)}$	F-T	56.65	55.00	26.73	25.10	9.26
	P-T>10	35.27	33.82	15.17	14.15	5.50
	P-T<10	14.15	13.67	7.28	6.85	2.49
	None	0.83	1.20	5.34	3.33	4.18
$y_{tj}^{end(h)}$	F-T	8.69	7.86	12.73	9.49	8.49
	P-T>10	16.19	14.04	17.41	12.23	12.40
	P-T<10	27.23	23.16	23.61	15.38	17.92
	None	32.89	27.52	27.10	17.01	21.12
$y_{t}^{ex(ben)}$		6.90	7.00	11.20	4.64	10.19
$y_{t}^{ex(nly)}$		51.23	58.89	68.33	43.17	52.99
Wife's Age		36.1	36.8	10.94	10.93	0.47
(Wife's Age)^2		1434	1473	840.83	840.96	36.34
No. Children Aged 0-4		0.48	0.34	0.61	0.59	0.19
No. Children Aged > 4		0.84	0.82	1.02	1.00	0.22
Local Unemployment		14.02	13.76	3.31	3.22	0.76
Husband at Work		0.35	0.42	0.49	0.25	0.43

Notes: All columns refer to the subset of the data used for the FECL estimation, except Column 1, which refers to the whole sample. All money variables are measured in pounds.

Table 8
Results for the multinomial fixed effects conditional logit model.

Non-Choice-Specific Variables	Full-Time		Part-Time > 10 Hours		Part-Time < 10 Hours	
	Coefficient (*t-Stat.*)	Marginal Effect	Coefficient (*t-Stat.*)	Marginal Effect	Coefficient (*t-Stat.*)	Marginal Effect
$y_t^{ex(nly)}$	-0.0079 (*-2.57*)	-0.0009	-0.0075 (*-2.92*)	-0.0008	-0.0086 (*-2.69*)	-0.0003
Dummy: Children Aged 0-4	-5.5705 (*-3.80*)	-0.1482	-3.9775 (*-3.79*)	-0.0099	-2.0098 (*-2.50*)	0.2028
Dummy: Children Aged > 4	0.7109 (*1.07*)	0.0471	0.0882 (*0.15*)	-0.0024	1.6106 (*2.14*)	0.0778
Local Rate of Unemployment	-0.0853 (*-0.70*)	-0.0090	-0.2133 (*-1.82*)	-0.0277	0.1166 (*0.90*)	0.0076
Husband at Work	1.8881 (*4.83*)	0.1288	1.6689 (*5.02*)	0.0030	1.3433 (*3.30*)	0.1318
Choice-Specific Variables	Coefficient	*t-Statistic*	Marginal Effects × 10^2			
			F-T	P-T > 10	P-T < 10	None
$y_{tj}^{end(w)}$	0.0221	*2.41*	0.2722	0.2562	0.1009	0.4852
$y_{tj}^{end(h)}$	0.0006	*0.07*	0.0071	0.0067	0.0026	0.0126

Number of Observations: 420 *Log Likelihood:*-416.9

Notes: Asymptotic t-statistics in brackets. All money amounts are in pounds. Marginal effects are calculated at the sample probability of occupying the relevant state; here, $\Pr(FT) = 0.144$, $\Pr(PT > 10) = 0.134$ and $\Pr(PT < 10) = 0.048$

Figures

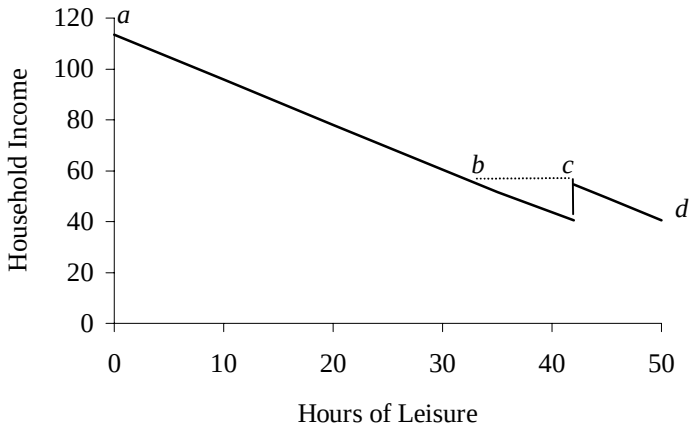

Figure 1. Budget constraint faced by the wife of an unemployed man who receives UB.

Note: The budget constraint is calculated for an hourly wage rate of £1.77, the average net wage in the *LSUS* data used later in the paper, and for a UB entitlement of the husband of £25, plus £15.45 dependant's allowance. These were the prevailing rates in 1983-84. The tax system is ignored.

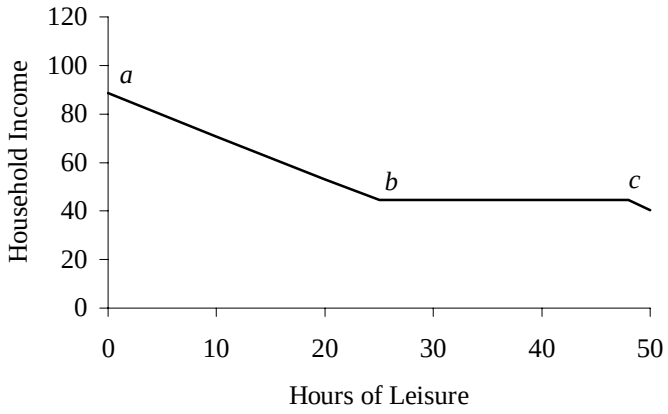

Figure 2. Budget constraint faced by the wife of an unemployed man who receives SB.

Note: The amount of SB entitlement illustrated is the same as for Fig. 1 when the wife works zero hours, so the differences between Fig. 1 and Fig. 2 reflect only the difference in treatment of the wife's income between UB and SB.

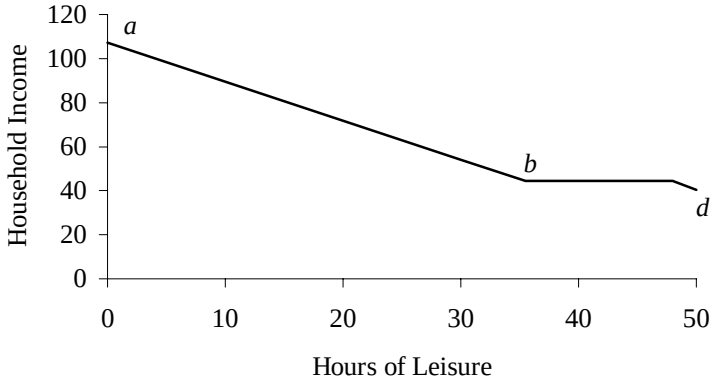

Fig. 3. Budget constraint faced by the wife of an unemployed man who receives both UB and SB.

Note: The amount of UB entitlement illustrated is the three-quarter rate of £18.75 plus £11.59 dependant's allowance, with household income topped up to £40.45 by SB. Thus, the total benefit entitlement at zero hours of work of the wife is the same as for Figs. 1 and 2.