Evaluating In-Work Benefit Reform: the Working Families Tax Credit in the UK

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Abstract

In this paper we examine the labour market impact of the proposed new earned income tax credit - Working Families Tax Credit - in the UK. Family labour supply behaviour is modelled as a discrete choice among a finite set of hours alternatives. Our estimation strategy allows for random preference heterogeneity, fixed costs, program participation and childcare expenditures. In simulation we find moderately sized positive behavioural responses to the introduction of the new tax credit.

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1. Introduction and Background

From April 2000 the UK will introduce a new Working Families Tax Credit (WFTC) as a replacement for Family Credit (FC), the UK's main in-work benefit. This in-work benefit has many similarities to the Earned Income Tax Credit in the US. Consequently there is much to learn from the various studies that have evaluated the EITC[1] and, as we document below, our evaluation approach builds on this work. The structure of the WFTC reform is modelled closely on the existing FC system, with the exception that the WFTC is to be packaged as a refundable tax credit, rather than as a welfare benefit. The WFTC is intended to "improve work incentives for families by making work pay". This is to be achieved by boosting the in-work incomes available to families with children in low wage jobs. Most of the extra resources are delivered by reducing the benefit reduction rate of the WFTC to 55%, down from the 70% taper found in FC. Additionally, the WFTC contains generous provision for the subsidy of childcare costs.

The aim of this paper is to consider the effects on employment and hours of work of the Working Families Tax Credit reform. Since this is a policy reform that is to be implemented in the future, an ex-ante evaluation is all that is available. Consequently, our analysis will rely on a structural simulation model of the type used in the work by Bingley and Walker (1997), Hoynes (1996) and Keane and Moffitt (1998). However, as we document below, this is not the first in-work benefit reform in the UK and past reforms to the system will be used to assess the reliability of the model specification. Such ex-post evaluations are close in spirit to the difference-in-differences or natural experiment evaluation of reforms (see Eissa and Liebman (1996), for example). The difference-in-difference parameter will also have an interpretation within a structural model, although it is unlikely to relate directly to any specific preference parameter. One (eventual) aim of this paper is to use the history of the FC reforms in the UK to build a bridge between these evaluation methods and more structural approaches that are necessary for any ex-ante policy reform evaluation of the

[1] See Dickert, Houser and Scholtz (1995), Eissa and Hoynes (1998), Eissa and Liebman (1996), Meyer and Rosenbaum (1998) and Scholtz (1995). There is also interesting recent evidence on work and finacial incentives in the Canadian Self-Sufficiency Project, see Card and Robins (1998).

kind described here.

There are effectively two target groups for the WFTC reform: single parents and married couples with children. Nearly 50% of currently working single parents are in receipt of some in-work benefit through the existing Family Credit system. For married couples with children this proportion is smaller, at around 16%. However, the latter group is more than two and half times the size of the former. The behaviour of both of these groups, and their economic circumstances, are sufficiently different to warrant a separate analysis. Consequently, we provide results for each group separately.

A reasonable evaluation of such a reform requires three components: Firstly, a sample with a sufficiently large number from each of these two target groups. For this we use the British Family Resources Survey (FRS) which covers almost 50,000 individuals per year. Secondly, sufficient detailed information on each household so as to reliably construct their net incomes under the FC and WFTC systems. For this we have implemented the IFS tax and benefit simulation model, TAXBEN, on the FRS data. Finally, we need a behavioural model that can reasonably predict changes in labour supply resulting from the reforms to the welfare system. In this respect we specify and estimate a structural discrete choice model of work behaviour for lone parents and for couples with children on the FRS data. This model is evaluated against the previous reforms to FC that have occurred since its introduction in 1988 and then used to simulate the proposed WFTC reform..

These three requirements and the way they are developed to address the impact of WFTC are discussed in more detail below. However, it is worth pointing out two other key features of our simulations. Firstly, we construct the full budget constraint facing each individual in a family. This accounts for different levels of tax allowances and marginal tax rates as well as the detailed interactions of the benefit and WFTC systems. Secondly, we account for childcare costs and availability. This posed a particularly difficult challenge. Our approach is to assume that the reforms do not change the structure of the childcare market. The proportions choosing types and levels of childcare post-reform are determined by the pre-reform distribution of childcare. Consequently, we do not allow the childcare market to adapt to the introduction of WFTC. However, we do allow childcare usage to

vary with hours worked and with the demographic composition of the household. We nevertheless recognise that the move to WFTC may impact on the childcare market in a manner which could have implications for the costs of the new program.

The layout of the rest of the paper is as follows. In the next section we outline the structure of the WFTC reform and contrast it with the existing FC system. Section 3 examines the history of participation and hours changes and relates them to past reforms to the family credit system. It also examines the population characteristics of the target groups in the WFTC reform. Section 4 documents the structure of the existing childcare market. Section 5 presents a detailed analysis of the potential incentive effects of WFTC, both for lone parents and for married couples with children. Section 6 presents the components of the structural model. In Section 7, we present details of the data and model estimates. Section 8 presents the results of the simulations of the impact of the WFTC reform. Section 9 concludes.

2. The Structure of Family Credit and the WFTC Reform

Introduced in 1998, Family Credit shares many of the features of the EITC in the US. It was designed to provide support for low wage families with children. An unusual feature of the Family Credit system is the minimum weekly hours eligibility criterion. A family with children needs to have one adult working 16 hours or more per week to qualify for FC. At its introduction in 1988 this was set at 24 hours but then reduced in April 1992 to encourage part-time work by lone parents with young children. A further supplement credit at 30 hours per week was introduced in April 1995. These previous reforms are interesting in their own right, but we will be particularly interested in them as a basis for evaluating the reliability of our structural simulation model.

In the FC system each eligible family is paid a credit up to a maximum amount which depends on the number of children. There is also a smaller addition if they work 30 hours or more. Eligibility depends on family net income being lower than some threshold (£79.00 per week in 1998-99). As incomes rise the credit is withdrawn at a rate of 70%. In

1996 average payments were around £57 a week and take-up rates stand at 69% of eligible individuals and 82% of the potential expenditure.

The recently announced replacement of FC - the WFTC - will be substantially more generous. It increases the generosity of in-work support relative to the FC system in four ways. It increases in the credit for younger children. It increases the threshold; it reduces the benefit reduction rate from 70% to 55%. Finally, it incorporates a childcare credit of 70% of actual childcare costs up to £150 per week.

Figure 1 about here

The effects of these changes relative to FC are shown in Figure 1. Those currently receiving the maximum payment see a small increase in the level of their payment if they have children under 11. Those with net incomes between £79 and £90 move from being on the taper to receiving maximum support, and those who remain on the taper following the introduction of the WFTC see their withdrawal rate fall from 70% to 55%. The largest cash gains go to those people who are currently just at the end of the taper under FC, but for whom the introduction of the WFTC will create an entitlement to in-work support.

The final element of the increased generosity of the WFTC reform is the childcare credit. This replaces a childcare disregard in Family Credit, which has suffered from very low levels of take-up. The credit increases the maximum amount of WFTC by 70% of childcare costs up to a maximum of £100 per week for those with one child or £150 per week for those with two or more children. The credit is available to lone parents and couples where both partners work more than 16 hours per week. The effect of the credit is also illustrated in Figure 1.

It should also be noted that Housing Benefit and Council Tax Benefit may also be payable at the same time as Family Credit/WFTC. In these cases the increase in the disposable income of a family may not be as large as the increase in the level of FC/WFTC payment as entitlement to other benefits may be reduced. Such interactions with other benefits are taken into account in the budget constraint examples that follow and in all the modelled results.

3. Hours, Participation and the History of In-Work Benefit Reform in Britain

3.1. The 16 Hour Reform to Family Credit

As described in the previous section, there have been a number of reforms to the existing in-work benefit - Family Credit - since its introduction in 1988. Here we use two data sources to document the changes in participation and hours of work over the period of these reforms.

The 16 hour reform took place in 1992. To examine the behaviour of hours and participation before and after this reform we use the Family Expenditure Survey data source, a cross section survey of some 7000 British households per year. Tables A1 - A3 of Appendix A present participation and hours of work in the FES over the 1988 to 1995 period. The data has been re-organised according to fiscal years to coincide with the reforms to the Family Credit system. The larger FRS data source, covering some 50,000 British households, which is used for estimation of the structural model below, is also on a fiscal year basis but is only available for the 1994-1997 period and so is not useful in studying the impact of the 1992 budget reform. Both data sources collect sufficient income and earnings information to accurately trace out the budget constraint facing individual families.

The 1992 reform to Family Credit moved the hours eligibility rule from 24 hours per week to 16 (see Duncan and Dilnot (1994) for a detailed description of this reform). In the Tables A1-A3, the hours of work and participation of three key groups are analysed: single women, married couples with an employed partner and married women with an unemployed partner. These groupings are chosen with an eye on the incentives underlying the Family Credit system and the underlying characteristics of eligibility for the credit. In each of these groups we further separate according to whether the head of household has basic school qualifications vs higher school qualifications.

Table A1a(i) in Appendix A presents the participation rates for lower educated single women across the fiscal years from 1989 to 1995. This provides some indication of the

potential impact of the 1992 reform. Since this data is drawn from the Family Expenditure Survey, the cell sizes are small[2]. Nonetheless, for lower educated single women with children in the 5-10 year category (the group that might be expected to respond most to this reform) there is an increase in participation between fiscal years' 1991 and 1992. This is also true for those women with the youngest child in the 3-5 range. If at all there, the changes are smaller in the non-eligible groups e.g. the single women without children. This lends some support to the view that the lowering of the hours eligibility rule increased participation among the target groups. Although providing an increased incentive for participation, the reform also provided an incentive to reduce hours. The distribution of working hours is presented in Table A1b(i). This indicates that the hours of work among workers in this group did tend to fall after the reform.

Figures 2(a) - 2(d), about here

A clearer picture of the hours changes before and after the 1992 reform are presented in Figures 2(a) - 2(d). These figures relate to a lower educated sample of women from the Family Expenditure Survey. The first histogram in each Figure gives the distribution of hours of work for the fiscal year 1991 - before the reform. Notice that for single parents the spike at 24 hours tends to disappear and a spike at 16 hours becomes more pronounced.

3.2. The 30 Hour Reform

A further 30 hour supplement to family credit was introduced in 1995 (see Duncan and Giles (1996) for a detailed description). The larger FRS sample can be used to analyse hours of work before and after this reform and in Figures 2(e) - 2(h) the hours of work among lower educated women participants are presented for each of the four financial years available in the FRS. Notice the pronounced spike in the hours distribution at 16 hours for single parents in Figure 2 (a) and the increasingly pronounced spike at 30 hours. Again these spikes are difficult to detect in other groups.

[2]There are around 900 lower educated single women of working age in each year of data. Of these, there are only around 120 with a youngest child in the 5-10 age group.

Figures 2(e) - 2(h), about here

3.3. Characteristics of the WFTC target groups

This sub-section outlines some of the basic demographic characteristics of the target groups for the WFTC reform - lone parents and couples with children. Table 1 shows the number of each group that are in the population. Certain groups are excluded from the labour supply model set out in Section 7. These are the self-employed, students, the retired, those aged under 17 and those aged over 64.[3]

Table 1: Numbers of families with children, about here

The participation rate for the groups in Table 1 is 40% for lone parents, 82% for men in couples and 57% for women in couples. Figure 2(i) shows the distribution of hours for these groups from the FRS data. For men, the basic decision is one of whether to participate or not - virtually no men work part-time. Women, on the other hand, work at a wide range of hours levels. As before there are also clear indications of the impact of the family credit system on female labour supply, with a spike in the distribution of hours for lone parents at the 16 hours point - the cut-off for eligibility for Family Credit.

Figure 2(i), about here

4. Hours of Childcare and Childcare Expenditure

One key element of the WFTC reform is the childcare element. This could potentially a large impact on labour supply decisions. For this paper, we concentrate on the childcare used by families where the youngest child is below school age. Table 2 shows the type of childcare used by such families. For couples, over one-third report that they use no childcare, while just over 25% use relatives and just under 25% use formal childminders or nursery care. For lone parents, the largest difference is in the numbers reporting no

[3]The self-employed are by far the most important of the excluded groups. These account for 850,000 of the excluded cases where the man works in a couple.

childcare, which are below 10%, and a corresponding increase in those depending on relatives.

Table 2, about here

Table 3 and 4 show the weekly expenditure on childcare by hours of work of the mother and by type of childcare. Clearly the expenditure rises with hours worked by the mother. It is also highly variable across types of childcare. For those on low hours, the total cost of care provided by relatives is marginal. The costs escalate for more formal types of childcare, such as nursery care and childminders, and also tend to be higher for couples compared to lone parents.

Table 3 and Table 4, about here

5. Potential Incentives of the WFTC

The WFTC is designed to influence the work incentives of those with low potential returns in the labour market. It does this via the increased generosity of in-work means-tested benefits. It is important to be clear about the likely direction of the incentives that such changes generate. Any such increase unambiguously increases the financial returns to working a given number of hours relative to not working. But this does not imply that the reform will unambiguously increase either the total number of hours worked or the total number of labour market participants. It is well known that a change to marginal tax rates has an ambiguous effect on the number of hours worked by those currently in work - the income and substitution effects of the change move in opposite directions. Less widely appreciated is the fact that such changes also have an ambiguous effect on the numbers participating in the labour market. This is because in-work benefits, although nominally paid to one member of a family, are assessed on the basis of household rather than individual income. For second earners in couples, an increase in the generosity of in-work benefits can therefore introduce an incentive to stop participating in the labour market.

The aim of this section is to examine how we would expect the WFTC to influence work incentives by examining hypothetical changes in budget constraints faced by 'typical' individuals. This will provide an intuitive explanation for the results generated by the simulations. One should nevertheless guard against generalising too widely at this stage on the basis of what are merely illustrative examples.

5.1. Incentives for lone parents

For lone parent families, the impact of the WFTC is relatively straightforward, as we only have to consider the labour supply decision of one adult. As an illustration of the likely impact of the WFTC on the work incentives of lone parents, Figure 3 presents the change in the budget constraint of a lone parent with one child. This constraint is constructed at the medium hourly wage rate for working lone parents. We additionally assume that the lone parent is in public housing facing the median rent.

It is clear that the reform unambiguously enhances the probability of participation, as the financial returns to working any given hours level above 16 hours per week are greater post-reform than pre-reform. However, the increase in net income is small below 25 hours of work, due principally to the interaction of WFTC with the Housing Benefit system. For higher hours levels, the reduction in the WFTC taper starts to increase the returns to working.

For those already working, the labour supply response to the introduction of the WFTC is less clear. The marginal tax rate is unambiguously reduced at all hours levels under the reform, though even with the WFTC it remains high, at almost 70%. This increases the 'price' of non-market (the marginal wage rate), causing individuals to consume less non-market time and therefore increase their hours of work - the standard substitution effect. The income effect, on the other hand, will be negative in hours of work (assuming non-market time is a normal good). The combination of the two effects leaves us with an ambiguous overall effect on hours of work.

Figure 3 Budget constraint for example lone parent - no childcare, about here

Figure 4 shows the effect of the childcare credit element to WFTC. For illustration we assume that childcare costs £1.96 per hour and that the relationship between hours of work and hours of childcare is linear. This second figure is presented net of childcare costs, and includes an entitlement to the childcare credit addition to WFTC. Two points are worth noting. First, the introduction of childcare costs flattens the budget constraint, since more hours tends to imply greater childcare costs on average. Second, the relative reward to working at or beyond 16 hours increases once the WFTC compensation for childcare costs is introduced. One would therefore expect there to be an unambiguously positive participation response to the childcare credit element of WFTC over and above the standard credit, and an indeterminate conditional hours response for those in work.

Figure 4 Budget constraint for example lone parent with childcare, about here

5.2. Incentives for men in couples

Figure 5 shows the effect on an example man in a single earner couple. Again the incentives are unambiguously to move into work. Indeed the gains are far larger than for our lone parent example, as the largest cash gains from the WFTC reform accrue to those at the end of the current taper. The incentives to change hours of work are again ambiguous. Nevertheless, there is a marked increase in the effective marginal tax rate for those who become eligible to WFTC as a result of the reform. This group face an increase in their marginal tax rates from 33%, produced by income tax and National Insurance, to just under 70%, produced by the interaction of the 55% WFTC taper on post-tax income. In the example the marginal tax rate rises from 33% to just under 70% above 40 hours of work.

Figure 5 Budget constraint for example man in couple without childcare, about here

5.3. Incentives for women in couples

One point which is often neglected when considering the impact of increasing in-work means-tested benefits is that they can lead to incentives to move out of work altogether.

Such an outcome relates particularly to secondary earners in two person households, many of whom are women. For illustration, Figure 6 shows the budget constraint for the partner of the man in Figure 5, conditional on him working 40 hours a week. Family income for a household in which the woman does not work therefore corresponds to the level of income at 40 hours on the man's budget constraint. The WFTC reform will increase household income for a non-working women by an amount equal to the income difference at 40 hours for the man. As she moves into work (and household earnings increase), the income differential will fall as WFTC is withdrawn. For the illustrative example shown here, any woman working more than 10 hours will have an increased incentive to reduce their labour supply or move out of work altogether.

Figure 6 Budget constraint for example woman in couple - no childcare, about here

Figure 7 Budget constraint for example woman in couple - with childcare, about here

The situation is a little different when we allow additionally for childcare costs. For couples, the childcare credit is only available where both partners work more than 16 hours per week. Figure 7 repeats Figure 6, but this time allows for the purchase of childcare at a cost of £1.96 per hour. Here there is an additional incentive for the woman to work just over 16 hours to take advantage of the childcare credit.

5.4. Who is likely to gain, and by how much?

The preceding analysis throws some light on the potential responses among different household types, but fails to indicate the expected level of income gain following the introduction of WFTC. As with most benefit reforms, any increase in the generosity of either Family Credit or WFTC tends to be offset by consequent reductions in entitlement to other means-tested benefits. The ultimate potential for reforms to improve work incentives may therefore be less than initially suggested by the particular structure of the reform.

To give some indication of the impact of introducing WFTC for a range of household types in different labour market states, Table 5 reports the proportion of households who

would gain from the new credit among a sample of families drawn from the 1996 Family Resources Survey assuming no behavioural responses. Data are split according to observed hours of work, marital status and age of child. We base these simulations on patterns of childcare expenditure observed in the FRS sample. Thus, the reported figures do not take account of any changes either in the pattern of childcare use or cost. They nevertheless provide a benchmark against which we can judge the full impact of WFTC including the childcare credit element.

It is immediately evident that working lone parents are most likely to benefit from the WFTC reform. For example, nearly 80% of lone parents in part-time paid employment (of between 20 and 30 hours) will benefit from the new tax credit. This proportion falls for those women in full-time paid employment, as fewer will have incomes low enough to qualify for either FC or WFTC. No income gains are simulated among women on zero or low hours, since eligibility for either FC or WFTC is contingent on working at least 16 hours per week.

Table 5: Proportion of Gainers from WFTC, about here

Table 6: Average Income Gains from WFTC among Gainers, about here

Table 5 reveals an interesting pattern of eligibility for women in couples where the male partner is in work. We find the WFTC to be most generous to households in which the women not in paid employment; around one third of this group will benefit from the introduction of the tax credit. For women in part-time work, the figure falls to around 5%. This feature of the reform may give rise to negative work incentive effects among women in couples, given that those in part-time employment (who are unlikely to see a financial benefit from the tax credit) are more likely to see an increase in their out-of-work incomes under WFTC. For women whose partner is unemployed, the pattern of increased eligibility is closer to that for the lone parent population.

Among those lone parent households who do gain, it is instructive to note from Table 6 that the greatest increases in income (of around £20.00 per week) fall to those in full-time employment, many of whom are new WFTC recipients not previously eligible for Family

Credit. For married women, on the other hand, the income gains re spread more evenly across the hours distribution. Indeed, the greatest income gain falls to women not in paid employment whose partner is in work. Combined with the evidence from Table 5, this confirms the view that negative work incentive effects are entirely possible for this group of women.

6. Specifying a Structural Empirical Model

This section builds up the components of the sample likelihood for our structural model. It begins by describing a joint participation model with discrete hours choices and unobserved heterogeneity. Here we follow the previous work by Bingley and Walker (1997), Hoynes (1996) and Keane and Moffitt (1998). We develop the specification to include fixed costs of work, missing wages, program take-up and childcare demand.

6.1. Participation and hours for lone parents

In estimation families are stratified according to whether they are single parents or couples with children and a separate model is estimated for each. Consider first the problem for lone mothers. To simplify the problem, in view of the large number of non-convexities we discretize hours to five hours bands, and consider the choice across these intervals. As in Keane and Moffitt (1998) the utility function is modelled as

$$U^*_{H(.)} = U(Y_{H_{(.)}}, T - H_{(.)}; X) + \varepsilon_{H(.)} \tag{6.1}$$

where $\varepsilon_{H(.)}$ represents an unobserved preference component relating to the particular hours choice, and we assume it is distributed as an extreme value random variable. Household disposable income, when supplying H hours, is defined by

$$Y_H = WH + V - T(H, W, V; X) \tag{6.2}$$

where W is the pre-tax hourly wage rate, V is other income (not including benefits and transfers) and $T(H, W, V; X)$ is the tax payable (positive or negative) when working H

hours and having demographic composition X. Thus T will reflect both tax payments and credits or welfare payments received. The way we write this reflects the fact that the tax and benefit system may be non-linear and may give rise to non-convexities; in these cases it is no longer possible to express the impact of the tax system simply by a marginal tax rate.

We now specify the utility function as a quadratic in hours and income, i.e.

$$U = \alpha_{YY}.Y^2 + \alpha_H.H^2 + \alpha_{YH}.YH + \beta_Y.Y + \beta_H.H \tag{6.3}$$

where the marginal utility of income Y and of hours H are assumed to be heterogeneous across individuals.. In particular we assume that

$$\begin{aligned} \beta_Y &= \beta_{y0} + \beta_y' X + v \\ \beta_H &= \beta_{h0}^1 + \beta_h^{1\prime} X \end{aligned} \tag{6.4}$$

Hence we add an additional source of unobserved heterogeneity v, through the marginal utility of income. This will have the effect of diminishing the impact of the extreme value assumption and will add generality by allowing for heterogenous responses by individuals.

Given the unobserved heterogeneity component v and the observables X, the probability of any hours choice being made is given by the multinomial logit probability, by virtue of the extreme value assumption on ε_H. Thus

$$\begin{aligned} \Pr[H &= H^j|X, v] = \Pr[U^*_{H^j} > U^*_{H^s} \text{ for all } s \neq j] \\ &= \frac{\exp[U(Y_{H^j}, T - H^j; X, v)]}{\sum_s \sum_t \exp[U(Y_{H^s}, T - H^s; X, v)]}. \end{aligned} \tag{6.5}$$

Given this structure the likelihood function for the sample can be written as

$$\log L = \sum_{i=}^{N} \log \int \prod_{s=1}^{J} \Pr[H = H^j|X_i, v]^{1(H=H^s)} f(v) dv \tag{6.6}$$

where $f(v)$ is the distribution of unobserved heterogeneity. However, at this point we have ignored three major issues: Fixed costs of work, missing wages for those out of work and programme participation. We now add these features and we follow on with a discussion on identification.

6.2. Fixed Costs

Fixed costs are the costs that an individual has to pay to get to work. For many families they are made up in part by childcare costs which we allow for separately below. In particular, in our model childcare induces both fixed and variable costs that effectively act as a marginal tax rate. However, there are additional costs, e.g. transport, which will vary by household type and by region. These are modelled as a once off weekly cost. In the model they are subtracted directly from net income for any choices that involve work. They are modelled in terms of a set of observable factors. These terms will now enter the utility comparisons for each individual in their work -non-work choice. Consequently, they will also enter the probability terms described above.

Fixed costs are written

$$F = X_F.\gamma$$

and each U^* in (6.13) is replaced by

$$U^*(Y_H - F, T - H|\, X, v) \tag{6.7}$$

for all states with $H^j > 0$.[4] Since we have assumed that fixed costs are not stochastic the likelihood function is not modified - only the functional form for the utility specification changes.

[4]We could consider the case where fixed costs are distributed randomly in the population. However, there is a danger of over-parameterising the model.

6.3. Missing Wages

For non-workers gross wages are not observed. For each individual in the family we write

$$\ln W = Z'\gamma + \omega \tag{6.8}$$

where ω has density $g(\omega)$ and where Z include education, cohort and time dummies and their interactions. Below we extend the model to family labour supply, in which case separate regressions are run by gender and marital status.

In principle the wage equation and the labour supply model can be estimated jointly. However, for computational reasons we pre-estimate the marginal density of wages and then treat it as known at the estimation stage. Thus we assume that ω is normally distributed, independently of the Z variables and we apply a standard two step selection correction approach to estimate the coefficients γ. To identify γ we exclude from the wage equation a measure of income at zero hours of work. This is driven by the benefit system and it varies across individuals as a function of housing costs. All these aspects of the benefit system are of course reflected in the budget constraint that we use in the structural model.

Once the density of wages is estimated we integrate wages out for non-workers. In effect this implies that we derive the potential earnings of the nonworkers for a number of wages, evaluate the probability of participation for each case and then take a weighted average of the results. The observations on the workers allow the estimation of the correlation of wages and the unobserved heterogeneity in the individual utilities.

This method accounts for the endogeneity of gross wages and also allows for the complex relationship between gross wages and marginal wages in the tax and benefit system. To implement this approach we use quadrature methods for the intergral over the wage distribution. The quadrature points only need be passed through the tax and benefit model once for each individual.

For couples the likelihood contribution is similar but allows for the joint distribution over male and female wages.

6.4. Benefit Take-Up and Program Participation

Suppose $P = 1$ indicates that an eligible family takes-up the programme. Eligibility at any hours H^j will depend on earnings, other income sources, family characteristics, and the rules of the tax and benefit system. Suppose that the hassle cost and stigma is given by η an unobservable random variable. Then we write utility for combination $\{H^j, P\}$ as

$$U^* \equiv U^*(Y_{H^j,P} - F, T - H^j, \mid X) - \eta P. \tag{6.9}$$

The stigma cost variable η may be modelled as a single unknown parameter representing a common cost across all individuals. More usefully it can be modelled as a random process with unknown mean μ_η and distribution $f_\eta(\eta)$. The parameters of its distribution are then recovered during estimation. Notice that net income $Y_{H^j,P}$ also depends directly on P through the working of the benefit and credit system. For any distribution of stigma costs an increase in the generosity of the benefit will increase the probability of take-up. Consequently, other things equal, take-up will be higher among those eligible for a larger benefit.

For each hours H^j where the family is eligible to participate in the program, utility function (6.9) defines a reservation stigma cost $\eta^*_{H^j}$ above which the family would prefer not to participate at that hours level (note that the same family may choose to participate for some other hours level where they are also eligible for the program). Given the family characteristics and the tax/benefit rules, the eligibility of each family at each level of hours can be determined. For families who are observed at an hours combination where they are eligible, it is therefore known whether their η lies above or below $\eta^*_{H^j}$. For example, if a family is observed to take-up at point H^j then η can be drawn such that $\eta < \eta^*_{\{H^j,H^k\}}$ and the probabilities of H^j, P can be determined for all combinations and entered in the sample log likelihood for that family. For any family observed at an hours combination where they are not eligible for the program, a draw of η from $f_\eta(\eta)$ determines take-up at all other hours combinations.

6.5. The likelihood function for lone parents labour supply

We can now write the extended likelihood function that accounts for missing wages and stigma costs. This takes the form

$$\begin{aligned}\log L \quad = \quad & \sum_{i\in work} \log \int_{\eta\in U_i} \int_v \prod_{s=1}^{J} \Pr[H = H^j|P(\eta), X_i, v]^{1(H=H^s)} g(\omega|v) f(v) f_\eta(\eta) d\eta dv + \\ & \sum_{i\in work} \log \int_\omega \int_{\eta\in U_i} \int_v \prod_{s=1}^{J} \Pr[H = H^j|P(\eta), X_i, v]^{1(H=H^s)} g(\omega|v) f(v) f_\eta(\eta) d\eta dv d\omega \end{aligned} \tag{6.10}$$

In (6.10) the first part of the likelihood function corresponds to non-workers, for whom the wage rate is known. In the second part however, the wage rate is not known and it is integrated out. The additional feature here, is that the unobservable wage rate (ω) is allowed to be correlated with the unobserved component in the marginal utility of income; this reflects the idea that pre-tax wages (as well as post-tax ones) are endogenous for labour supply. This of course raises serious identification issues which we will discuss below. Finally, note that the integration with respect to the stigma component η takes place over an individual specific range U_i. This will vary depending on whether the individual is taking up or not and on whether she is eligible or not. If the individual is never eligible, then no integration takes place.[5] If the individual is not eligible at this hours choice but is eligible at some other point then there is no information on η and we integrate over the entire range of η, determining the take-up state at each possible point for the unobservables. Finally, if the individual is eligible , then her observed take-up state provides information on the range of the stigma parameter η.

The likelihood function (6.10) is relatively complicated and the simple policy evaluation question may appear lost in this sea of densities and probabilities. However, on closer examination all that is happening is that we are estimating probabilities of working at different hours points. Identification is provided by the comparison across different tax/benefit regimes and across different types of individuals with varying eligibility status. From a quasi-experimental point of view, identification is obtained to the extent there is enough variation in the policy parameters and a sufficient number of groups generating dif-

[5] Notationally we could think of U as a single point.

ferences in eligibility. Integrating out unobserved heterogeneity just relaxes the functional form assumptions on the specified probabilities. Ultimately, it is straightforward to check that the estimated probabilities can replicate the results obtained by a simple difference of differences methodology. However, by specifying each component in the way we do, and by allowing explicitly for wage effects, stigma effects on take up etc., we are able to provide a framework for extrapolation, subject to our identifying assumptions being valid.

Finally, precisely because of the discussion above it is important to include within the structural estimation procedure households not eligible to in-work benefits due to their exogenous characteristics. They provide the required comparison group for evaluating the effects of in-work benefits.

6.6. Costs of Childcare and Childcare Credits

The childcare credit component of the Working Families Tax Credit could potentially offer generous benefits for those women who purchase some form of registered formal childcare. It is therefore important both in estimation and in our simulations of the work incentive impact of the WFTC reform that we account in some way for childcare expenditures. Ideally, we would like to observe actual childcare expenditures and childcare use among the full sample of women.[6]

Our strategy uses sample information on hourly prices of childcare. We assume that individuals do not respond to the reform by changing childcare type and we associate a narrow price range with a different quality of childcare. We then estimate a distribution of types of childcare/prices, given characteristics. This distribution is used to integrate out prices for those not observed using childcare. For those observed using it we simply condition on the observed price/quality combination. Finally, in this paper we assume a deterministic relationship between hours of childcare and hours of work combinations represented by

[6]Previous work has established that up to 30% of non-working households may purchase formal childcare to some degree, which suggests that any model designed to assess work incentives in the presence of childcare ought ideally to include childcare expenditures among non-working households.

$$H_{cc} = G(H|X_c).$$

and fitted from the data. Thus childcare costs for a household with characteristics X_c become

$$CC(H|p_c, X_c) = p_c.G(H|X_c).$$

Net household income taking into account now becomes

$$Y_{(p_c)} = WH + V - T(H, W, V, CC; X) - F(Z) - CC(H|p_c, X_c).$$

where $T(.)$ takes account of childcare credit.

Given the distribution of childcare prices, $f_{X_c}(p_c)$ is used to integrate over the distribution of childcare prices in the sample log likelihood contribution for each family.

6.7. Participation and hours for couples

We apply the same modelling structure for couples. This requires but a few modifications. First, given the data the male's decision will be whether to work or not. We interact his participation decision with all terms in the utility function above. This essentially doubles the number of work options faced by the household. Since his decision is binary, any fixed costs he faces are not identifiable. Thus the only additional component is the male wage. In the same way as the female wage we treat male pre-tax wages as endogenous, and we integrate them out whenever he is not working.

The important difference in practice is that now we have to take into account the interaction of the welfare benefits that individuals may receive. Thus, the options facing the woman are very different depending on whether he works or not. We take this fully into account, when computing the household income at each hours combination that the household faces.

To model joint participation decisions for couples we write utility

$$U = U(Y_{\{H_1,H_2\}}, T - H_1, T - H_2; X), \tag{6.11}$$

where Y is net household income Y, H_1 and H_2 represent hours of work for each individual, X are characteristics for the household. Denoting the gross wage rates by given by $\{W_1, W_2\}$ and other household income by V, net income is

$$Y_{\{H_1,H_2\}} = W_1H_1 + W_2H_2 + V - T(\{H_1, H_2\}, \{W_1, W_2\}, V; X) \tag{6.12}$$

where $T(\{H_1, H_2\}, \{W_1, W_2\}, V; X)$ tax payments minus benefit receipts. Single parent families are modelled in the exact same way but without the W_2 and H_2 terms. In what follows we detail the model for couples with children.

Preferences over these hours choices are allowed to vary stochastically across individuals according to an extreme value distribution. The utility for some hours combination $H_{1(.)}, H_{2(.)}$ be written as

$$U^*_{\{H_{1(.)},H_{2(.)}\}} = U(Y_{\{H_{1(.)},H_{2(.)}\}}, T - H_{1(.)}, T - H_{2(.)}; X) + \varepsilon_{\{H_{1(.)},H_{2(.)}\}} \tag{6.13}$$

where $H_{i(.)} \in \{H^1, H^2, .., H^G\}$ is a particular hours choice for each individual i in the family. This implies that, the probability that hours combination $\{H^j, H^k\}$ is preferred to all other hours points may be written

$\Pr[H_{1(.)} = H^j, H_{2(.)} = H^k)]$

$$\begin{aligned} &= \Pr[U^*_{\{H^j,H^k\}} > U^*_{\{H^s,H^t\}} \text{ for all } s \neq j, t \neq k] \\ &= \frac{\exp[U(Y_{\{H^j,H^k\}}, T - H^j, T - H^k; X)]}{\sum_s \sum_t \exp[U(Y_{\{H^s,H^t\}}, T - H^s, T - H^t; X)]}. \end{aligned} \tag{6.14}$$

The empirical results below we also assume a quadratic utility

$$U = \alpha_{YY}.Y^2 + \alpha_{H_1H_1}.H_1^2 + \alpha_{H_2H_2}.H_2^2$$

$$+\alpha_{YH_1}.YH_1 + \alpha_{YH_2}.YH_2 + \alpha_{H_1H_2}.H_1H_2$$
$$+\beta_Y.Y + \beta_{H_1}.H_1 + \beta_{H_2}.H_2 \tag{6.15}$$

with heterogeneity

$$\beta_Y = \beta_{y0} + \beta_y' X + v_Y$$

The sample log likelihood contribution for each household is given by

$$\ell(\alpha, \beta \,|\, X) = \int \sum_j \sum_k d_{jk} \ln \Pr[H_{1(.)} = H^j, H_{2(.)} = H^k | X] f(v) dv \tag{6.16}$$

where $d_{jk} = \mathbf{1}\left[H_{1(.)} = H^j, H_{2(.)} = H^k\right]$.

Incorporation of fixed costs, missing wages, programme participation and childcare costs follows as described for lone parents above.

7. Model Estimates

7.1. Data

The Family Resources Survey is an annual budget survey of individual, family and household incomes, characteristics and labour market attachment. It is a relatively new survey in the UK and contains a much larger and more representative sample of households than the surveys, principally the Family Expenditure Survey, on which the vast majority of previous work has been carried out. For this analysis, we use the 1994-95 and 1995-96 FRS datasets, together combining information on over 50,000 UK households.

We select for our empirical work two samples; single parent households and married or de facto married couples. Excluding self-employed and retired households, together with students and those in the forces, leaves samples of 1807 single parents and 4694 two-person households for use in estimation.

7.2. Net Incomes

To generate net incomes we use the Institute for Fiscal Studies tax and benefit model TAXBEN. TAXBEN is a microsimulation model of the UK tax and benefit system that cal-

culates taxes due and benefit entitlements for the Family Resources Survey data. TAXBEN calculates the financial returns for each working age individual to employment at all possible hours by calculating gross and net incomes at these levels. For workers we assume their current wage remains unchanged, and for non-workers, we use drawings from an estimate log wage equation described in more below.

The use of TAXBEN combined with varying the potential hours of individuals allows us to generate highly accurate budget constraints for each individual in the survey in order to estimate the labour supply effect of the reforms to taxation. For each working individual from the sample of lone parents, and for each pair of working adults in the sample of couples with children, the FRS data together with the IFS TAXBEN model allows a net income figure Y to be calculated for each hours of work point $\{H^j, H^k\}$.

7.3. Empirical Results

The variables we include to pick up variation in tastes for work include indicators for the age of the youngest child (0-2, 3-4 and 5-10), the age of the mother (squared also), whether or not the mother left school at 16, and the number of pre-school children in the household. To pick up any systematic differences in fixed costs we include the age and number of children in the household, together with regional indicators (Metropolitan area, Greater London). The labour supply model estimates for single parent and married or cohabiting households are presented in Tables C1 and C2 of Appendix C.

7.3.1. Single parents

The first column of Table C1 reports estimates for a model of single parents' labour supply behaviour with no controls for childcare expenditures, whereas the second column relates to a model in which we impute childcare expenditures for single parents of different demographic types. Turning to the parameter estimates, we see some differences between the models with and without controls for childcare. Specifically, we find the marginal utility of income among single parents to increase once childcare costs have been controlled for. We use this second set of estimates for policy simulation, for the reasons described

earlier. Concentrating on these, we see in general terms that the model is consistent with economic priors. The marginal utility of income increases at a decreasing rate with the level of income. Similarly, the marginal disutility of hours decreases with the level of hours. Higher educated women prefer to work longer hours, as do women with older children.

The fixed cost parameters are jointly highly significant, with average fixed costs imputed at around £65 per week for the reference group. Fixed costs are modelled to increase with the number of young children in the household, and decrease for those in Metropolitan areas outside Greater London.

7.3.2. Married/cohabiting households

Table C2 of Appendix C presents the corresponding estimation results for married couples. Among estimated taste parameters we see again an increased but diminishing marginal utility of income, highest among households with primary-school aged children. The marginal utility of hours for men is relatively small, suggesting a lower hours elasticity than for women in married or cohabiting couples. It is interesting to see the contrast in the effect the presence of young children have on tastes for work. Women with young children in the household are seen to prefer to work significantly less than women with older (secondary school-aged) children. For male partners, there seems little relationship between preference for work and the number or age of children. It is noticeable also that preferences for work increase for older males, but decrease for older women, suggesting a move towards single-earner couples as the household ages. Fixed costs increase markedly with the number of young children in the household.

8. Policy Simulations

The IFS tax and benefit model TAXBEN generates household net incomes for each member of our FRS samples at each of the range of discrete hours choices {0,10,20,30,40}. For each individual we compute the probability that they would be at each discrete hours point both before and after the Working Families Tax Credit reform, using the estimated

models of preferences over work and household net incomes. This enables us to simulate both the proportion of new workers, and the change in the hours distribution.

At the moment we have not implemented the take-up model as an integral part of these simulations. In these preliminary results we assume 100% take-up of the childcare credit component of the WFTC. We do however consider a number of alternative scenarios to establish to what degree the 100% take-up assumption dominates our results. Specifically, we examine alternative scenarios, which assume zero take-up of the childcare credit component, and a take-up rate of 50%.

Table 7 to Table 9 report the results of our simulations for single parent households, women with employed partners and women with unemployed partners. These results are presented both in the form of a matrix of simulated transitions between no work, part-time work and full-time employment under the two systems, and using summary measures of changes in participation rates and average changes in hours among workers and among the full sample.

8.1. Policy simulations: lone parents

In Table 7 we report the simulated work responses to the WFTC among our sample of single parents. Around 2.2% of the sample move from no work to either part-time or full-time work, with no offsetting movements out of the labour market. To take account of sampling variability, we simulate a standard error of 0.42% around this figure. One can clearly see the reason for this shift in our earlier graphs of the potential impact of the WFTC on single parents' budget constraints. At or above 16 hours per week the single parent becomes eligible for WFTC (with any childcare credit addition to which she may be entitled). For some women this extra income makes a transition to part-time employment attractive. Nevertheless, the level of the aggregate behavioural response is perhaps lower than one might have anticipated given the potential cost of the WFTC reform; the 2.2% of single parents who are simulated to move into the labour market would gross up to

around 35,000 women in the population.[7]

We see a minor offsetting reduction in labour supply through a simulated shift from full-time to part-time employment among 0.2% of the sample. This is consistent with a small (negative) income effect among some full-time single women, for whom the increase in income through the WFTC encourages a reduction in labour supply. Nevertheless, the predominant incentive effect among single parents could be said do be small but positive.

Table 7. Single parents, 100% take-up of WFTC childcare credit, about here

8.2. Policy simulations: women with employed partners

For married women the simulated incentive effect is quite different. In Table 8 we report estimates of the transitions following WFTC among a sub-sample of women with employed partners. What we find is a significant overall reduction in the number of women in work of around 0.57%, equating to a grossed-up figure of around 20,000 in the population. This overall reduction comprises around 0.2% who move into the labour market following the reform, and 0.8% who move from work to non-participation. The number of hours worked by women with employed partners is predicted to fall slightly, by 0.18 hours on average over the full sample.

The predominant negative response is clearly not one that is intended, but from our earlier budget constraint analysis one can easily see why. There will be a proportion of non-working women whose low earning partners will be eligible for the WFTC. The greater generosity of the tax credit relative to the current system of Family Credit increases household income. This increase in income would be lost if the woman in the household were to work. And for those women currently in the labour market, the WFTC increases the income available to the household if she were to stop working.

Table 8. Married women with employed partners, 100% take-up of WFTC childcare credit, about here

[7] Gregg, Johnson and Reed (1999) consider the transitions into work and find a short-run (one year) impact of the WFTC reform for single mothers of 9,000, with a long run impact (assuming a constant number of outflows) of 56,000.

8.3. Policy simulations: women with unemployed partners

In Table 9 we look at incentives for a sub-sample of women whose partners do not work. For this group we simulate a significant overall increase of 1.32% in the number of women who work, equating to a grossed-up figure of around 11,000 in the population.

The reason for this shift is more straightforward, and stems from the increased generosity of the basic WFTC relative to the current Family Credit system for those women who choose to move into work. Note that for this group the generosity of the childcare credit component of the WFTC is not an issue, since households only qualify for the childcare credit if both household members work 16 hours or more. There is of course potential for both members of an unemployed household to move into work in order to qualify for the WFTC including the childcare credit, but a joint simulation (not reported here) shows that such an outcome is virtually non-existent.

Table 9. Married women with partners out of work, 100% take-up of WFTC childcare credit, about here

8.4. Policy Simulations: alternative scenarios

The simulations presented above assume 100% take-up of Family Credit, the Working Families Tax Credit and the additional childcare credit component of WFTC. Although the take-up of Family Credit has been on the increase, this particular feature of the models is certainly open to question. To gain some feel for the sensitivity of our simulated results to the assumption of 100% take-up, we run two alternative scenarios for each of the three sub-samples covered in the previous sections. The first alternative forces zero take-up of the childcare credit component of the WFTC for the full samples. In some sense, this alternative scenario gives some feel for the work incentive effects of the basic WFTC relative to Family Credit rather than the cumulated incentive effect of the full WFTC including the childcare component. As a second scenario we assign a random 50% of our sample to receive the childcare credit component of the WFTC. A third scenario responds to the suggestion that the childcare credit might have an impact on the childcare

market. We are currently unable to model an expansion in demand for childcare places following the WFTC reform. However, we can conduct a rough experiment in which the availability of the childcare credit and the consequent impact on demand for places bids up the market price of childcare services. This we do by altering the distribution of prices faced by each member of the sample, to an extent that increases the average hourly price paid for childcare by 50%. This hypothetical shift in no sense represents our view of what will actually happen in the childcare market; it merely serves to illustrate how price changes might affect behavioural responses to the childcare credit element of the WFTC reform.

In Table 10 we present simulations of labour market transitions under these alternative scenarios for each of the three groups of women (single parents, women with employed partners and women whose partners remain out of the labour market). For single parents, we find an increase in participation of around 1.3% with no take-up of the childcare credit, compared with 2.2% assuming full take-up. For women with employed partners we see a greater proportion (0.81%) moving out of work. This suggests that the additional childcare credit component does improve the incentive to enter the labour market.

Table 10 also show that an increase in the price of childcare serves to offset the effectiveness of the WFTC in encouraging labour market participation. This is because the increase in price increases the costs of working, with the childcare credit component only partially offsetting that cost.

Table 10. Simulated Responses to WFTC: alternative scenarios, about here

9. Conclusions

This paper has examined the labour market impact of the proposed new earned income tax credit - Working Families Tax Credit - in the UK. Labour supply behaviour is modelled as a discrete choice among a finite set of hours alternatives. Our estimation strategy allows for random preference heterogeneity, fixed costs, program participation and childcare expenditures. In simulation we find moderately sized positive behavioural

responses to the introduction of the new tax credit.

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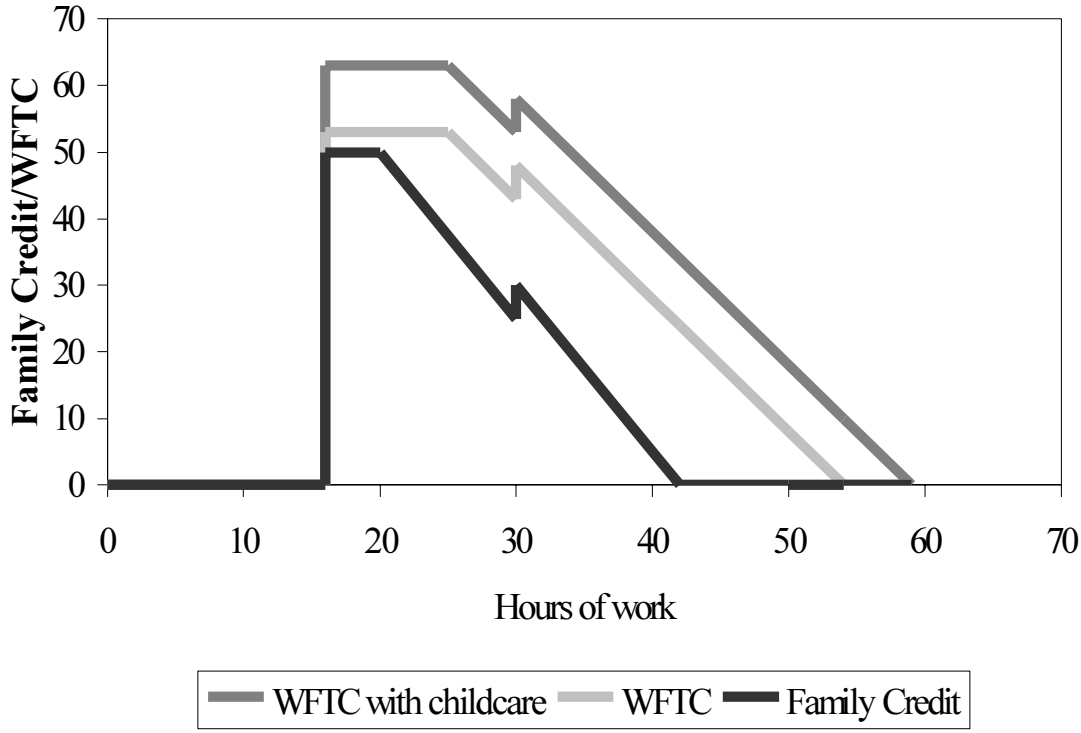
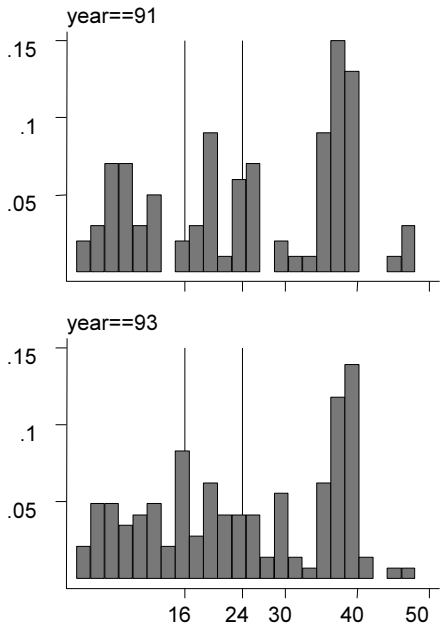
Figure 1: The WFTC reform





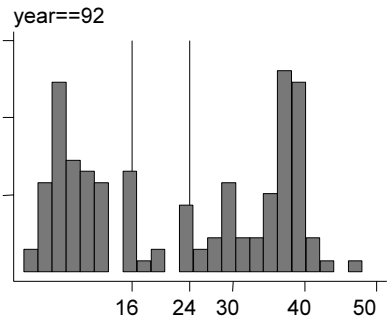
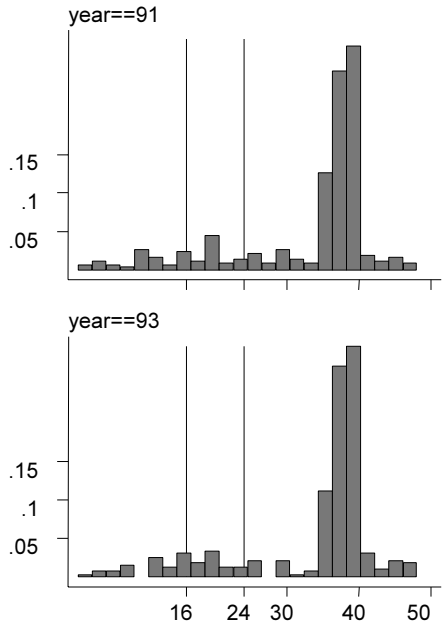


Figure 2(a): Single parents lower education, FES



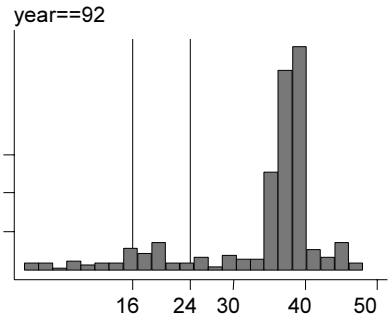


Figure 2(b): Single women, no kids Lower education, FES

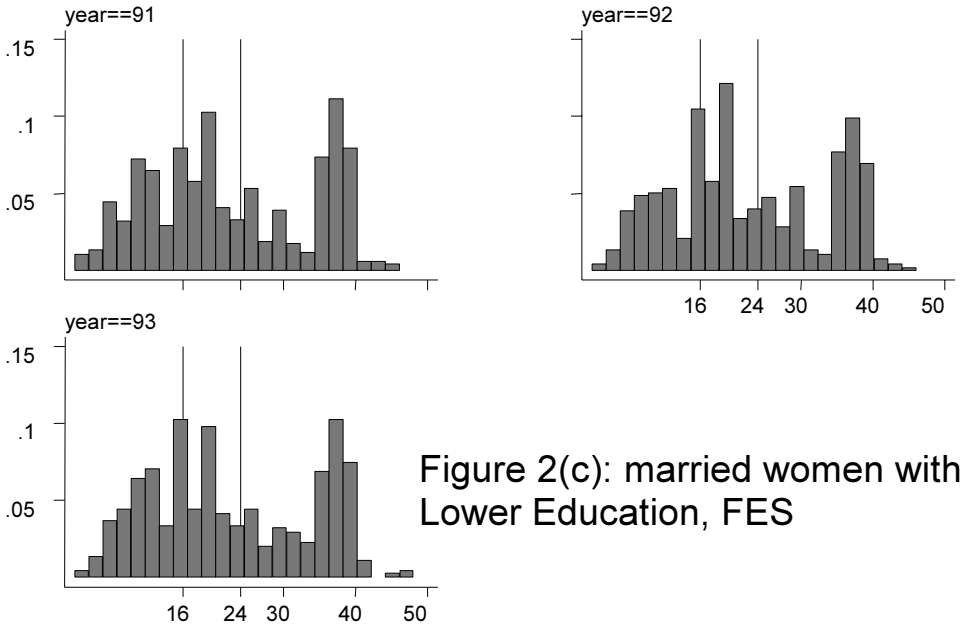


Figure 2(c): married women with kids Lower Education, FES

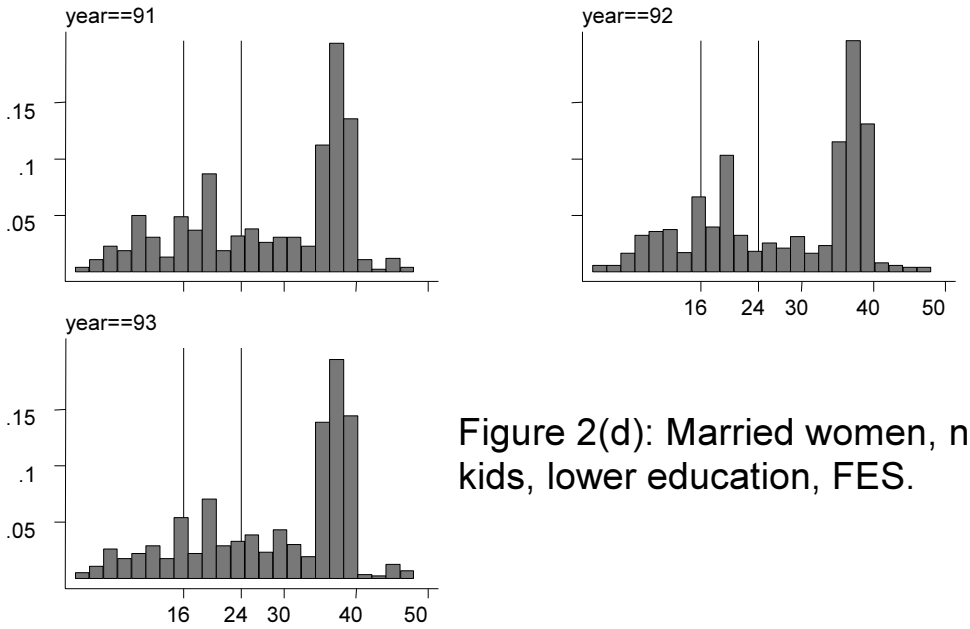


Figure 2(d): Married women, no kids, lower education, FES.

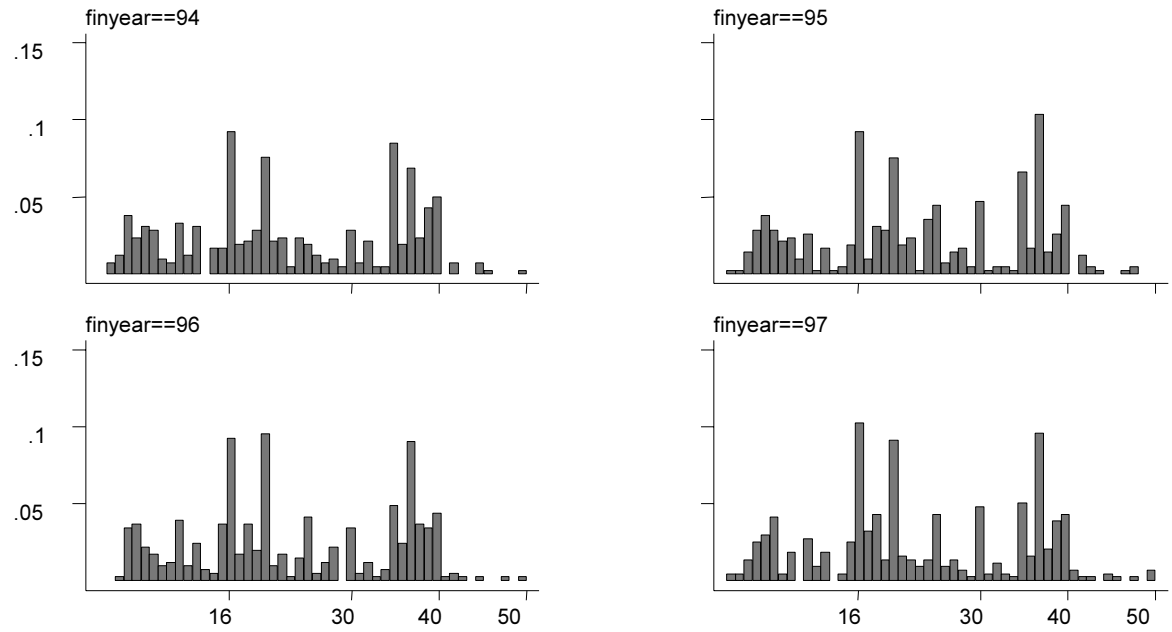


Figure 2(e): Single Parents, low ed., FRS

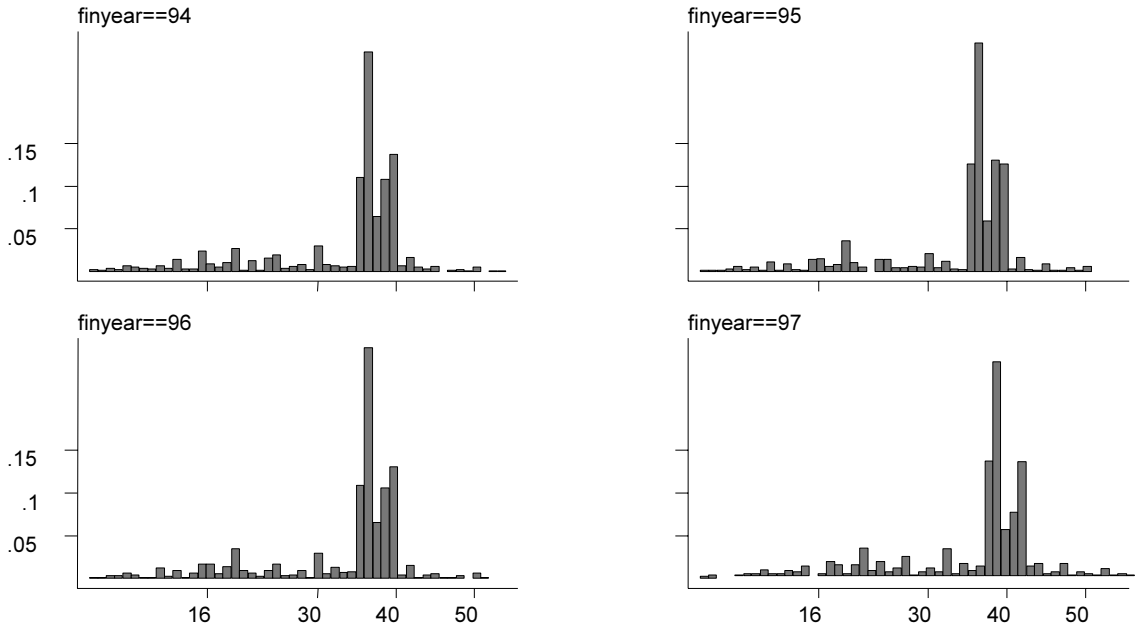


Figure 2(f): Single women, no kids, FRS

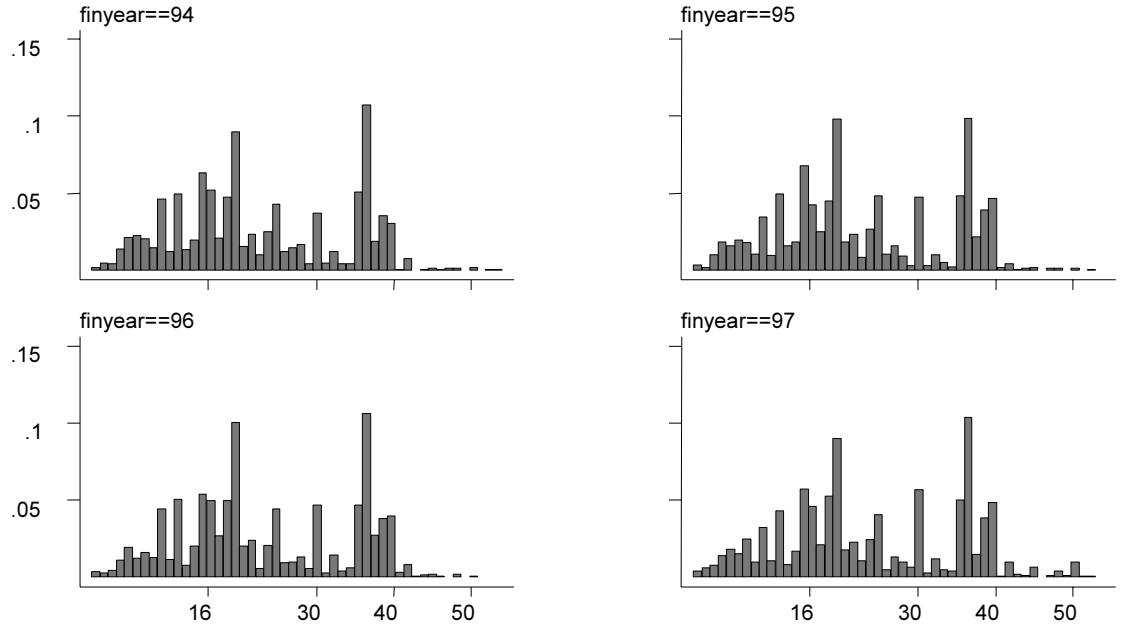


Fig 2(g): Married women with kids,FRS

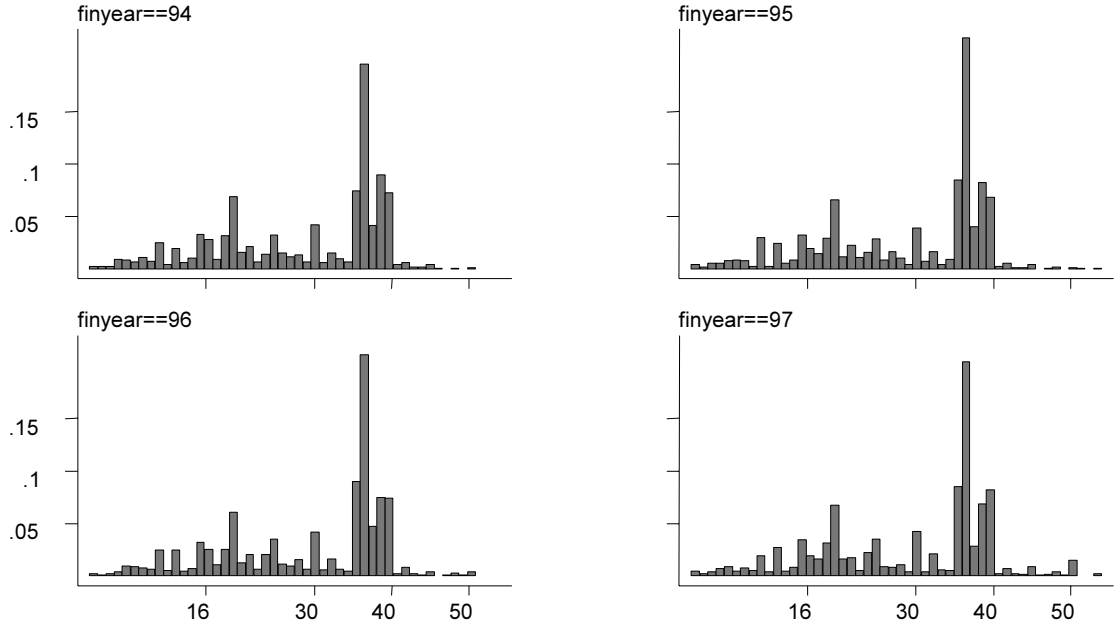
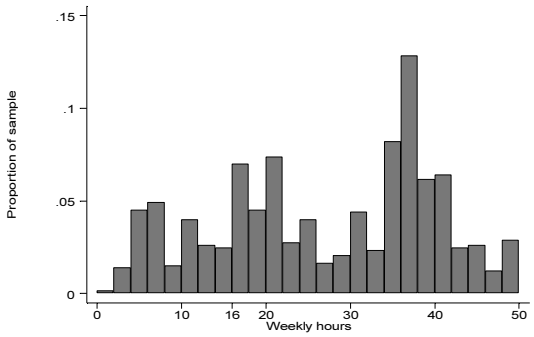
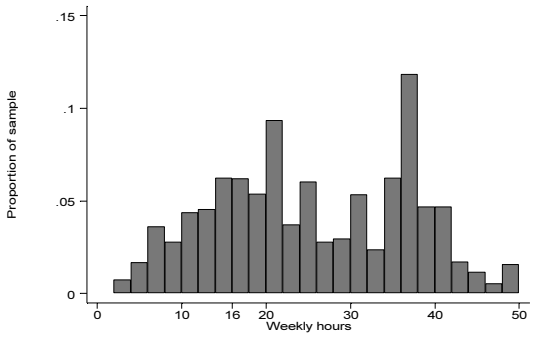


Fig 2(h): Married women, no kids, FRS

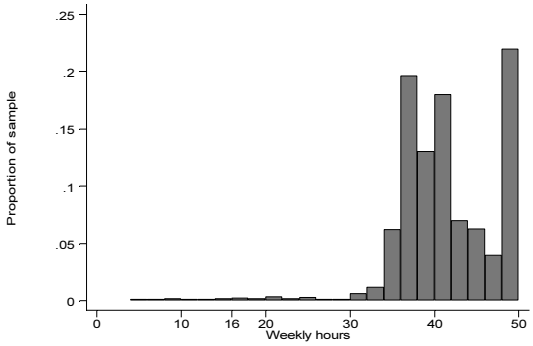
Lone mothers



Women in couples



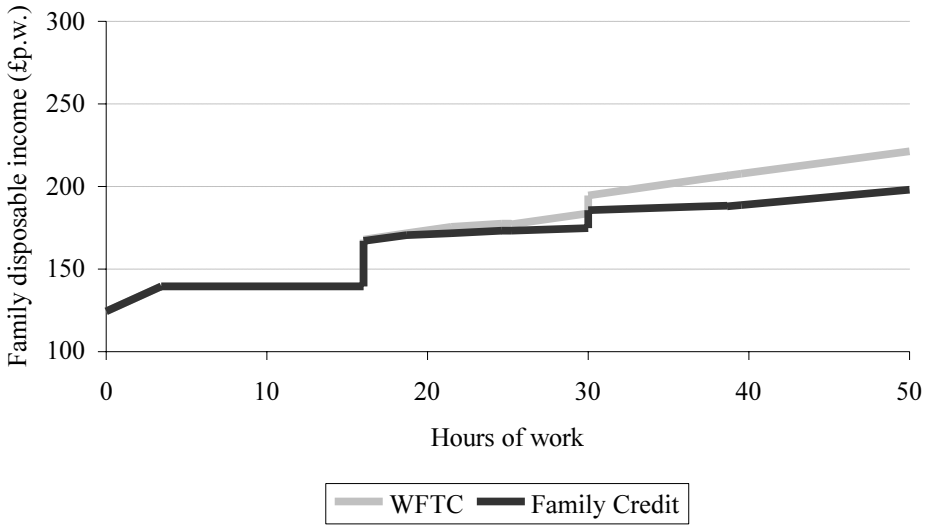
Men in couples



Source: Family Resources Survey 1996/1997

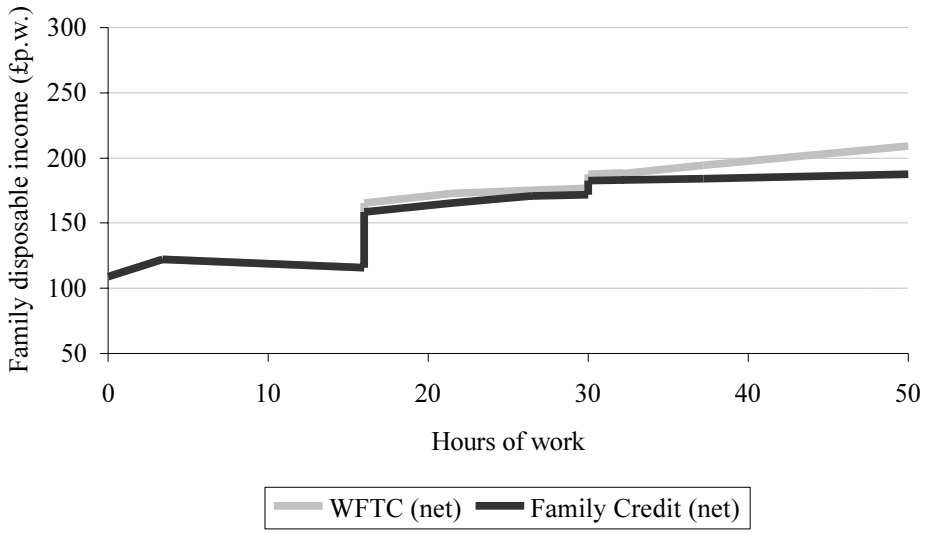
Figure 2(i) Overall weekly hours of work by family types

Figure 3 Budget constraint for example lone parent – no childcare



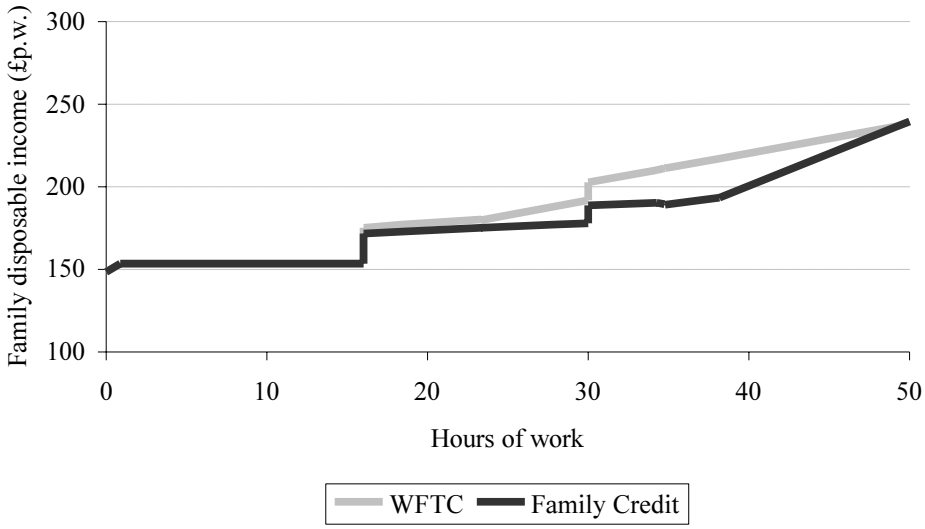
Notes: 1 child aged under 11
Hourly wage £4.39 (median for lone parents)
Rent £41.10p.w. (median for social renters with children)
No childcare costs

Figure 4 Budget constraint for example lone parent with childcare



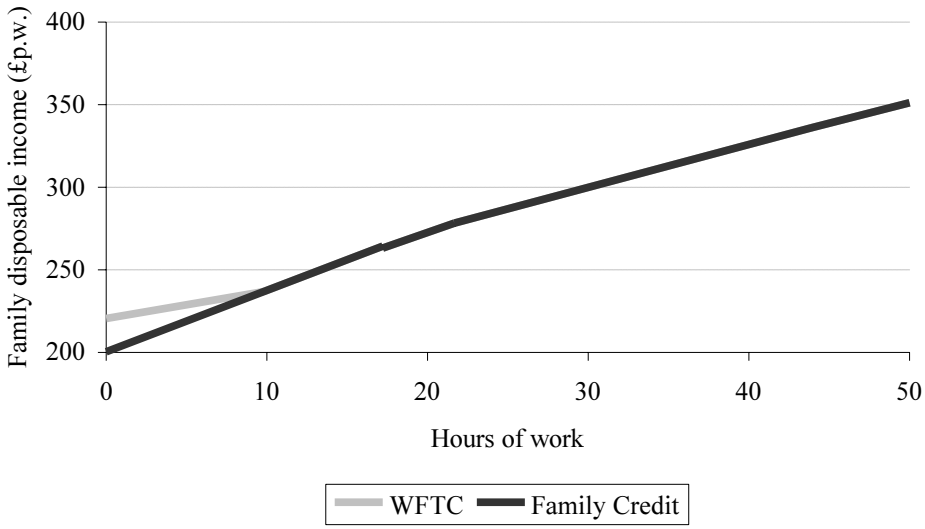
Notes: 1 child aged under 11
Hourly wage £4.39 (median for lone parents)
Rent £41.10p.w. (median for social renters with children)
Childcare at £1.96 per hour

Figure 5 Budget constraint for example man in couple without childcare



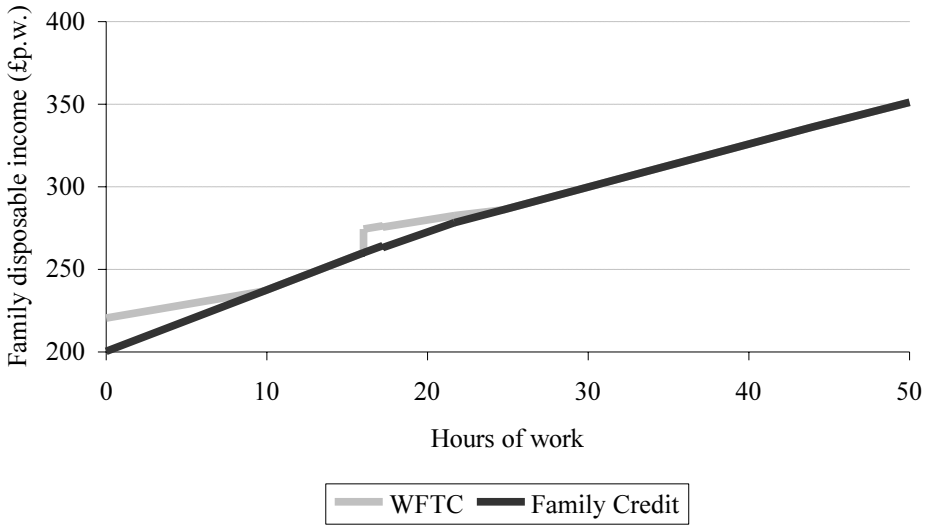
Notes: Spouse not working
1 child aged under 11
Hourly wage £5.87 (25th percentile for men in couples with children)
Rent £41.10p.w. (median for social renters with children)

Figure 6 Budget constraint for example woman in couple – no childcare



Notes: Spouse working 40 hours at £5.87 per hour
1 child aged under 11
Hourly wage £3.72 (25th percentile for women in couples with children)
Rent £41.10p.w. (median for social renters with children)
No childcare costs

Figure 7 Budget constraint for example woman in couple – with childcare



Notes: Spouse working 40 hours at £5.87 per hour
1 child aged under 11
Hourly wage £3.72 (25th percentile for women in couples with children)
Rent £41.10p.w. (median for social renters with children)
Childcare at £1.96 per hour

Table 1 Numbers of families with children

Group	*Number in population (thousands)*
Lone parents	
Total population	1,600
Modelled population	1,550
Couples – man works	
Total population	4,550
Modelled population	3,500
Couples – man not working	
Total population	850
Modelled population	820

Source: Family Resources Survey, 1994/5

Table 2 Type of childcare usage where youngest child under 5

Type of Care	*Couples*	*Lone parents*	*All*
no care reported	35.4%	9.3%	32.9%
relatives only	28.7%	44.0%	30.1%
relatives and friends combined	1.1%	4.4%	1.4%
friends only	3.0%	9.8%	3.6%
childminders only	11.2%	11.1%	11.2%
nursery care only	7.1%	6.7%	7.1%
childminders & informal combined	2.5%	3.4%	2.6%
nursery care & informal combined	4.3%	7.5%	4.6%
multiple formal care	3.4%	1.0%	3.1%
other forms of care	3.3%	2.6%	3.3%
Total	100.0%	100.0%	100.0%

Source: Family Resources Survey, 1994/5 and 1995/96

Table 3 Weekly childcare expenditure by hours of mother and type of care - couples

Type of Care	*Hours of Work (banded)*					
	1-10	*11-20*	*21-30*	*31-40*	*>40*	*Total*
relatives only	1.25	2.50	6.20	13.41	15.26	7.00
relatives and friends combined	15.00	5.17	9.39	25.82	.	13.06
friends only	5.91	14.78	14.50	32.91	23.33	17.43
childminders only	17.21	35.62	54.21	72.70	72.16	59.33
nursery care only	40.57	47.53	60.58	82.81	66.58	67.56
childminders & informal combined	15.33	29.05	41.41	53.85	55.00	41.36
nursery care & informal combined	12.81	27.96	30.80	48.09	46.87	34.10
multiple formal care	34.61	49.30	67.18	100.90	88.36	70.23
other forms of care	35.00	64.69	83.27	124.19	119.69	108.85
Total	3.09	10.74	22.63	41.11	33.82	22.51

Source: Family Resources Survey, 1994/5 and 1995/96

Table 4 Weekly childcare expenditure by hours of mother and type of care – lone parents

Type of Care	*Hours of Work (banded)*					
	1-10	*11-20*	*21-30*	*31-40*	*>40*	*Total*
relatives only	0.82	2.34	5.27	15.94	9.00	5.75
relatives and friends combined	3.33	6.33	18.00	50.00	.	16.94
friends only	6.09	7.86	15.42	30.45	0.00	14.46
childminders only	.	36.87	42.33	65.13	110.23	61.66
nursery care only	15.75	9.67	48.03	64.53	66.50	48.39
childminders & informal combined	.	34.13	13.67	55.60	48.00	40.38
nursery care & informal combined	8.67	8.57	18.45	60.52	0.00	30.37
multiple formal care	.	48.00	.	69.92	.	64.44
other forms of care	0.00	42.50	71.00	57.50	138.00	60.85
Total	1.88	8.18	17.11	37.70	35.55	19.65

Source: Family Resources Survey, 1994/5 and 1995/96
Note: Some cell sizes are too small for reliable figures to be produced

Table 5: Proportion of Gainers from WFTC

	Hours of Work (banded)					
	0	*1-10*	*11-20*	*21-30*	*31-40*	*41+*
Lone parents						
No pre-school children	.	.	62.1%	74.0%	52.2%	51.1%
One or more pre-school children	.	.	75.0%	87.9%	61.5%	61.5%
All women	.	.	65.2%	78.2%	53.8%	53.4%
Married, partner working						
No pre-school children	30.6%	19.0%	10.2%	4.9%	3.6%	3.1%
One or more pre-school children	35.9%	12.7%	11.7%	5.3%	4.4%	4.1%
All women	33.9%	16.2%	10.9%	5.0%	3.9%	3.4%
Married, partner not working						
No pre-school children	.	.	38.6%	53.3%	36.7%	66.7%
One or more pre-school children	.	.	73.1%	80.0%	45.0%	33.3%
All women	.	.	51.4%	60.0%	39.1%	61.9%

Source: TAXBEN, based on 1995-6 Family Resources Survey
Notes: Data are grouped according to observed hours of work for all household members and conditioned on observed childcare expenditure patterns.

Table 6: Average Income Gains from WFTC among Gainers

	Hours of Work (banded)					
	0	*1-10*	*11-20*	*21-30*	*31-40*	*41+*
Lone parents						
No pre-school children	.	.	£8.70	£14.17	£18.91	£21.74
One or more pre-school children	.	.	£12.67	£19.59	£26.70	£20.67
All women	.	.	£9.82	£16.00	£20.48	£21.47
Married, partner working						
No pre-school children	£19.12	£19.32	£17.95	£17.57	£19.86	£19.72
One or more pre-school children	£23.87	£17.57	£21.82	£19.99	£20.60	£18.30
All women	£22.27	£18.73	£19.72	£18.44	£20.13	£19.24
Married, partner not working						
No pre-school children	.	.	£12.42	£16.45	£20.57	£24.33
One or more pre-school children	.	.	£10.99	£16.77	£18.36	£39.65
All women	.	.	£11.66	£16.56	£19.83	£25.51

Source: TAXBEN, based on 1995-6 Family Resources Survey
Notes: As for Table 5. Each cell reports average gains (in pounds per week) *among households who gain from WFTC*. To recover average gains over all women, multiply each figure by the probability in the corresponding cell of Table 5.

Table 7. Single parents, 100% take-up of WFTC childcare credit

Transitions

pre-reform	*post-reform* out of work	part-time	Full-time	Pre-reform %
Out of work	58.0	0.7	1.5	60.2
Part-time	0.0	18.6	0.5	19.1
Full-time	0.0	0.2	20.6	20.7
Post-reform %	58.0	19.4	22.6	100
Change (%)	-2.2	0.3	1.9	

Summary

	mean	*Std.dev*
change in participation	+2.20%	[0.42%]
average change in hours (all)	+0.75	[0.16]
average change in hours (workers only)	+0.22	[0.04]
average hours before reform (all)	10.20	
average hours before reform (workers)	25.70	

Notes: Transitions tables built by drawing 100 times from the distribution of unobserved heterogeneity and allocating each observation to the cell which yields maximum utility for each draw. Standard deviations for each transitions cell and summary measure are simulated by drawing 100 times from the estimated asymptotic distribution of the parameter estimates, and for each *of those 100 parameter draws, applying the method described above to build transitions matrices.

Table 8. Married women with employed partners, 100% take-up of WFTC childcare credit

Transitions

pre-reform	*post-reform* out of work	part-time	Full-time	pre-reform %
Out of work	32.2	0.1	0.1	32.4
Part-time	0.3	31.6	0.0	32.0
Full-time	0.4	0.1	35.0	35.6
Post-reform %	33.0	31.8	35.2	100
Change (%)	0.6	-0.1	-0.4	

Summary

	mean	*std.dev*
change in participation	-0.57%	[0.06%]
average change in hours (all)	-0.18	[0.02]
average change in hours (workers only)	-0.03	[0.005]
average hours before reform (all)	17.34	
average hours before reform (workers)	25.65	

Notes: As for Table 7.

Table 9. Married women with partners out of work, 100% take-up of WFTC childcare credit

Transitions

pre-reform	*post-reform* out of work	part-time	Full-time	pre-reform %
Out of work	56.8	0.4	0.9	58.1
Part-time	0.0	22.2	0.4	22.6
Full-time	0.0	0.1	19.2	19.3
Post-reform %	56.8	22.8	20.5	100
Change (%)	-1.3	0.2	1.1	

Summary

	mean	*std.dev*
change in participation	+1.32%	[0.16%]
average change in hours (all)	+0.46	[0.067]
average change in hours (workers only)	+0.14	[0.017]
average hours before reform (all)	10.04	
average hours before reform (workers)	23.96	

Notes: As above.

Table 10. Simulated Responses to WFTC: alternative scenarios

	Simulated responses to WFTC (per cent)				*Summary Measures*		
	Non-work to work	*work to non-work*	*part-time to full-time*	*full-time to part-time*	*Δ partic. (per cent)*	*Δ in hours (all)*	*Δ in hours (w)*
Single parents							
- full take-up ***(1)***	2.2	0.0	0.5	0.2	+2.20	+0.75	+0.22
- zero take-up ***(2)***	1.4	0.0	0.4	0.2	+1.34	+0.47	+0.15
- 50% (random) take-up ***(3)***	1.8	0.0	0.5	0.2	+1.75	+0.60	+0.19
- increased childcare price ***(4)***	1.9	0.0	0.5	0.2	+1.76	+0.64	+0.20
Women, partner employed							
- full take-up	0.2	0.7	0.0	0.1	-0.57	-0.18	-0.03
- zero take-up	0.2	0.9	0.0	0.1	-0.81	-0.25	-0.04
- 50% (random) take-up	0.2	0.9	0.0	0.1	-0.73	-0.23	-0.04
- increased childcare price	0.2	1.9	0.0	0.4	-1.79	-0.59	-0.15
Women, partner unemployed							
- full take-up	1.3	0.0	0.4	0.1	+1.32	+0.46	+0.14
- zero take-up	1.3	0.0	0.3	0.1	+1.24	+0.43	+0.12
- 50% (random) take-up	1.3	0.0	0.3	0.1	+1.26	+0.43	+0.13
- increased childcare price	1.0	1.3	0.3	0.3	-0.30	+0.02	+0.04

Notes: The "benchmark" state **(1)** involves full take-up of WFTC including the childcare credit (as presented in the main text in Tables 7 to 9). Alternative scenarios to this benchmark include; **(2)** zero take-up of the childcare credit component of WFTC; **(3)** a fifty per cent (randomly assigned) chance of take-up of the childcare credit component of WFTC; and **(4)** a simulated increase in the price of childcare (of around 50% on average), implemented by a progressive shift in the distribution of childcare prices.

Appendix A: Hours and Participation:

FES Financial Years 1989 – 1995

Table A1 (a) Participation: single women

(i) Lower Education

year	0-2	3-4	5-10	11+	no kids	
88	0.10	0.27	0.39	0.47	0.25	0.26
89	0.23	0.36	0.41	0.62	0.25	0.28
90	0.18	0.18	0.37	0.64	0.24	0.26
91	0.17	0.26	0.39	0.57	0.22	0.24
92	0.09	0.30	0.45	0.60	0.23	0.26
93	0.15	0.31	0.44	0.49	0.23	0.26
94	0.09	0.28	0.47	0.58	0.24	0.26
95	0.09	0.24	0.37	0.47	0.24	0.26

(ii) Higher Education

88	0.33	0.00	0.83	0.75	0.60	0.60
89	0.18	0.38	0.57	0.78	0.54	0.53
90	0.44	0.58	0.54	0.67	0.51	0.52
91	0.31	0.40	0.61	0.67	0.56	0.55
92	0.19	0.42	0.67	0.55	0.54	0.53
93	0.32	0.21	0.55	0.62	0.58	0.56
94	0.13	0.57	0.53	0.78	0.56	0.55
95	0.20	0.38	0.67	0.71	0.55	0.55

Table A1 (b) Hours: single women

(i) Lower Education

year	0-2	3-4	5-10	11+	no kids	
88	32.00	24.50	28.11	27.29	32.11	31.19
89	26.48	28.33	24.06	26.02	34.47	32.34
90	23.44	24.88	21.74	28.26	33.01	31.12
91	24.71	20.00	25.26	29.06	32.97	31.21
92	22.00	17.06	19.51	24.26	33.64	29.93
93	15.90	18.38	19.17	26.31	34.49	27.59
94	23.75	23.18	18.92	25.54	31.20	28.75
95	25.29	13.45	22.43	25.88	32.84	30.23

(ii) Higher Education

88	10.00	.	35.00	35.00	35.71	34.92
89	31.00	21.40	22.85	36.93	37.94	36.75
90	24.75	30.14	21.70	32.10	38.16	35.70
91	22.60	22.25	34.29	29.50	38.63	37.07
92	34.50	16.80	29.25	31.31	36.59	35.32
93	35.14	29.50	22.90	35.85	37.57	36.40
94	19.67	17.12	27.54	30.52	36.84	34.78
95	19.50	37.00	27.68	27.27	37.28	34.78

Table A2 (a) Participation: married women partner employed

(i) Lower Education

year	0-2	3-4	5-10	11+	no kids	
88	0.35	0.69	0.63	0.78	0.71	0.65
89	0.36	0.52	0.72	0.78	0.74	0.67
90	0.38	0.64	0.72	0.83	0.72	0.68
91	0.40	0.57	0.69	0.81	0.74	0.69
92	0.43	0.46	0.70	0.83	0.70	0.67
93	0.39	0.67	0.75	0.80	0.70	0.68
94	0.48	0.62	0.75	0.78	0.74	0.71
95	0.57	0.63	0.69	0.78	0.72	0.70

(ii) Higher Education

88	24.79	27.43	26.13	27.56	33.84	30.47
89	24.60	20.25	23.38	28.09	34.13	29.37
90	27.08	20.29	24.79	27.60	35.66	31.11
91	23.38	21.76	25.49	28.04	36.44	30.79
92	24.34	20.82	22.03	27.37	36.00	30.16
93	26.35	22.27	26.07	28.31	36.00	31.14
94	26.68	21.56	23.12	28.51	34.86	30.11
95	27.31	25.47	26.19	27.35	34.99	30.82

Table A2 (b) Hours: married women partner employed

(i) Lower Education

year	0-2	3-4	5-10	11+	no kids	
88	23.45	18.52	24.45	24.80	32.73	28.66
89	21.68	21.03	22.90	27.13	31.76	28.48
90	22.42	21.97	21.62	26.36	31.63	28.16
91	22.71	20.62	22.51	26.50	31.44	28.28
92	22.87	21.17	22.47	27.11	31.97	28.61
93	24.63	22.91	20.62	26.41	32.60	28.66
94	23.37	21.61	21.37	28.03	32.19	28.49
95	25.57	24.98	24.16	28.30	32.46	29.40

(ii) Higher Education

88	24.79	27.43	26.13	27.56	33.84	30.47
89	24.60	20.25	23.38	28.09	34.13	29.37
90	27.08	20.29	24.79	27.60	35.66	31.11
91	23.38	21.76	25.49	28.04	36.44	30.79
92	24.34	20.82	22.03	27.37	36.00	30.16
93	26.35	22.27	26.07	28.31	36.00	31.14
94	26.68	21.56	23.12	28.51	34.86	30.11
95	27.31	25.47	26.19	27.35	34.99	30.82

Table 3 (a) Participation: married women partner unemployed

(i) Lower Education

year	0-2	3-4	5-10	11+	no kids	
88	0.26	0.46	0.61	0.29	0.28	0.30
89	0.26	0.34	0.47	0.59	0.26	0.29
90	0.29	0.22	0.51	0.49	0.30	0.33
91	0.25	0.33	0.41	0.50	0.28	0.30
92	0.26	0.38	0.47	0.48	0.26	0.30
93	0.22	0.28	0.43	0.53	0.25	0.28
94	0.37	0.41	0.46	0.57	0.28	0.32
95	0.31	0.21	0.49	0.41	0.27	0.29

(ii) Higher Education

88	0.42	0.40	0.60	0.83	0.30	0.38
89	0.41	0.38	0.54	0.64	0.29	0.36
90	0.27	0.36	0.40	0.38	0.32	0.33
91	0.38	0.62	0.48	0.63	0.32	0.38
92	0.33	0.50	0.63	0.49	0.30	0.37
93	0.31	0.47	0.63	0.35	0.27	0.33
94	0.47	0.45	0.58	0.39	0.36	0.40
95	0.22	0.43	0.53	0.63	0.29	0.35

Table A3 (b) Hours: married women partner unemployed

(i) Lower Education

year	0-2	3-4	5-10	11+	no kids	
88	19.11	20.33	21.53	21.20	31.80	28.54
89	20.89	16.83	19.82	27.42	29.77	27.35
90	23.17	21.57	23.09	26.64	30.04	28.27
91	24.07	23.82	22.18	25.80	28.78	27.44
92	22.86	28.05	23.23	24.59	28.49	26.99
93	16.37	20.88	21.21	27.48	29.61	27.41
94	28.56	23.75	20.38	23.97	29.12	27.46
95	27.06	27.91	24.37	26.33	29.60	28.50

(ii) Higher Education

88	19.40	10.50	31.33	37.60	26.00	26.32
89	19.33	19.00	18.50	29.72	33.02	28.08
90	19.00	26.40	23.10	24.62	31.95	28.50
91	18.69	20.30	21.25	20.76	31.64	26.67
92	24.33	18.88	28.81	27.35	32.83	29.64
93	23.12	27.00	22.47	33.67	31.59	29.11
94	29.82	14.78	28.61	30.31	31.83	29.98
95	19.09	21.50	26.09	29.77	32.37	29.09

Appendix B: Childcare Costs and Hours of Work

FRS Data

Table B1. Hourly childcare costs among women in paid employment

		Percentage in Price Range:				
Lower bound		*£0.00*	*£1.25*	*£1.75*	*£2.25*	*£3.25+*
upper bound	*no cost*	*£1.25*	*£1.75*	*£2.25*	*£3.25*	
Married Women						
one child, youngest <3	37.00	11.91	18.18	19.46	8.71	4.74
one child, youngest 3+	45.45	12.17	14.96	12.02	9.68	5.72
two children, youngest <3	37.83	19.14	16.54	15.93	7.81	2.76
two children, youngest 3+	49.22	15.37	12.46	11.11	7.37	4.47
three+ children, youngest <3	43.98	25.90	11.45	7.83	5.42	5.42
three+ children, youngest 3+	54.46	15.69	11.38	7.69	7.38	3.38
Single Parents						
one child, youngest <3	46.15	21.98	15.38	6.59	6.59	3.30
one child, youngest 3+	53.22	15.79	13.16	9.94	4.68	3.22
two children, youngest <3	52.73	27.27	10.91	1.82	7.27	0.00
two children, youngest 3+	60.20	16.84	11.73	6.63	3.06	1.53
three+ children, youngest <3	48.28	24.14	17.24	6.90	0.00	3.45
three+ children, youngest 3+	57.14	28.57	1.30	5.19	1.30	6.49
Total	45.85	15.92	14.27	12.45	7.39	4.13
Average price within range	.	£0.79	£1.48	£1.96	£2.62	£5.20

Table B2. Relationship between hours of work and hours of childcare (per child)

Dependent Variable: hours of childcare per child
Regressor: hours of work by mother

	Constant	*(t-value)*	*Slope*	*(t-value)*
Married Women				
one child, youngest <3	1.589	1.569	0.885	26.746
one child, youngest 3+	4.335	3.026	0.384	8.839
two children, youngest <3	2.321	2.431	0.674	20.167
two children, youngest 3+	2.196	3.414	0.222	10.504
three+ children, youngest <3	0.094	0.061	0.503	9.216
three+ children, youngest 3+	3.103	3.821	0.139	5.158
Single Parents				
one child, youngest <3	1.264	0.605	0.984	13.763
one child, youngest 3+	7.825	5.234	0.264	5.671
two children, youngest <3	2.210	1.052	0.702	9.362
two children, youngest 3+	6.900	5.651	0.141	3.632
three+ children, youngest <3	5.228	1.720	0.350	3.310
three+ children, youngest 3+	2.813	1.352	0.242	3.143

Appendix C: Parameter Estimates

Table C1. Single Parents estimates

	No controls for childcare		*with controls for childcare*	
Variable	**Estimate**	**Std.Err**	**Estimate**	**Std.Err**
Income^2	-0.1631	0.0503 *	-0.165	0.0536 *
hours^2	0.0334	0.0191	0.0212	0.0195
hours x income	-0.0099	0.0041 *	-0.0087	0.0043 *
Income	2.4705	0.2967 *	2.5995	0.3125 *
x **1**(youngest child 0-2)	-0.2896	0.2928	-0.3747	0.3085
x **1**(youngest child 3-4)	0.1829	0.3119	0.0519	0.3241
x **1**(youngest child 5-10)	0.4032	0.1738 *	0.3473	0.1846
x (age-35)/10	-0.1474	0.1065	-0.1725	0.1157
x (age-35)^2/100	0.0047	0.079	-0.0249	0.0872
x **1**(education<18)	-0.0151	0.1361	0.0155	0.1444
x # children aged 0-1	0.3859	0.3085	0.4325	0.3406
hours	0.008	0.0124	0.0048	0.0127
x **1**(youngest child 0-2)	-0.0554	0.0091 *	-0.0456	0.0089 *
x **1**(youngest child 3-4)	-0.0622	0.0088 *	-0.0584	0.0089 *
x **1**(youngest child 5-10)	-0.0313	0.0054 *	-0.0274	0.0056 *
x (age-35)/10	-0.0036	0.0032	-0.0069	0.0034 *
x (age-35)^2/100	-0.0077	0.0027 *	-0.0087	0.003 *
x **1**(education<18)	-0.0154	0.0046 *	-0.0152	0.0047 *
x # children aged 0-1	-0.0193	0.0093 *	-0.0183	0.0091 *
fixed costs/100	0.6717	0.0752 *	0.6459	0.0714 *
x **1**(Metropolitan area)	-0.0286	0.0506	-0.0324	0.049
x # children aged 0-2	0.2365	0.1368	0.2197	0.1242
x # children aged 3-4	0.0776	0.0973	0.0861	0.0939
x **1**(Greater London)	0.0109	0.0805	0.0064	0.0774
sample size	1807		1807	
log-likelihood	-3358.65		-3740.4	

Notes: All estimates are by Simulated Maximum Likelihood. The discrete choice model covers five labour market states (hours of work=0,10,20,30,40). The parameters associated with fixed costs have all been scaled down by a factor of 100. For those estimates which control for childcare expenditures, we approximate the distribution of hourly childcare prices by the five-point distribution reported in Table B1. Childcare expenditures are imputed at each (discrete) hours point {0,10,20,30,40} according to the product of each hourly childcare price and the imputed level of non-parental childcare hours at each hours level (generated by simple regression relationships according to Table B2).

Table C2. Married couples estimates

	No controls for childcare		*with controls for childcare*	
Variable	**Estimate**	**Std.Err**	**Estimate**	**Std.Err**
income^2	-0.1506	0.0053 *	-0.1431	0.0063 *
female hours^2	-0.0047	0.01	-0.01	0.0101
male hours x income	-0.0014	0.0012	-0.0011	0.0013
female hours x income	0.0016	0.0006 *	0.0015	0.0006 *
male hours x female hours	-0.0474	0.0078 *	-0.0566	0.0079 *
income	2.652	0.0822 *	2.5501	0.0964 *
x **1**(youngest child 0-2)	-0.4096	0.055 *	-0.283	0.0682 *
x **1**(youngest child 3-4)	0.0211	0.0824	-0.0889	0.0859
x **1**(youngest child 5-10)	0.1206	0.0422 *	0.2059	0.0508 *
x (male age-35)/10	-0.4621	0.0338 *	-0.3531	0.0354 *
x (female age-35)/10	0.3502	0.0438 *	0.2031	0.0463 *
x **1**(male education<18)	0.2122	0.0333 *	0.2137	0.0517 *
x **1**(female education<18)	0.0418	0.0332	0.0721	0.0468
male hours	0.0048	0.0057	0.0084	0.0061
x **1**(youngest child 0-2)	0.0088	0.0042 *	0.0006	0.0045
x **1**(youngest child 3-4)	0.0019	0.0048	-0.0002	0.0048
x **1**(youngest child 5-10)	-0.0046	0.0036	-0.0089	0.0037 *
x (age-35)/10	0.0073	0.002 *	0.0062	0.002 *
x (age-35)^2/100	-0.006	0.0012 *	-0.007	0.0011 *
x **1**(education<18)	-0.013	0.003 *	-0.0119	0.0033 *
x # children aged 0-1	-0.0002	0.0039	0.0005	0.0039
female hours	0.0169	0.0057 *	0.024	0.006 *
x **1**(youngest child 0-2)	-0.052	0.0034 *	-0.0486	0.0036 *
x **1**(youngest child 3-4)	-0.0645	0.0045 *	-0.0596	0.0044 *
x **1**(youngest child 5-10)	-0.0389	0.002 *	-0.0455	0.0022 *
x (age-35)/10	-0.0105	0.0021 *	-0.0122	0.0021 *
x (age-35)^2/100	-0.0046	0.0013 *	-0.0051	0.0014 *
x **1**(education<18)	-0.0145	0.0019 *	-0.0122	0.0024 *
x # children aged 0-1	-0.0206	0.0035 *	-0.0179	0.004 *
fixed costs/100	0.374	0.0273 *	0.3609	0.0267 *
x **1**(Metropolitan area)	-0.0097	0.0248	0.0003	0.0252
x # children aged 0-2	0.2316	0.0323 *	0.1585	0.0313 *
x # children aged 3-4	0.079	0.0253 *	0.1278	0.0313 *
x **1**(Greater London)	0.0885	0.0506	0.0746	0.048
sample size	4694		4694	
log-likelihood	-16186.3		-12665	

Table C2 (cont.) Married / de facto couples

	zero childcare expenditure for non-working heads			*Fixing labour supply of head*		
Variable	**Estimate**	**Std.Err**		**Estimate**	**Std.Err**	
income^2	-0.141	0.0062	*	-0.1445	0.007	*
female hours^2	-0.0086	0.01		-0.008	0.0101	
male hours x income	-0.0026	0.0012	*	.	.	
female hours x income	0.0014	0.0006	*	-0.0016	0.0008	*
male hours x female hours	-0.0506	0.0077	*	.	.	
Income	2.5722	0.0977	*	2.6629	0.1232	*
x **1**(youngest child 0-2)	-0.2768	0.068	*	-0.4277	-0.0418	*
x **1**(youngest child 3-4)	-0.0887	0.0859		-0.2888	0.0592	*
x **1**(youngest child 5-10)	0.2204	0.051	*	0.0604	0.049	
x (male age-35)/10	-0.3605	0.0352	*	.	.	
x (female age-35)/10	0.2146	0.046	*	-0.4001	0.0585	*
x **1**(male education<18)	0.2057	0.0513	*	.	.	
x **1**(female education<18)	0.0653	0.0465		0.0399	0.0354	
male hours	0.0119	0.006	*	.	.	
x **1**(youngest child 0-2)	0.0007	0.0045		.	.	
x **1**(youngest child 3-4)	-0.0002	0.0049		.	.	
x **1**(youngest child 5-10)	-0.0094	0.0038	*	.	.	
x (age-35)/10	0.0067	0.002	*	.	.	
x (age-35)^2/100	-0.007	0.0011	*	.	.	
x **1**(education<18)	-0.0129	0.0033	*	.	.	
x # children aged 0-1	0.0007	0.0039		.	.	
female hours	0.0224	0.006	*	-0.0014	0.007	
x **1**(youngest child 0-2)	-0.0497	0.0036	*	-0.0321	0.0047	*
x **1**(youngest child 3-4)	-0.0591	0.0044	*	-0.0403	0.0049	*
x **1**(youngest child 5-10)	-0.0457	0.0023	*	-0.0288	0.0038	*
x (age-35)/10	-0.0112	0.0021	*	-0.0026	0.0025	
x (age-35)^2/100	-0.0059	0.0014	*	0.002	0.0019	
x **1**(education<18)	-0.0125	0.0024	*	-0.0174	0.0032	*
x # children aged 0-1	-0.0188	0.0039	*	-0.0143	0.0045	*
fixed costs/100	0.3639	0.027	*	0.3525	0.031	*
x **1**(Metropolitan area)	0.0021	0.0253		0.0168	0.0301	
x # children aged 0-2	0.157	0.0313	*	0.0938	0.0307	*
x # children aged 3-4	0.1347	0.0319	*	0.0378	0.0335	
x **1**(Greater London)	0.0731	0.0483		0.1022	0.065	
sample size	4694			4694		
log-likelihood	-12660.5			-10938.6		