The Labour Market Impact of the Working Families' Tax Credit

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Abstract

In October 1999, the working families' tax credit (WFTC) replaced family credit as the main package of in-work support for families with children. Among a range of stated aims, the WFTC is intended to '… improve work incentives, encouraging people without work to move into employment'. In this paper, we consider the impact of WFTC on hours and participation. To simulate labour supply responses, we use a discrete behavioural model of household labour supply with controls for fixed and childcare costs, and unobserved heterogeneity. In simulation, we experiment with a number of scenarios regarding the take-up of the credit, entry wage level and hourly childcare price. We find participation rates among single mothers to increase by around 2.2 percentage points for the base-case scenario, while for married women participation rates are modelled to fall. Our simulation results indicate a small increase in overall participation of around 30,000 individuals.

I. INTRODUCTION

In the March 1998 Budget, the UK Chancellor, Gordon Brown, announced the introduction of the working families' tax credit (WFTC) as a replacement for

family credit (FC), the UK's main in-work benefit. The structure of WFTC was modelled closely on the FC system, with the exception that WFTC was to be packaged as a refundable tax credit rather than as a welfare benefit. Among a range of stated aims, the government claims that WFTC 'will improve work incentives, encouraging people without work to move into employment …' (HM Treasury Press Release, 17 March 1998). 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 withdrawal rate of WFTC to 55 per cent, down from the 70 per cent taper found in FC. Additionally, WFTC contains generous provision to subsidise childcare costs.

The aim of this paper is to consider the effects on the labour market of the WFTC reform. In particular, we aim to study the impact of WFTC on hours of work and participation. There are effectively two target groups for WFTC: single parents and married couples with children. Nearly 50 per cent of currently working single parents are in receipt of some FC. For married couples with children, this proportion is smaller, at around 16 per cent. However, the latter group is more than two-and-a-half times the size of the former. The behaviour of these groups, and their economic circumstances, are sufficiently different to warrant separate analysis.

To perform a reasonable evaluation, three things are required. First, a sample with a sufficiently large number from each of these two target groups is needed. For this, we use the Family Resources Survey (FRS), which covers almost 50,000 individuals per year. Second, we require sufficient information for 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 utilise an econometric model of the work behaviour of lone parents and of couples developed by Blundell, Duncan, McCrae and Meghir (1999).

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. First, we construct the budget constraint facing each individual, which accounts for different levels of tax allowances and marginal tax rates as well as the detailed interactions of the benefit and WFTC systems. Second, we account for childcare costs and availability in the simulation of the WFTC reform. This posed a particularly difficult challenge. Our approach, detailed further in the text and in the appendix, calculates entitlements to the childcare credit element of WFTC at different hours levels on the basis of observed patterns of childcare use and cost. We do not allow the childcare market to adapt to the introduction of WFTC. However, we do allow usage to vary with hours worked and with the demographic composition of the household. We nevertheless recognise that the

move to WFTC may affect the childcare market in a manner that could have implications for the costs of the new programme. To give some feel for these effects, we experiment with a number of alternative assumptions concerning the take-up of the childcare credit and the use of childcare.

Putting all these aspects together, we present what we believe to be a reasonably accurate analysis of the likely labour market impact of the WFTC reform. Of course, there are many other labour market reforms currently taking place, some of which will have a direct impact on these target individuals. These include the changes to National Insurance contributions, the minimum wage legislation and the working hours directive. To obtain a full picture, these should be accounted for. However, given the relatively large impact of the WFTC reform on the budget constraints of the target groups, we believe that this is the dominant reform and that our results will not be altered greatly by the spillover effects from other reforms.

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. An analysis of the characteristics of the WFTC target groups is followed in Section IV by a detailed analysis of the potential incentive effects of WFTC, both for lone parents and for married couples with children. We then describe the data and report the results of our simulations of the impact of the WFTC reform for a range of household types. Finally, Section VII concludes.

II. THE STRUCTURE OF FAMILY CREDIT AND THE WFTC REFORM

Family credit is the main UK in-work benefit. It is designed to provide support for low-wage families with children that are working. A family with children needs to have one adult working 16 hours or more per week to qualify for FC. Each family is potentially eligible to a maximum amount, which increases with the number of children in the household and a small addition if they work full-time. This maximum amount is payable if the family's net income (after income tax and National Insurance contributions) is lower than a threshold (£79 per week in 1998–99). Net income in excess of this threshold reduces entitlement to FC from the maximum by 70p for every £1 of excess income. The basic structure of FC is shown in Figure 1.

Family credit is payable on a six-monthly flat rate, regardless of changes in the claimant's circumstances, in order to minimise administrative and compliance costs and to hide the effects of the high withdrawal rate over the period of the fixed payment. It is paid to mothers even when the eligibility is in respect of the father's earnings. The average payment at the end of 1996 was £57 per week. Take-up of FC after its introduction in 1988 was initially low but it has since increased. The present estimated take-up rates are that 69 per cent of eligible individuals take up 82 per cent of the potential expenditure.

FIGURE 1

Increased Generosity of In-Work Support
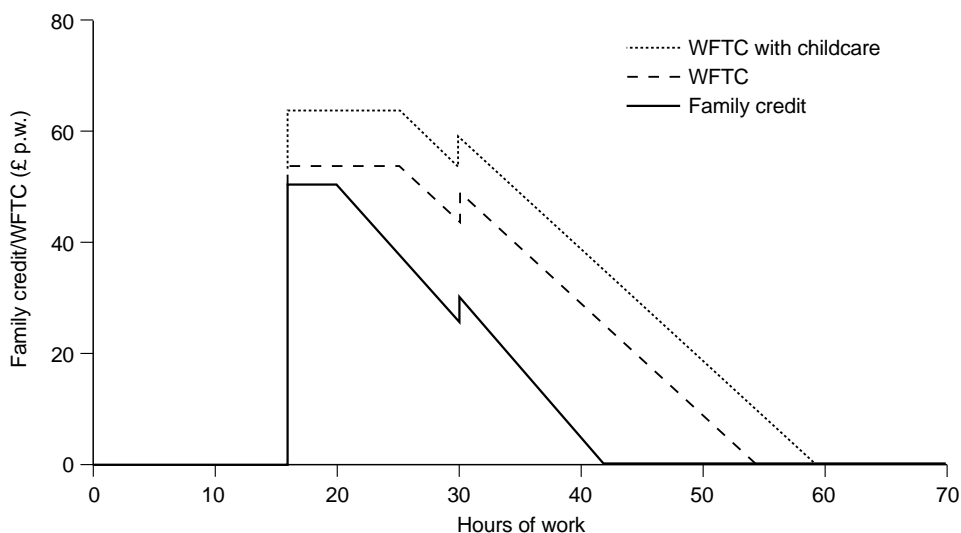
The working families' tax credit will be substantially more generous than FC. By the end of the century, the government expects to be spending £5 billion per year on WFTC, which is £1.5 billion more than was expected under FC. WFTC will increase the generosity of in-work support relative to the FC system in four ways:

- an increase in the credit for children under 11 from £12.35 to £14.85 per child;
- an increase in the threshold from £79 to £90 per week;
- a reduction in the taper from 70 per cent to 55 per cent;
- a childcare credit of 70 per cent of actual childcare costs up to £150 per week.

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 WFTC see their withdrawal rate fall from 70 per cent to 55 per cent. The largest cash gains from WFTC go to those people who are currently just at the end of the taper under FC but for whom the introduction of 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 FC, which has suffered from very low levels of take-up. The credit increases the maximum amount of WFTC by 70 per cent 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 be noted that housing benefit and council tax benefit may also be payable at the same time as FC/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, since entitlement to other benefits may be reduced. Such interactions with other benefits are taken into account in the budget constraint examples in Section IV and in all the modelled results.

III. DEMOGRAPHICS

1. Population Characteristics

This 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 V. These are the self-employed, students, the retired, those aged under 17 and those aged over 64. The self-employed are by far the most important of the excluded groups. They account for 850,000 of the excluded cases where the man works in a couple.

TABLE 1

Numbers of Families with Children

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

Source: Family Resources Survey, 1994–95.

The participation rates for the target groups are 40 per cent for lone parents, 82 per cent for men in couples and 57 per cent for women in couples. Figure 2 shows the distribution of hours for these groups. 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. There are also clear indications of the impact of the benefit system on female labour supply, with a spike in the distribution of hours for lone parents at 16 hours — the cut-off for eligibility for family credit.

FIGURE 2

Hours of Work by Family Type
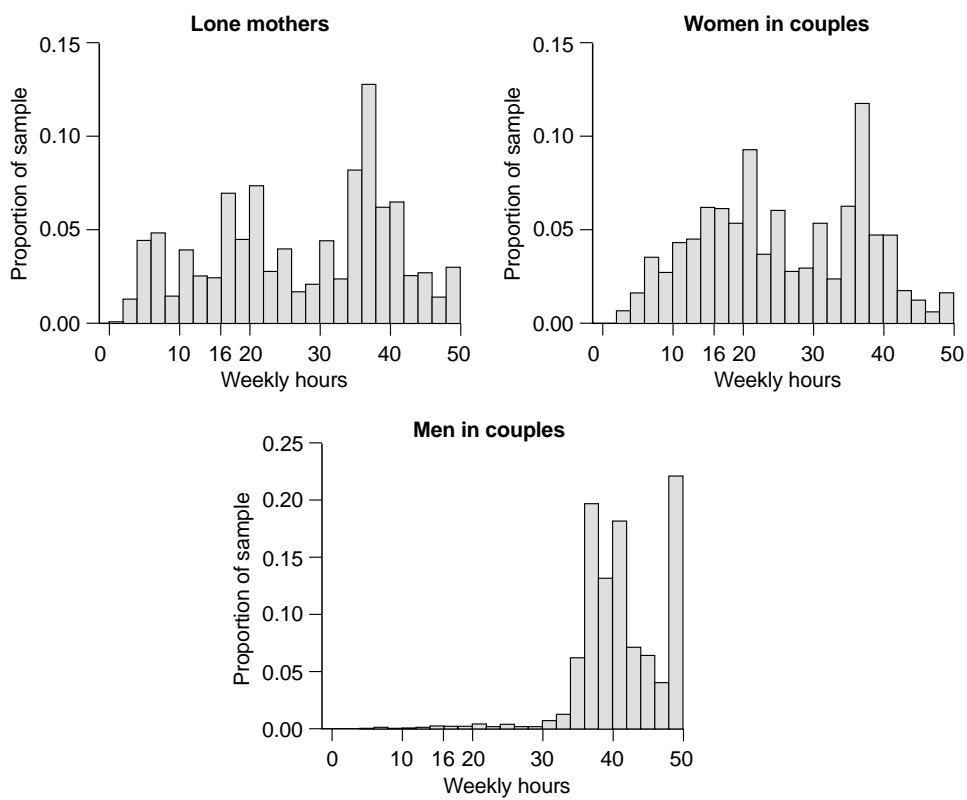
Source: Family Resources Survey, 1994–95.

2. *Childcare Expenditure*

One key feature of the WFTC reform is the childcare element, which could potentially have 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 per cent use relatives and 25 per cent use formal childminders or nursery care. For lone parents, the largest difference is in the numbers reporting no childcare (below 10 per cent) and a corresponding increase in those depending on relatives.

Tables 3 and 4 show, for couples and for single parents, the weekly expenditure on childcare by the mother's hours of work 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 minimal. The costs escalate for more formal types of childcare, such as nursery care and childminders, and also tend to be higher for couples than for lone parents.

TABLE 2

Type of Childcare Used when Youngest Child is under 5

			Per cent
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 and informal combined	2.5	3.4	2.6
Nursery care and informal combined	4.3	7.5	4.6
Multiple formal care sources	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, 1994–95 and 1995–96.

TABLE 3

Weekly Childcare Expenditure by Hours of Mother and Type of Care: Couples

Type of care	Mother's 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	.[a]	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 and informal combined	15.33	29.05	41.41	53.85	55.00	41.36
Nursery care and informal combined	12.81	27.96	30.80	48.09	46.87	34.10
Multiple formal care sources	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

[a]Cell size too small for reliable figures to be produced.
Source: Family Resources Survey, 1994–95 and 1995–96.

TABLE 4

Weekly Childcare Expenditure by Hours of Mother and Type of Care: Lone Parents

Type of care	Mother's 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 and informal combined	.	34.13	13.67	55.60	48.00	40.38
Nursery care and informal combined	8.67	8.57	18.45	60.52	0.00	30.37
Multiple formal care sources	.	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

Note: Some cell sizes are too small for reliable figures to be produced.
Source: Family Resources Survey, 1994–95 and 1995–96.

IV. POTENTIAL INCENTIVES OF WFTC

The working families' tax credit 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 vital 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 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 labour supply model in Section VI. One should nevertheless guard against generalising too widely at this stage on the basis of what are merely illustrative examples. We report later the results of a simulation study based on a large and representative sample of potential in-work benefit recipients.

1. Incentives for Lone Parents

For lone-parent families, the impact of 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 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 median hourly wage rate for working lone parents. We additionally assume that the lone parent is a social renter 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.
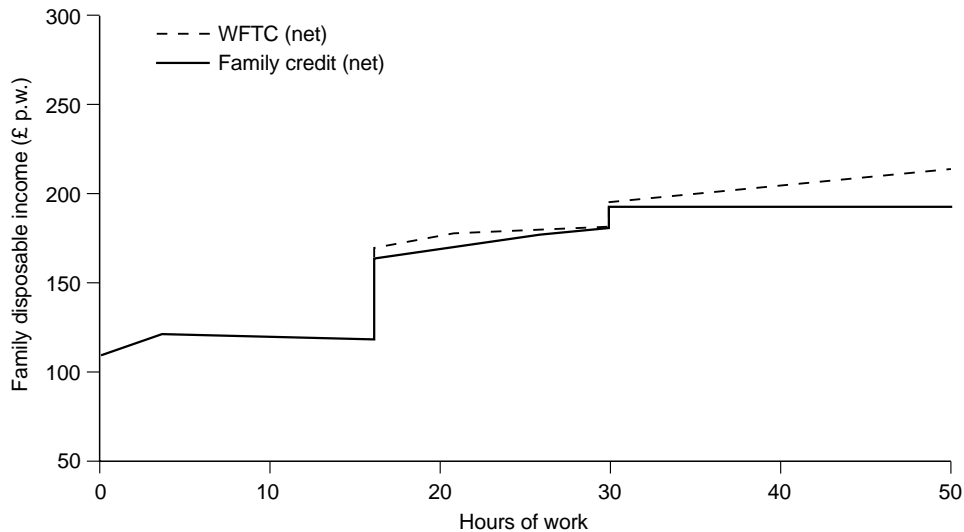
FIGURE 3
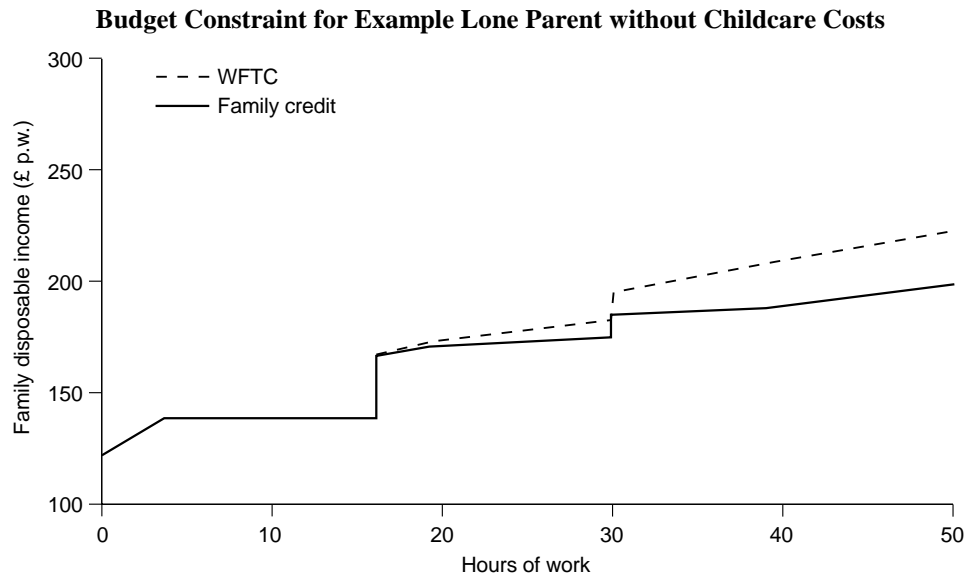
Budget Constraint for Example Lone Parent without Childcare Costs

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

For those already working, the labour supply response to the introduction of WFTC is less clear. The marginal tax rate is unambiguously reduced at all hours levels under the reform, though even with WFTC it remains high, at almost 70 per cent. This increases the 'price' of non-market time (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 4 shows the effect of the childcare credit element of WFTC. For illustration, we assume that childcare costs £1.96 per hour (the average hourly cost for those households in the mid-range in Table A.1 of the appendix) and that

FIGURE 4

Budget Constraint for Example Lone Parent with Childcare Costs

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

the relationship between hours of work and hours of childcare is linear.[1] This graph 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 working 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 ambiguous hours response for those in work.

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[1]We choose not to impose an equivalence between hours of work and hours of childcare; empirical evidence in Duncan, Giles and Webb (1995) suggests equivalence to be an unreasonable assumption. For this illustrative example, and for the simulation exercise that follows, we assume a linear relationship between childcare hours and hours of work. The form of the linear relationship is estimated from observed patterns of childcare use in the FRS for a range of households of different demographic types. Details of these estimated relationships between childcare hours and hours of work are given in Table A.2 of the appendix.

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 per cent, produced by income tax and National Insurance, to just under 70 per cent, produced by the interaction of the 55 per cent WFTC taper on post-tax income. In the example, the marginal tax rate rises from 33 per cent to just under 70 per cent above 40 hours of work.

FIGURE 5

Budget Constraint for Example Man in Couple without Childcare Costs
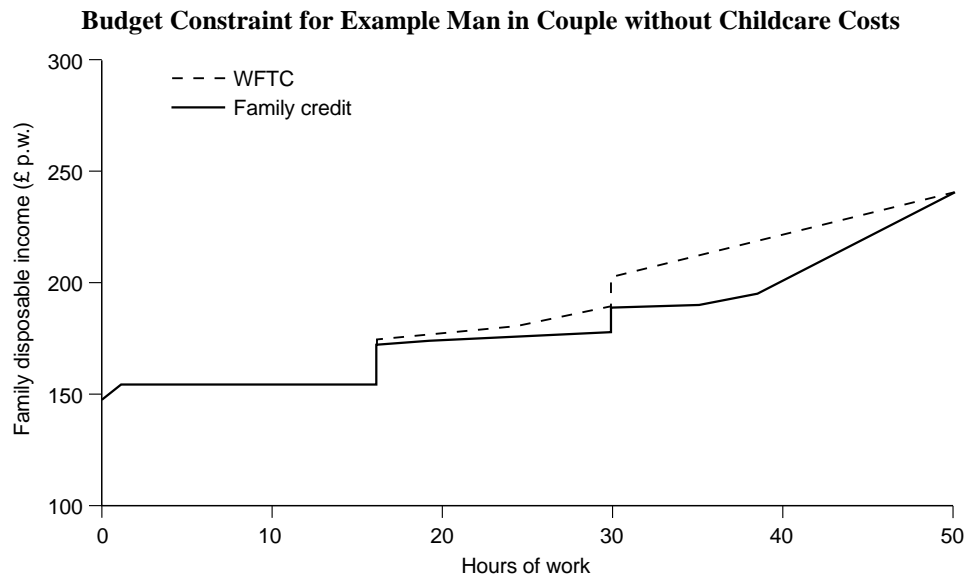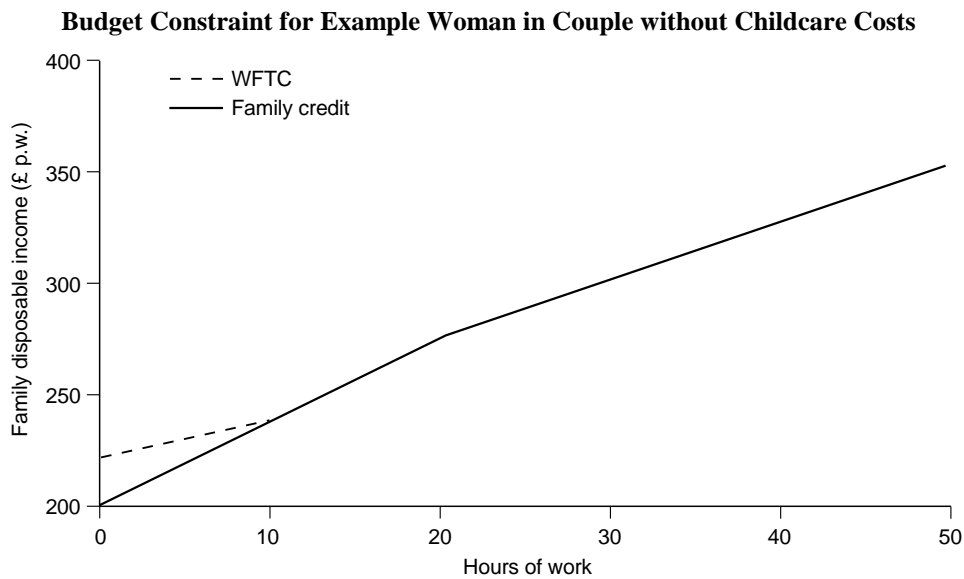

Notes: Spouse not working.
         One child aged under 11.
         Hourly wage £5.87 (25th percentile for men in couples with children).
         Rent £41.10 p.w. (median for social renters with children).
         No childcare costs.

3. Incentives for Women in Couples

One point that 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-adult 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 woman in a couple 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.[2] For the illustrative example shown here, any woman working more than 10 hours will have an increased incentive to reduce her labour supply or move out of work altogether.

FIGURE 6

Budget Constraint for Example Woman in Couple without Childcare Costs

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

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[2]This is not universally true, however. If the man were to work 30 rather than 40 hours, then examination of Figure 5 shows the income differential *rising* initially as the woman moves into work, before ultimately falling once household income reaches the pre-reform cut-out point for family credit.

FIGURE 7

Budget Constraint for Example Woman in Couple with Childcare Costs
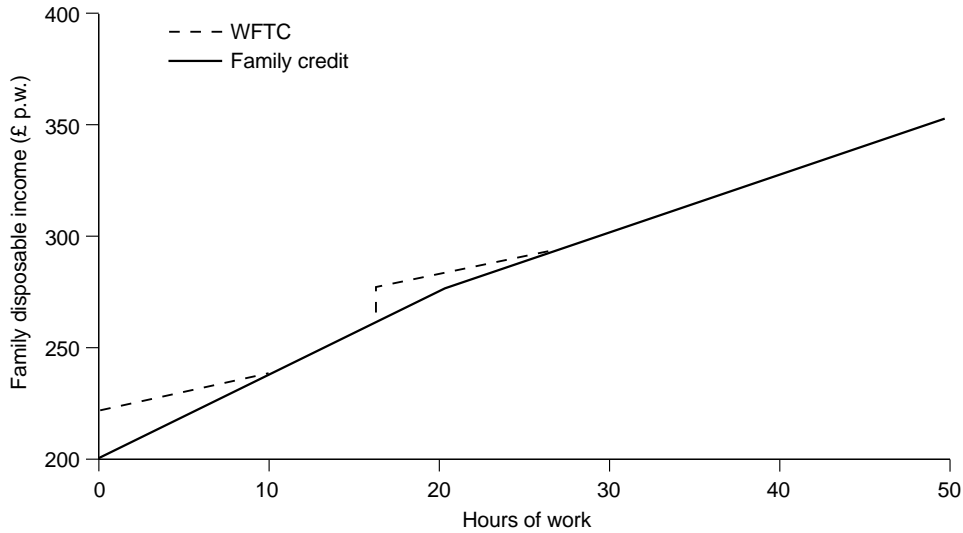

Notes: Spouse working 40 hours p.w. at £5.87 per hour.
One child aged under 11.
Hourly wage £3.72 (25th percentile for women in couples with children).
Rent £41.10 p.w. (median for social renters with children).
Childcare at £1.96 per hour.

The situation is a little different when we allow additionally for childcare costs. For couples, the childcare credit is only available if *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.

V. WFTC REFORM SIMULATION

1. Data

The Family Resources Survey (FRS) is used to examine the income and incentive impacts of tax credits. It is an annual budget survey of individual, family and household incomes, characteristics and labour market attachment. It is a 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 cohabiting couples. Excluding self-employed and retired households, together with students and those in HM Forces, leaves samples of 1,807 single parents and 4,694 two-adult households for use in estimation.

To generate net incomes, we use the IFS tax and benefit model, TAXBEN. TAXBEN is a microsimulation model of the UK tax and benefit system which calculates taxes due and benefit entitlements for the Family Resources Survey data. It 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; for non-workers, we estimate wages using a wage equation based on their characteristics. 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.

2. Modelling Childcare Costs

The childcare credit component of WFTC 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 drawn from the FRS. Previous work[3] has established that up to 30 per cent 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. However, these data are not available to us. Instead, we are forced to impute childcare expenditures because the FRS neglects to record childcare expenditures among non-working households.

Our strategy uses sample information on hourly prices of childcare and the relationship between formal hours of childcare and hours of work described earlier and set out in Table A.2 of the appendix. We allow for the fact that similar households may purchase different types or levels of childcare by using information on the *distribution* of childcare prices paid by specific demographic groups directly in our estimation procedure. For each household in our sample, we calculate childcare expenditures at *each* price in the six-point distribution of childcare prices. By doing so, we are able to generate an average behavioural

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[3]See Duncan, Giles and Webb (1995).

response over a range of possible values for the childcare credit component of WFTC.

3. Non-Behavioural Effects

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.[4] 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, Table 5 reports the proportion of households that are modelled to gain from the new credit among a sample of families drawn from the 1994–95 and 1995–96 FRSs. Data are split according to observed hours of work, marital status and age of children. We base these simulations on patterns of childcare expenditure observed in the FRS sample. Thus the reported figures *do not take account of* labour market

TABLE 5

Proportion of Gainers from WFTC

Per cent

	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

Note: Data are grouped according to observed hours of work for all household members and conditioned on observed childcare expenditure patterns.
Source: TAXBEN, based on Family Resources Survey, 1994–95 and 1995–96.

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[4]A point well documented in Dilnot and Giles (1998), for example.

responses to WFTC. Neither do they account for possible changes in the pattern of childcare use or cost. They nevertheless provide a bench-mark against which we can judge the full behavioural 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 per cent of lone parents in part-time paid employment (of between 21 and 30 hours) will benefit from the new tax credit.[5] This proportion falls for those women in full-time paid employment, as fewer will have incomes low enough to qualify for FC or WFTC. No income gains are simulated among women on zero or low hours, since eligibility for FC or WFTC is contingent on working at least 16 hours per week.

Table 5 reveals an interesting pattern of gainers amongst women in couples where the male partner is in work. We find WFTC to be most generous to households in which the woman is 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 per cent. This feature of the reform may give rise to *negative* work incentive effects among women in couples, given that

TABLE 6

Average Income Gains from WFTC among Gainers

Pounds per week

	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

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.
Source: TAXBEN, based on Family Resources Survey, 1994–95 and 1995–96.

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[5]Based on observed patterns of work and childcare use among working women.

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 that do gain, it is instructive to note from Table 6 that the greatest increases in income (of around £20 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 are 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.

4. Simulating Labour Supply Responses

To translate these potential income gains into simulated hours responses requires an economic model of labour market behaviour among a range of household types. Our goal is to anticipate how families will respond to the change in economic circumstances brought about by the introduction of WFTC. For each household in our sample, we are able to generate the net income that would be associated with any choice of hours of work, both under the current tax and benefit system and following the introduction of WFTC. This information is used to simulate the labour supply responses to WFTC. Since our study involves the *simulation* of a tax reform that has yet to be implemented, rather than an *evaluation* of a tax reform already in operation, we require a structural model for household labour supply in order to proceed with the policy simulation.[6]

Budget sets faced by households in the UK are notoriously non-convex. The model specification chosen therefore needs to be able to deal adequately with non-linear taxes in estimation. The model ought ideally to account for labour supply decisions at the level of the household rather than at the level of the individual, and should include controls for fixed costs and child-related costs. These considerations lead us to choose a structural model of household preferences defined over a *subset of discrete hours points* rather than over a continuous hours range.[7] A precise specification of this model, together with detailed discussion of empirical estimates, can be found in Blundell, Duncan, McCrae and Meghir (1999).

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[6]See Moffitt (1992) for a survey of incentive responses to welfare reform in the US, and Dickert, Hauser and Scholz (1995), Eissa and Hoynes (1998) or Eissa and Liebman (1996) for an evaluation of the labour market responses to changes in the US system of Earned Income Tax Credit (EITC). For the UK, see Dilnot and Duncan (1992) for a simulation study of the 16-hour-rule reform in family credit.

[7]The discrete approach to estimation has become increasingly popular in recent literature. See Blundell and MaCurdy (1999) for a survey and Bingley and Walker (1997), Duncan and Giles (1998), Hoynes (1996), Keane and Moffitt (1998) and Van Soest (1995) for specific applications of discrete choice methods to labour supply analysis.

VI. SIMULATION RESULTS

We use the estimated models of household labour supply to simulate the work incentive impact of the WFTC reform. 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 WFTC reform, using the estimated models of preferences over work and household net incomes.[8] This enables us to simulate both the proportion of new workers and the change in the hours distribution.

We report in the main body of the text our simulations of the labour market impact of WFTC assuming 100 per cent take-up of the childcare credit component of WFTC. We do, however, consider a number of alternative scenarios to establish to what degree the 100 per cent take-up assumption dominates our results. Specifically, we examine alternative scenarios that assume zero take-up of the childcare credit component and a take-up rate of 50 per cent. We must emphasise, however, that there is no model of take-up driving this latter scenario — we simply nominate a random 50 per cent of our sample to receive the childcare credit component of WFTC.

Tables 7 to 10 report the results of our simulations for single-parent households, women in couples (separated according to the employment status of their partner) and men in couples under the assumption of 100 per cent take-up of WFTC. These results are presented in the form of a matrix of simulated transitions between no work, part-time work and full-time employment under the two systems for women, and transitions between no work and (implicitly full-time) work for men. We also report summary measures of changes in participation rates and average changes in hours among workers and among the full sample. The simulated movements in hours for male and female members of a two-adult household derive from a joint labour market model, the estimates for which are reported by Blundell, Duncan, McCrae and Meghir (1999). We report the *marginal* hours movements for each household member, on the basis that the likelihood of a *joint* labour market response to WFTC was found to be negligible in simulation.

1. Policy Simulations: Lone Parents

In Table 7, we report the simulated work responses to WFTC among our sample of single parents. The most common simulated transition takes around 2.2 per cent of the sample 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

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[8]This requires re-sampling techniques, since to operationalise the computations of the new probabilities involves drawing repeated realisations of the stochastic elements of the discrete choice model laid out in earlier sections. See Duncan and Weeks (1998) for a more detailed explanation.

variability, we simulate a standard error of 0.42 per cent around this figure, which would admit the possibility that the actual increase could be as much as 3 per cent. One can clearly see the reason for this shift in our earlier graphs of the potential impact of 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 per cent of single parents who are simulated to move into the labour market would gross up to around 30,000 women in the population.

We see a minor offsetting reduction in labour supply through a simulated shift from full-time to part-time employment among 0.2 per cent 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 WFTC encourages a

TABLE 7

Simulated Transitions among Single Parents
(100% take-up of WFTC)

Transitions

	Post-reform			Pre-reform %
Pre-reform	Out of work	Part-time	Full-time	
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 (% points)	–2.2	0.3	1.9	

Summary

	Mean	Standard deviation
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 only)	25.70	

Notes: Transitions tables built by drawing 100 times from the distribution of unobserved heterogeneity and allocating each observation to the cell that 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.

reduction in labour supply. Nevertheless, the predominant incentive effect among single parents could be said to be small but positive.

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 per cent, equating to a grossed-up figure of around 20,000 in the population. This overall reduction comprises around 0.2 per cent who move into the labour market following the reform and 0.8 per cent 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 it happens. There will be a proportion of non-working women whose low-earning partners

TABLE 8

**Simulated Transitions among Married Women with Employed Partners
(100% take-up of WFTC)**

Transitions

Pre-reform	Post-reform			Pre-reform %
	Out of work	Part-time	Full-time	
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 (% points)	0.6	–0.1	–0.4	

Summary

	Mean	Standard deviation
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 only)	25.65	

Notes: As for Table 7.

will be eligible for 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. For those women currently in the labour market, WFTC increases the income available to the household if she were to stop working.

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 per cent 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 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 WFTC is not an issue, since households only qualify for the childcare credit if both adult household members work 16 hours or more. There is, of course, potential for both members of an

TABLE 9

Simulated Transitions among Married Women with Unemployed Partners
(100% take-up of WFTC)

Transitions

	Post-reform			*Pre-reform %*
Pre-reform	Out of work	Part-time	Full-time	
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 (% points)	−1.3	0.2	1.1	

Summary

	Mean	*Standard deviation*
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 only)	23.96	

Notes: As for Table 7.

unemployed couple to move into work in order to qualify for WFTC including the childcare credit, but the joint simulation shows that such an outcome is virtually non-existent, comprising less than 0.1 per cent of the full sample of couple households.

4. Policy Simulations: Men in Couples

Turning to male labour supply responses to WFTC, we find the simulated net effect to be small (at around 0.1 per cent overall). This nevertheless conceals a greater level of response once we disaggregate further. Table 10 reports the simulation results for men in couples and highlights two distinct responses which broadly balance out in aggregate. First, we see 0.4 per cent of the male sample (grossing up to around 13,000 in the population) moving into work to take advantage of the increased generosity of the new tax credit. Since the majority of unemployed men in couples have a non-working partner (around 58 per cent in our sample), this response contributes to an overall increase in the proportion of single-earner households. The second major response sees around 0.3 per cent of the sample of men (equivalent to a grossed-up figure of 10,500) moving out of work. All in this group have an employed partner and are therefore choosing to move out of employment to take advantage of the increased generosity of WFTC on the basis of the female partner's earnings.

TABLE 10

**Simulated Transitions among Married Men
(100% take-up of WFTC)**

Transitions

	Post-reform		Pre-reform %
Pre-reform	Out of work	Working	
Out of work	19.6	0.4	20.0
Working	0.3	79.8	80.0
Post-reform %	19.9	80.1	100
Change (% points)	–0.1	0.1	

Summary

	Mean	Standard deviation
Change in participation	+0.07%	[0.03%]
Average change in hours (all)	+0.03	[0.01]
Average hours before reform (all)	32.11	
Average hours before reform (workers only)	39.06	

Notes: As for Table 7.

5. Policy Simulations: A Sensitivity Analysis

To gain some feel for the sensitivity of our simulation results, we consider a number of alternative modelling assumptions and scenarios. The simulations presented above assume 100 per cent take-up of family credit, the working families' tax credit and the additional childcare credit component of WFTC. Although the take-up of FC has been on the increase, these assumptions are certainly open to question. With this in mind, we consider two alternative scenarios. As a first experiment, we assign a random 50 per cent of our sample to receive the childcare credit component of WFTC. The second alternative forces zero take-up of the childcare credit component of WFTC for the full sample. In some sense, this alternative scenario gives some feel for the work incentive effects of basic WFTC relative to FC rather than the cumulated incentive effect of full WFTC including the childcare component. 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 on the supposition that the childcare credit increases demand for childcare places and bids up the price of childcare. 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 per cent. 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.

As a final sensitivity test, we consider the use of alternative measures of the hourly wage for those observed out of employment. In a standard selectivity-adjusted model, the wage offers for those out of employment are, on average, below the observed wages for those in work.[9] As an alternative, we consider the recent work by Gregg, Johnson and Reed (1999). This studied the impact of WFTC on labour supply using a transitions model of labour market entry in which the relevant wage rates assumed for current non-workers had been predicted from a sample of labour market entrants drawn from the Labour Force Survey. Although their modelling strategy differs in a number of respects from ours,[10] the sensitivity of simulated responses to the assumed wage among potential labour market entrants is clearly an issue worthy of closer scrutiny. With this in mind, we compare simulation results from the bench-mark model with those from an alternative empirical model estimated using entry wage

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[9]This standard approach for dealing with missing wages is discussed in Blundell, Duncan, McCrae and Meghir (1999).

[10]See Blundell and Reed (1999) for a more detailed comparison of the two approaches.

TABLE 11
Simulated Responses to WFTC: Alternative Scenarios

	Simulated responses to WFTC (%)				Summary measures		
	Non-work to work	Work to non-work	Part-time to full-time	Full-time to part-time	Δ partic. (%)	Δ in hours, all	Δ in hours, workers
Single parents							
1. Full take-up of childcare credit	2.2	0.0	0.5	0.2	+2.20	+0.75	+0.22
2. 50% take-up of childcare credit	1.8	0.0	0.5	0.2	+1.75	+0.60	+0.19
3. Zero take-up of childcare credit	1.4	0.0	0.4	0.2	+1.34	+0.47	+0.15
4. Increased childcare price	1.9	0.0	0.5	0.2	+1.76	+0.64	+0.20
5. Entry wage for non-workers	3.0	0.0	0.6	0.1	+2.99	+1.04	+0.30
Women, partner employed							
1. Full take-up of childcare credit	0.2	0.7	0.0	0.1	−0.57	−0.18	−0.03
2. 50% take-up of childcare credit	0.2	0.9	0.0	0.1	−0.73	−0.23	−0.04
3. Zero take-up of childcare credit	0.2	0.9	0.0	0.1	−0.81	−0.25	−0.04
4. Increased childcare price	0.2	1.9	0.0	0.4	−1.79	−0.59	−0.15
5. Entry wage for non-workers	0.2	1.1	0.0	0.2	−0.94	−0.28	−0.05
Women, partner unemployed							
1. Full take-up of childcare credit	1.3	0.0	0.4	0.1	+1.32	+0.46	+0.14
2. 50% take-up of childcare credit	1.3	0.0	0.3	0.1	+1.26	+0.43	+0.13
3. Zero take-up of childcare credit	1.3	0.0	0.3	0.1	+1.24	+0.43	+0.12
4. Increased childcare price	1.0	1.3	0.3	0.3	−0.30	+0.02	+0.04
5. Entry wage for non-workers	1.6	0.0	0.5	0.1	+1.61	+0.59	+0.27

Notes: See next page.

predictions for non-workers along the lines suggested in Gregg, Johnson and Reed (1999).[11]

In Table 11, 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 per cent with no take-up of the childcare credit compared with 2.2 per cent assuming full take-up. For women with employed partners, we see a greater proportion (0.81 per cent) moving out of work. This suggests that the additional childcare credit component does improve the incentive to enter the labour market.

Our sensitivity analysis also shows that an increase in the price of childcare serves to offset the effectiveness of WFTC in encouraging labour market participation. This is because the price rise increases the cost of working, with the childcare credit component only partially offsetting that change in cost.

The comparative results under the alternative entry wage assumption are interesting. We find an increase of around 0.8 of a percentage point in the proportion of single parents moving into work in response to WFTC when (typically lower) entry wage rates are assumed for non-workers, with smaller effects among women with an unemployed partner. This result can be rationalised on the basis that higher wages among those who have chosen not to work tend to imply less elastic preferences and less responsiveness to changes in incomes in work. For women with employed partners, the negative response to WFTC is also amplified.

VII. CONCLUSIONS

Using the Family Resources Survey, we estimate a model of family labour supply for married couples and individual labour supply for single parents. The model allows for childcare costs that vary with hours of work and takes into account the existence of many different types of childcare. Having validated the

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[11]Since this fifth scenario requires full re-estimation of the structural model, we restrict the reported comparison to an illustrative sample of single-parent households only.

model in terms of its consistency with basic economic principles, we use it to simulate the labour supply effects of the new working families' tax credit, assuming that the structure of the childcare market will not change. Given full take-up for the existing family credit and other benefits and full take-up of the new tax credit, we find that:

- the participation rate for single mothers increases by 2.2 percentage points, which corresponds to 34,000 individuals;
- the participation rate for married women with employed partners decreases by 0.57 percentage points (corresponding to 20,000 individuals) because of an income effect arising from the improved benefit eligibility of their husbands;
- the above behavioural effects combined with those for men and for women with non-working partners imply a small increase in overall participation of about 30,000 individuals.

These behavioural effects act to reduce the cost of the WFTC programme compared with the no-behavioural, full take-up outcome, by 14 per cent. When we simulate other take-up scenarios, we find small shifts in the level of participation. The question of the potential for changes in the childcare market remains an open one. It is not likely to lead to very large participation effects but could have important expenditure implications.

APPENDIX

See overleaf.

TABLE A.1

Hourly Childcare Costs among Women in Paid Employment

		Percentage in price range (lower bound, upper bound):				
	No cost	*£0.00, £1.25*	*£1.25, £1.75*	*£1.75, £2.25*	*£2.25, £3.25*	*£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 A.2

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	1.57	0.885	26.75
One child, youngest 3+	4.335	3.03	0.384	8.84
Two children, youngest <3	2.321	2.43	0.674	20.17
Two children, youngest 3+	2.196	3.41	0.222	10.50
Three+ children, youngest <3	0.094	0.06	0.503	9.22
Three+ children, youngest 3+	3.103	3.82	0.139	5.16
Single parents				
One child, youngest <3	1.264	0.61	0.984	13.76
One child, youngest 3+	7.825	5.23	0.264	5.67
Two children, youngest <3	2.210	1.05	0.702	9.36
Two children, youngest 3+	6.900	5.65	0.141	3.63
Three+ children, youngest <3	5.228	1.72	0.350	3.31
Three+ children, youngest 3+	2.813	1.35	0.242	3.14

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