



**HM REVENUE & CUSTOMS  
Analysis Team**

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**Child Tax Credit and Working  
Tax Credit**

**Take-up rates**

**2006-07**

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For general enquiries relating to tax credits, including advice on making a claim, please contact the Tax Credits Helpline:

Great Britain: 0845 300 3900  
Northern Ireland: 0845 603 2000

For enquiries relating to these statistics, please contact:

Tax Credits Analysis Team  
Room 2E/08  
100 Parliament Street  
London  
SW1A 2BQ

☎ : 020 7147 0675  
Fax: 020 7147 3119  
E-mail : [benefitsandcredits.analysis@hmrc.gsi.gov.uk](mailto:benefitsandcredits.analysis@hmrc.gsi.gov.uk)

# Child Tax Credit and Working Tax Credit

## Take-Up Rates 2006-07

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## **Introduction**

### **The tax credit system**

Child Tax Credit (CTC) and Working Tax Credit (WTC) were introduced in April 2003 and replaced Working Families' Tax Credit, Disabled Person's Tax Credit and Children's Tax Credit, as well as some other forms of financial support for families with children. For the first time, WTC also extended in-work financial support to families without children or a disability. The aims of the tax credits were set out in Budget 2002, and are as follows<sup>1</sup>:

- supporting families with children, recognising the responsibilities that come with parenthood;
- tackling child poverty, by offering the greatest help to those most in need, such as low-income families;
- helping to make sure that work pays more than welfare and that people have incentives to move up the earnings ladder.

In order to meet these objectives, the financial support available through the tax credit system must be taken up by those eligible for support. This publication presents estimates of annual take-up rates for CTC and WTC, covering the 2006-07 financial year.

Entitlement to tax credits in 2006-07 depended on family circumstances in that year (for example, number of children, use of eligible childcare, disability) and incomes in 2005-06 and 2006-07. The first £25,000 of any increase in income between 2005-06 and 2006-07 was disregarded for tax credit purposes. This is a substantial increase on previous years, where only the first £2,500 of an increase in income was disregarded.

There are a number of methodological challenges involved in estimating take-up rates for CTC and WTC, many of which have been dealt with fully or partially in the analysis undertaken to produce this publication, and others which remain unaddressed. The methodological section of the publication gives a fuller treatment of these issues.

### **The data used**

Three separate data sources have been used to produce the take-up rate estimates. A brief description of these sources is given below; more details are provided in the methodology section.

- *Administrative data*  
Various scans of the tax credits computer system were used to produce the caseload figures in this publication, using a similar method to that used to produce the HMRC statistical publication "Child and Working Tax Credits Statistics: Finalised Annual Awards 2006-07.
- *The Family Resources Survey (FRS):*  
This is a household survey carried out by the Department for Work and Pensions, which collects a wide range of information relating to (amongst other things)

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<sup>1</sup> "The Child and Working Tax Credits, the Modernisation of Britain's Tax and Benefit System Number Ten", April 2002

family circumstances and income, which can be used to model families' entitlement to tax credits.

- *The British Household Panel Survey (BHPS)*  
This is a longitudinal survey of British households, carried out since 1991. As a panel study, it allows for comparisons of incomes in individual families across different years, which we used to derive information on 2005-06 and 2006-07 incomes.

## Definition of take-up rates

The caseload take-up rate represents the proportion of families who are entitled to a positive tax credit award who take up, or claim, their entitlement. It is estimated as:

$$\frac{C_A}{C_A + ((ENR_{FRS} \times DAF_{BHPS}) - BA_A - PRZ_A)}$$

Where:

- C<sub>A</sub>** is the administrative caseload (the number of families who have made a claim and are entitled to a positive award)
- ENR<sub>FRS</sub>** is the estimated number of those entitled to, but not receiving, tax credits based on the FRS
- DAF<sub>BHPS</sub>** is an adjustment factor which scales the number of FRS ENRs so that they reflect the impact of the £25,000 disregard; the disregard adjustment factor is calculated using the BHPS
- BA<sub>A</sub>** is an adjustment for backdating using administrative data, since some ENRs who applied after the FRS interview date, or were waiting for an award for which they had already applied, would subsequently receive tax credits which covered that date
- PRZ<sub>A</sub>** is an adjustment for cases whose payments were reduced to zero, based on administrative data - these cases are in the tax credit system and entitled to a positive award, but receive no payments due to repayment of overpayments, and are regarded as non-recipients on the FRS.

The expenditure take-up rate represents the proportion of total 2006-07 tax credit entitlements which have been claimed. It is calculated in precisely the same way as the caseload take-up rate, except that in each part of the calculation, total entitlement (defined as caseload multiplied by mean entitlement) replaces the relevant caseload terms.

Note that the expenditure figures presented in this publication should not be regarded as definitive estimates of spending on tax credits, and are primarily used to construct expenditure take-up rates. They are based on modelled levels of entitlement, which may differ in some respects from actual expenditure. In particular, the existence of underpayments and overpayments may result in expenditure being incurred in a different financial year to the one implied by simple modelling of current entitlements.

Central estimates of the number of entitled non-recipients, amounts of tax credits unclaimed, and caseload and expenditure take-up rates are presented with lower and upper bounds; these approximately represent 95 per cent confidence intervals. The upper and lower bounds for the number of entitled non-recipients and the amounts unclaimed are symmetric around the central estimate, but the rates are not, since the impact on take-up rates of adding or subtracting given levels of ENRs or amounts unclaimed depends on the level of those rates.

## **Format of the tables**

Each of the tables in this publication has a similar format:

- The first column presents caseload or expenditure estimates derived from administrative data;
- The following three columns contain estimates of the number of entitled non-recipients, or the amount of tax credits unclaimed, and are given as central estimates with upper and lower bounds.
- The final three columns show take-up rates by caseload and expenditure, each with a central estimate and upper and lower bounds.

The exception is table 2, where take-up rates alone are shown.

Caseload figures are shown in thousands and are rounded to the nearest 10,000; expenditure figures are in millions and are rounded to the nearest £10 million. Some figures in the tables may not sum due to rounding.

## **Time series comparisons with previous systems**

Table 2 shows comparisons over time between four systems of in-work support for low income families with children:

- Family Income Supplement (in operation between 1971 and 1988)
- Family Credit (FC, which existed between 1988 to 1999)
- Working Families' Tax Credit (WFTC, which existed between 1999 to 2003)
- Child and Working Tax Credits (in operation from 2003 onwards).

Comparing take-up rates between these different systems is not straightforward, due to changes in the systems themselves, as well as changes in the methodologies and data sources used. We therefore recommend that the figures in table 2 are used only as broad indicators of levels and trends in take-up.

To mitigate some of the problems of comparability, we estimate take-up for that group of CTC and WTC claimants who are most similar to those analysed for the WFTC and FC publications. We exclude the out of work population, those without children and those entitled to the family element or less in CTC, as these three groups would not have been entitled under WFTC and FC. We also exclude the self-employed and those in Northern Ireland, as these cases were also excluded in estimating WFTC and FC take-up rates. Even with these exclusions, it should be noted that each of the systems which has been introduced have, in general, been more generous at given income levels than their predecessors, and so it should be borne in mind that the size of the entitled population underlying the figures in table 2 has increased over time.

## **Comparisons with 2005-06**

From 2006-07 onwards, the income disregard in the tax credit system was increased from £2,500 to £25,000. This led to a substantial increase in the entitled population and a more modest increase in the number of awards, with the overall effect on take-up rates being downwards. Comparisons between 2005-06 and 2006-07 figures should therefore be treated with caution.

## **Out of work families - change from previous publications**

Out-of-work families with children receive their child support either via Child Tax Credit, or through child allowances in out-of-work benefits (Income Support, income-based Jobseeker's Allowance or the pensioners' Minimum Income Guarantee). For previous publications, we did not have sufficiently detailed information on the annual incomes or level of child allowances received, so tables 4 to 9 in the 2003-04, 2004-05 and 2005-06 publications were restricted to in work families only.

For the 2006-07 publication we were able to obtain enough information to accurately estimate the caseload and expenditure of out-of-work families who receive their child support through the child allowances in out-of-work benefits. Therefore tables 4 to 9 now include both out-of-work and in-work families. This means that these tables are not directly comparable with those in previous publications.

## **Glossary of terms used in tables**

CTC – Child Tax Credit

WTC – Working Tax Credit

Caseload – the number of tax credit recipients entitled to a positive award

Expenditure – the total value of entitlements of tax credit recipients

Entitled non-recipients – families entitled to a positive tax credit award who have not claimed

Amount unclaimed – the total value of tax credit entitlements which have not been claimed by entitled non-recipients

Income used to calculate entitlement – the income figure used to calculate how much families are entitled to, after taking into account the £25,000 annual income disregard

Modelled entitlement – the annual amount of tax credits families are entitled to, based on their reported circumstances

In-work families – families where at least one adult works 16 hours or more per week

## Section 1 : Summary Figures

Table 1: Take-up of CTC and WTC

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
CTC	5,650	1,150	1,330	1,510	79	81	83
WTC	1,920	1,330	1,440	1,550	55	57	59

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
CTC	19,690	2,150	2,790	3,420	85	88	90
WTC	11,650	2,880	3,470	4,060	74	77	80

Notes:

The CTC and WTC figures in this table are not additive, since some families with children receive both CTC and WTC. Note also that the expenditure and amounts unclaimed relate to total tax credit expenditure for those entitled to CTC and WTC (ie. the CTC figures includes WTC expenditure for those receiving both CTC and WTC, and similarly the WTC figure includes CTC expenditure for those receiving both CTC and WTC).

## Section 2 : Families with Children

Table 2: time series comparisons: take-up rates for low income working families with children

	Caseload take-up rate (%)			Expenditure take-up rate (%)		
	Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
<b>Family Income Supplement</b>						
1974-75		50			*	
1978-79		51			58	
1981-82		48			53	
1983-84		54			65	
1985-86		48			54	
1986-87		51			60	
<b>Family Credit</b>						
1988-89**		57			67	
1990-91***		62			68	
1991-92 <sup>+</sup>		66			73	
1993-94		71			81	
1994-95		69			82	
1995-96		70			83	
1996-97	71		75	82		88
1997-98 <sup>++</sup>	67		70	75		81
1998-99	66		70	73		79
<b>Working Families' Tax Credit</b>						
2000-01	62		65	73		78
2001-02	71		74	80		85
2002-03 <sup>+++</sup>	72		76	82		88
<b>Child Tax Credit and Working Tax Credit – low income working families with children<sup>§</sup></b>						
2003-04	87	89	91	91	93	95
2004-05	87	90	93	93	95	98
2005-06	87	90	93	91	94	97
2006-07	81	85	88	85	88	92

### Notes:

Figures should be used as a broad guide only due to methodological, data and policy changes over the various years. Ranges were not published prior to 1996-97 and central estimates were not published between 1996-97 and 2002-03.

\* Expenditure take-up rate not available

\*\* April 1988 to December 1989

\*\*\* 1990 and 1991 calendar years

+ 1991 and 1992 calendar years

++ Revised estimates. Original estimates 71 to 76 per cent by caseload; 80 to 87 per cent by expenditure

+++ April 2002 to November 2002

§ Defined as families with children in work who receive more than the family element of the Child Tax Credit, excluding the self-employed and those living in Northern Ireland.

### Sources for previous years:

Family Income Supplement: Family Income Supplement Estimates of Take-up 1986-87  
Technical Note, Department of Social Security Analytical Services  
Division, 1991

Family Credit: Income-Related Benefits Estimates of Take-up, Department of  
Social Security, various years

Working Families' Tax Credit: Working Families' Tax Credit Estimates of Take-up, Inland  
Revenue, various years

**Table 3: Take-up by position on tax credits profile**

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
CTC out of work	1,400	0	50	90	94	97	100
CTC and WTC	1,610	180	250	310	84	87	90
CTC, more than family element	660	180	260	340	66	72	79
CTC, family element or less	1,970	610	750	890	69	72	76

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
CTC out of work	5,730	0	150	310	95	97	100
CTC and WTC	11,020	1,080	1,510	1,940	85	88	91
CTC, more than family element	1,800	420	660	900	67	73	81
CTC, family element or less	1,130	330	410	490	70	73	77

**Notes:**

CTC out of work cases includes those benefiting via Income Support/Jobseeker's Allowance. See methodology section for more details.

**Table 4: Take-up by income used to calculate entitlement**

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
£0-10,000	2,310	140	200	270	90	92	94
£10,000-£20,000	910	150	210	270	77	81	86
£20,000-£30,000	1,050	190	290	380	73	79	85
£30,000-£40,000	840	130	210	280	75	80	86
£40,000-£50,000	400	150	230	310	56	64	74
£50,000+	130	120	170	230	35	42	52

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
£0-10,000	13,110	730	1,110	1,480	90	92	95
£10,000-£20,000	4,250	560	820	1,080	80	84	88
£20,000-£30,000	1,440	260	420	580	71	78	85
£30,000-£40,000	580	120	180	250	70	76	83
£40,000-£50,000	250	100	150	210	55	62	72
£50,000 and over	40	40	70	100	31	39	53

**Notes:**

Both in-work and out-of work families.

**Table 5: Take-up by level of modelled entitlement**

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Under £500	100	90	140	200	34	42	53
£500 to £1,000	1,830	430	560	690	73	77	81
£1,000-£2,000	350	110	170	230	60	67	75
£2,000-£4,000	1,050	100	160	220	83	87	92
£4,000 and over	2,320	170	240	320	88	91	93

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Under £500	30	20	40	50	32	40	54
£500 to £1,000	1,020	240	310	380	73	77	81
£1,000-£2,000	470	150	220	290	61	68	75
£2,000-£4,000	2,810	260	420	570	83	87	92
£4,000 and over	15,360	1,200	1,670	2,140	88	90	93

**Notes:**

Both in-work and out-of work families.

**Table 6: take-up by family type**

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Lone parents	2,130	20	110	190	92	95	100
Couples with children	3,520	1,050	1,220	1,380	72	74	77

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Lone parents	10,420	0	180	510	95	98	100
Couples with children	9,270	2,090	2,590	3,100	75	78	82

**Notes:**

Both in-work and out-of work families.

**Table 7: take-up by family size**

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
One child	2,550	590	730	860	75	78	81
Two children	2,140	330	430	540	80	83	87
Three or more children	950	100	170	240	80	85	90

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
One child	6,350	750	1,050	1,360	82	86	89
Two children	7,290	580	920	1,250	85	89	93
Three or more children	6,060	350	780	1,210	83	89	95

**Notes:**

Both in-work and out-of work families.

**Table 8: take-up by age of youngest child**

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
0-4	1,980	400	520	640	76	79	83
5-9	1,580	140	220	300	84	88	92
10-15	1,690	290	390	490	78	81	85
16 or over	390	150	210	260	60	66	73

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
0-4	7,750	1,030	1,570	2,100	79	83	88
5-9	5,800	170	410	640	90	93	97
10-15	5,150	360	620	880	85	89	94
16 or over	990	160	280	400	71	78	86

**Notes:**

Both in-work and out-of work families.

**Table 9: take-up by country and region**

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
North East	260	10	40	70	78	87	98
North West	700	80	140	190	78	84	90
Yorks & the Humber	510	40	90	140	79	85	93
East Midlands	420	70	120	180	70	77	86
West Midlands	540	40	90	140	80	86	94
East	490	50	120	200	71	80	91
London	640	150	230	300	68	74	81
South East	660	120	200	270	71	77	84
South West	450	40	90	140	76	83	92
Wales	300	30	80	130	69	79	92
Scotland	480	50	90	130	78	84	91
Northern Ireland	180	20	60	90	66	76	88

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
North East	930	0	290	610	61	76	100
North West	4,490	90	300	510	90	94	98
Yorks & the Humber	3,350	0	90	220	94	97	100
East Midlands	2,610	10	170	320	89	94	100
West Midlands	3,510	60	340	630	85	91	98
East	2,800	0	230	470	86	92	100
London	4,260	100	360	620	87	92	98
South East	3,750	100	320	540	87	92	97
South West	2,710	0	160	330	89	94	100
Wales	1,860	40	140	240	88	93	98
Scotland	2,840	60	160	260	92	95	98
Northern Ireland	1,160	20	90	150	88	93	98

**Notes:**

Both in-work and out-of work families. Regions are defined according to Government Office region boundaries.

## Section 3 : Families without Children

Table 10: Overall take-up amongst families without children

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
WTC only	310	1,150	1,200	1,260	20	20	21

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
WTC only	630	1,710	1,930	2,150	23	25	27

Table 11: Take-up by income used to calculate entitlement

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
£0-£10,000	200	600	640	690	23	24	25
£10,000+	100	490	520	550	15	16	17

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
£0-£10,000	520	1,360	1,510	1,650	24	26	28
£10,000 and over	110	280	360	430	20	23	27

Table 12: Take-up by level of modelled entitlement

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Under £500	40	260	290	310	12	13	14
£500 to £1,000	40	160	190	220	16	18	21
£1,000-£2,000	70	190	220	250	21	23	26
£2,000 and over	160	440	470	500	24	25	26

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Under £500	10	50	60	80	12	14	17
£500 to £1,000	30	110	130	150	17	19	22
£1,000-£2,000	100	260	300	340	22	24	27
£2,000 and over	490	1,290	1,380	1,480	25	26	27

Table 13: take-up by family type

	Caseload ('000)	Entitled non-recipients ('000)			Caseload take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Singles without children	210	630	690	1,510	22	23	25
Couples without children	90	510	530	560	14	15	15

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Singles without children	400	700	850	1,000	28	32	36
Couples without children	230	950	1,090	1,230	16	17	19

## **Methodology**

As described in the introduction, the caseload take-up rate is defined as:

$$\frac{C_A}{C_A + ((ENR_{FRS} \times DAF_{BHPS}) - BA_A - PRZ_A)}$$

Where:

- C<sub>A</sub>** is the administrative caseload (the number of families who have made a claim and are entitled to a positive award)
- ENR<sub>FRS</sub>** is the estimated number of those entitled to, but not receiving, tax credits based on the FRS
- DAF<sub>BHPS</sub>** is an adjustment factor which scales the number of FRS ENRs so that they reflect the impact of the £25,000 disregard; the disregard adjustment factor is calculated using the BHPS
- BA<sub>A</sub>** is an adjustment for backdating using administrative data, since some ENRs who applied after the FRS interview date, or were waiting for an award for which they had already applied, would subsequently receive tax credits which covered that date
- PRZ<sub>A</sub>** is an adjustment for cases whose payments were reduced to zero, based on administrative data - these cases are in the tax credit system and entitled to a positive award, but receive no payments due to repayment of overpayments, and are regarded as non-recipients on the FRS.

This section describes how each of these elements of the calculation are constructed and used in creating the take-up rate estimates.

### **C<sub>A</sub> : The administrative caseload**

The majority of the administrative data used in this publication are consistent with those used in the previously published “Child and Working Tax Credits Statistics: Finalised Annual Awards, 2006-07”<sup>2</sup>. These figures are based on all 2006-07 tax credit records, with each sub-period of tax credit entitlement weighted by the duration of these periods. More details about the data used are available in the Technical Note of that publication.

### **ENR<sub>FRS</sub> : Estimates of entitled non-recipients (ENRs) from the Family Resources Survey**

The FRS is considered to be the best survey data source we have available covering current income and other circumstances. It therefore forms the basis of our estimates of “entitled non-recipients”; families who were entitled to a tax credit in 2006-07, but did not receive one.

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<sup>2</sup> Available at <http://www.hmrc.gov.uk/stats/personal-tax-credits/cwtc-annual-06-07.pdf>

One of the main shortcomings with the FRS in modelling the system of tax credits is that tax credit entitlements are based on annual income, whereas FRS estimates are largely “snapshots” of circumstances at a particular point in time. A particular family in the FRS may therefore appear to be entitled to tax credits if we annualise their weekly income, but that week’s income may not be typical of the year as a whole. Earlier research<sup>3</sup> has suggested that a number of families may have weekly incomes which vary considerably from an annual average.

In some ways, the FRS may be less prone to these problems of income variability than at first appears. Many sources of income in the FRS are not “weekly” as such, for various reasons; many individuals in families are paid monthly; some of the FRS questions ask about “usual” income, rather than income in a particular week or month; and some non-employee income sources are often recorded on an annual basis (for example self-employment income, and interest and investment income). In addition, the FRS is a survey which is carried out continuously through the whole year, and so long as income variations are not correlated (eg. there is no marked seasonality), random fluctuations in measured income at the individual level may be smoothed out when looking at figures derived for the year as a whole. As a result of these considerations, and because we lack a truly “annual” large scale survey of incomes, we accept the results of the FRS as giving the best available picture of 2006-07 incomes.

Aside from the question of annualisation, the FRS does have several well known, and some less well known, issues which we have attempted to address in our modelling. Income from self-employment is generally considered to be somewhat less reliable than other FRS income data. However, improvements have been made in recent years and self-employment income is now considered to be sufficiently reliable to be used in the Department for Work and Pensions Households Below Average Income publication. In addition, although families with income from self-employment were generally excluded from take-up estimates for Working Families’ Tax Credit, such an exclusion makes less sense in a tax credit system which is paid to those in and out of work. We therefore include the self-employed in all tables, apart from in table 2 where we explicitly exclude them in order to improve the comparability of time series figures.

Of the less well known issues, we highlight two in particular. The first is that income brought to account in tax credits now includes benefits in kind (for example, company cars), in line with the rules relating to income tax. FRS information on benefits in kind is limited, and so we have attempted to impute income from benefits in kind using administrative data.

The second issue is not related to income but disability. Entitlement to the disabled worker element (and the 50 plus return to work element) is extremely difficult to model reliably on the FRS. We have therefore modelled entitlement to the disabled worker element on a partial basis, based on current receipt of qualifying benefits, but make no attempt to model past receipt (eg. of Incapacity Benefit), and we do not attempt to model the 50 plus return to work element at all. Exclusion of these elements will tend to result in the population of entitled non-recipients being underestimated, and the caseload take-up rate being overestimated.

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<sup>3</sup> Hills, J., Smithies, R. and McKnight, A., “Tracking Income: How Working Families’ Incomes Vary Through the Year” (2006)

## **DAF<sub>BHPS</sub>      The disregard adjustment (DA) – British Household Panel Survey (BHPS) data**

Entitlement to tax credits does not rely, straightforwardly, on 2006-07 income, which is a necessary assumption for the FRS modelling. Following finalisation of 2005-06 awards, 2006-07 tax credit awards were based on 2005-06 incomes, but could be adjusted in-year to reflect applicants' own estimates of 2006-07 incomes if they felt these were more accurate. Once the 2006-07 tax year had ended, recipients were able to report their final 2006-07 income at finalisation. However, a £25,000 disregard was in operation which meant that the first £25,000 of any increase in income between 2005-06 and 2006-07 was not taken into account in tax credit calculations.

This means that there are three different definitions of income used to determine tax credit entitlement, depending on the direction and size of the income change between 2005-06 and 2006-07:

- 2006-07 income is used if income has fallen between 2005-06 and 2006-07;
- 2005-06 income is used if income has not changed, or has risen by up to £25,000, between 2005-06 and 2006-07;
- 2006-07 income, less £25,000, is used if income has risen by more than £25,000 between 2005-06 and 2006-07.

Clearly, this definition of entitlement requires 2005-06 income data to be linked with 2006-07 data on income and other circumstances relevant for tax credit entitlement. To do this, we need longitudinal data from a panel study, such as the BHPS or DWP's Families and Children Study (FACS). Because we require information on families without children, we have used BHPS data in this publication. FACS data has not been used this year as in previous years the figures from the two surveys were broadly consistent.

The BHPS data is used to produce a caseload adjustment factor to scale the number of entitled non-recipients that we derive from the FRS. The adjustment factor is defined as the following ratio:

$$\frac{\text{Entitled non-recipients based on actual (2005-06 and 2006-07) income rules}}{\text{Entitled non-recipients based on 2006-07 income rules}}$$

In most cases, this ratio is greater than 1, since the effect of the disregard is to increase the entitled population. As an example, a family whose 2006-07 income is such that they are just above the income necessary to receive a tax credit award, would be entitled if their 2005-06 income was within the range necessary to receive an award, and their income had risen by £25,000 or less between 2005-06 and 2006-07.

### **BA<sub>A</sub> : The backdating adjustment**

The backdating adjustment is intended to account for the fact that tax credit awards can be backdated by up to three months. Any survey-based estimate of entitled non-recipients is likely to overstate the number of ENRs in a system with backdating, since some ENRs who applied after the FRS interview date, or were waiting for an award for which they had already applied, would subsequently receive tax credits which covered that date.

The number of backdated awards is calculated using administrative data. We merge the main administrative dataset of 2006-07 awards with several “snapshot” datasets extracted throughout 2006-07, which are based on a sample of 10% of single claimants and 20% of couples. If a family has an earlier award start date on the main dataset than the date when they first appeared on the snapshot data, we assume that this constitutes a backdated award, and calculate the period in days between when their award started and their first appearance on the snapshot data. The cases are then grossed up by the number of days multiplied by a factor of 10 (in the case of singles) and 5 (in the case of couples), and divided by 365.

### **PRZ<sub>A</sub> : The adjustment for payments reduced to zero**

Based on the FRS question about tax credit receipt, which simply asks if a family is currently receiving a tax credit payment, it is impossible to identify families who have claimed tax credits, have a positive entitlement in 2006-07, but were receiving a nil payment because they were repaying a previous overpayment. Such cases may arise as a result of repaying either an in-year overpayment (ie. they were overpaid earlier in 2006-07) or a cross-year overpayment (ie. they were overpaid in 2005-06 and/or earlier years).

There have always been limits on the reduction in payments due to a recovery of cross-year overpayments; these are currently set at 10% for those entitled to maximum awards, 25% for those on the first taper, but for those on the family element of Child Tax Credit or less, the repayment may reduce payments to zero.

In the past there were no limits on repayments of in-year overpayments; this means that repayment could reduce payments to zero regardless of position on the tax credits profile. This changed in November 2006 to bring the repayment of in-year overpayments in line with cross-year overpayments – while this only affects half of the year for the 2006-07 publication, future publications should not see any households on the maximum award or 1<sup>st</sup> taper with payments reduced to zero.

To account for this discrepancy we therefore make an estimate of the number of families in this situation, based on administrative data on payments and entitlements, and deduct this number from our estimate of entitled non-recipients.

### **Derivation of upper and lower bounds**

Much of the data we make use of in this publication are based on samples, and as we are combining estimates derived from different samples, this adds to the total level of uncertainty present in our estimates. In presenting our ranges, we focus on the two biggest sources of uncertainty; the estimate of the number of ENRs derived from the FRS, and the estimate of the disregard adjustment factor derived from BHPS. As the administrative data estimates (including the adjustments for backdating and for payments reduced to zero) are derived either from 100% administrative data or from extremely large samples, we ignore any sampling uncertainty arising from this source.

The estimate of the number of entitled non-recipients derived from the FRS is subject to sampling uncertainty. We estimate its variance by calculating the standard error of the estimated proportion of entitled families who were not in receipt of a tax credit, as derived wholly from FRS, multiplying this by the estimated number of entitled families, and squaring the result.

We do not estimate the variance of the disregard adjustment factor derived from the BHPS directly, but instead separately estimate the variance of the numerator and denominator of the adjustment factor; in other words, the variance of those entitled to and not receiving tax credits based on 2005-06 income rules, and the variance of those entitled to and not receiving tax credits based on actual income rules. We then estimate the variance of the ratio of these two figures using the formula<sup>4</sup>:

$$V(R) = \frac{(s_Y^2 + R^2 s_X^2 - 2R s_{XY})}{nX^2}$$

Where X is the estimated denominator of the ratio, Y is the estimated numerator of the ratio, R is the ratio, n is the sample size and  $s_X^2$ ,  $s_Y^2$  and  $s_{XY}$  are the sample variance of X, the sample variance of Y, and the sample covariance of X and Y respectively.

To combine the sample variance of the estimate of ENRs from the FRS, and the estimated sample variance of the disregard adjustment factor, we use the following formula<sup>5</sup>:

$$V(P) = s_Z^2 s_R^2 + Z s_R^2 + R s_Z^2$$

Where Z is the estimated number of ENRs, R is the disregard adjustment factor ratio, P is the product of Z and R, and  $s_Z^2$  and  $s_R^2$  are the respective sample variances. Note that as Z and R are derived from different sources, they have no covariance.

V(P) is our final estimate of the variance of the number of entitled non-recipients, adjusted using the disregard adjustment factor. We take the square root of this figure and multiply by 1.96 to estimate approximate 95% confidence intervals for the estimate of ENRs, and use the upper and lower bounds to derive a range for the take-up rates. Similar calculations are carried out on the expenditure figures, although obviously the variance associated with mean entitlements generally leads to ranges which are somewhat wider than those for the caseloads.

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<sup>4</sup> See, for example, Cochran, W. G. "Sampling Techniques", 3<sup>rd</sup> edition, p.155.

<sup>5</sup> See for example Barnett H.A.R., "The Variance of the Product of Two Independent Variables and its Application to an Investigation Based on Sample Data", Journal of the Institute of Actuaries Vol 81 (1955), p. 190.