



**HM REVENUE & CUSTOMS
Analysis Team**

**Child Tax Credit and Working
Tax Credit**

Take-up rates

2004-05

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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 follows¹:

- 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 2004-05 financial year.

Entitlement to tax credits in 2004-05 depended on family circumstances in that year (for example, number of children, use of eligible childcare, disability) and incomes in 2003-04 and 2004-05. The first £2,500 of any increase in income between 2003-04 and 2004-05 was disregarded for tax credit purposes.

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. These are;

- Administrative data: several administrative datasets were used in the production of these tables. The first was a scan of almost all 2004-05 tax credit records, which was also used to produce the HMRC statistical publication "Child and Working Tax Credits Statistics: Finalised Annual Awards 2004-05". Certain data items (eg. age of youngest child, and information on backdated awards) were not available on this dataset, and for these, a 10 per cent sample of single claimants and 20 per cent sample of couples was used. A third administrative dataset was used to estimate the number of awards where payments were reduced to zero – more information on the need to incorporate such estimates is given in the Methodology section.
- The Family Resources Survey (FRS): a household survey carried out by the Department for Work and Pensions, which collects a wide range of information

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

relating to (amongst other things) family circumstances and income, which can be used to model families' entitlement to tax credits.

- The British Household Panel Survey (BHPS): 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 2003-04 and 2004-05 incomes.

In addition to the above datasets, we also make use of The Families and Children Study (FACS), which is a longitudinal survey of families with children carried out since 1999, funded by DWP, HMRC and other Government departments. Although it does not cover those without children, it provides a useful check against BHPS figures for those with children.

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_A is the administrative caseload (the number of families who have made a claim and are entitled to a positive award)

ENR_{FRS} is the estimated number of those entitled to, but not receiving, tax credits based on the FRS

DAF_{BHPS} is an adjustment factor which scales the number of FRS ENRs so that they reflect the impact of the £2,500 disregard; the disregard adjustment factor is calculated using the BHPS

BA_A 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_A 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 2004-05 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 have 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 £10m. 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) and 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.

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 £2,500 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	5,670	1,110	1,240	1,380	80	82	84
WTC	1,680	960	1,060	1,150	59	61	64

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
CTC	17,540	1,310	1,710	2,110	89	91	93
WTC	9,400	1,610	2,000	2,390	80	82	85

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
Family Income Supplement						
1974-75		50			*	
1978-79		51			58	
1981-82		48			53	
1983-84		54			65	
1985-86		48			54	
1986-87		51			60	
Family Credit						
1988-89**		57			67	
1990-91***		62			68	
1991-92 ⁺		66			73	
1993-94		71			81	
1994-95		69			82	
1995-96		70			83	
1996-97	71		75	82		88
1997-98 ⁺⁺	67		70	75		81
1998-99	66		70	73		79
Working Families' Tax Credit						
2000-01	62		65	73		78
2001-02	71		74	80		85
2002-03 ⁺⁺⁺	72		76	82		88
Child Tax Credit and Working Tax Credit – low income working families with children[§]						
2003-04	87	89	91	91	93	95
2004-05	87	90	93	93	95	98

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	70	110	140	91	93	95
CTC and WTC	1,440	50	90	140	91	94	97
CTC, more than family element	680	140	200	260	73	77	83
CTC, family element or less	2,150	720	840	950	69	72	75

	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	5,620	230	340	460	92	94	96
CTC and WTC	8,970	210	440	680	93	95	98
CTC, more than family element	1,720	250	390	540	76	81	87
CTC, family element or less	1,230	380	440	500	71	74	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	910	0	30	60	94	97	100
£10,000-£20,000	880	100	150	200	82	86	90
£20,000-£30,000	1,120	200	260	330	77	81	85
£30,000-£40,000	830	190	260	320	72	76	81
£40,000-£50,000	390	150	220	280	58	64	72
£50,000+	130	150	210	270	33	39	47

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
£0-10,000	6,330	0	160	330	95	97	100
£10,000-£20,000	3,560	250	430	600	86	89	93
£20,000-£30,000	1,220	220	320	430	74	79	84
£30,000-£40,000	530	130	170	210	72	76	81
£40,000-£50,000	240	90	130	170	59	65	73
£50,000 and over	50	50	70	100	33	40	50

Notes:

In-work families only.

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	110	100	140	180	37	44	52
£500 to £1,000	1,980	600	700	810	71	74	77
£1,000-£2,000	380	70	120	170	70	76	84
£2,000-£4,000	480	50	80	110	81	86	91
£4,000 and over	1,330	40	90	130	91	94	97

	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	30	40	40	48	59
£500 to £1,000	1,100	340	400	450	71	74	76
£1,000-£2,000	510	100	160	220	70	76	84
£2,000-£4,000	1,450	140	220	300	83	87	91
£4,000 and over	8,840	230	480	730	92	95	97

Notes:

In-work families only.

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	1,020	40	80	120	89	93	96
Couples with children	3,250	930	1,060	1,190	73	75	78

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Lone parents	5,220	0	20	180	97	100	100
Couples with children	6,700	970	1,290	1,610	81	84	87

Notes:

In-work families only.

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	1,880	500	590	690	73	76	79
Two children	1,740	320	400	480	79	82	85
Three or more children	650	100	150	210	76	81	87

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
One child	4,050	340	520	710	85	89	92
Two children	4,640	250	470	690	87	91	95
Three or more children	3,240	80	310	550	86	91	98

Notes:

In-work families only.

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	1,540	320	400	470	77	80	83
5-9	1,170	160	230	300	80	84	88
10-15	1,260	260	330	400	76	79	83
16 or over	300	130	190	240	55	62	70

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
0-4	4,890	320	570	810	86	90	94
5-9	3,460	50	230	420	89	94	99
10-15	2,990	150	300	460	87	91	95
16 or over	590	70	210	340	63	74	89

Notes:

In-work families only.

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	200	10	30	50	80	88	97
North West	530	60	90	120	82	86	90
Yorks & the Humber	400	40	80	110	78	84	91
East Midlands	330	60	90	130	72	78	86
West Midlands	410	50	90	140	75	82	90
East	380	60	100	150	72	79	87
London	380	150	220	290	57	63	71
South East	520	130	170	220	70	75	81
South West	370	40	90	140	72	80	90
Wales	230	20	60	90	71	80	91
Scotland	370	50	80	120	75	82	89
Northern Ireland	130	10	40	70	65	76	90

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
North East	590	0	0	60	90	99	100
North West	1,580	0	50	130	92	97	100
Yorks & the Humber	1,180	0	100	230	84	92	100
East Midlands	920	0	100	210	81	90	100
West Midlands	1,190	0	110	250	83	92	100
East	940	0	120	270	78	88	100
London	1,140	50	260	460	71	82	96
South East	1,270	50	240	430	75	84	96
South West	980	0	110	280	78	90	100
Wales	660	0	60	130	84	91	100
Scotland	1,020	0	70	140	88	94	100
Northern Ireland	420	10	70	130	76	86	98

Notes:

In-work families only. 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	230	930	980	1,020	19	19	20

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
WTC only	430	1,140	1,290	1,440	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	160	510	540	580	22	23	24
£10,000+	70	390	420	450	14	15	15

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
£0-£10,000	360	870	980	1,090	25	27	29
£10,000 and over	70	240	300	360	17	20	24

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	280	310	11	12	13
£500 to £1,000	40	150	170	190	17	18	20
£1,000-£2,000	60	240	280	320	15	17	19
£2,000 and over	100	250	270	290	26	27	29

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Under £500	10	60	70	80	10	12	15
£500 to £1,000	30	110	120	130	17	19	21
£1,000-£2,000	80	360	410	470	15	17	19
£2,000 and over	310	660	720	780	28	30	32

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	160	520	560	600	21	23	24
Couples without children	70	400	420	450	14	14	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	270	500	590	690	28	31	35
Couples without children	160	600	700	800	17	18	21

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_A is the administrative caseload (the number of families who have made a claim and are entitled to a positive award)

ENR_{FRS} is the estimated number of those entitled to, but not receiving, tax credits based on the FRS

DAF_{BHPS} is an adjustment factor which scales the number of FRS ENRs so that they reflect the impact of the £2,500 disregard; the disregard adjustment factor is calculated using the BHPS

BA_A 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_A 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.

1/ 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, 2004-05"². These figures are based on almost all 2004-05 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.

One particular point to note is the treatment of out of work families with children. Out of work families with children in 2004-05 received 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 pensioner's Minimum Income Guarantee). Although we have caseload estimates of the latter group, we do not have detailed information on their annual incomes or the level of child allowances they are receiving. Because of this, we restrict the analyses from table 4 onwards to families in work only. Expenditure-based take-up rates in tables 1 and 3 are calculated using a combination of administrative caseload data and mean entitlement figures which are derived from the FRS.

2/ 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

² Available at <http://www.hmrc.gov.uk/stats/personal-tax-credits/cwtc-annual-0405.pdf>

of “entitled non-recipients”; families who were entitled to a tax credit in 2004-05, but did not receive one.

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 research³ 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 2004-05 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 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.

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

3/ The disregard adjustment (DA) – British Household Panel Survey (BHPS) data

Entitlement to tax credits does not rely, straightforwardly, on 2004-05 income, which is what we have to assume in our FRS modelling. Following finalisation of 2003-04 awards, 2004-05 tax credit awards were based on 2003-04 incomes, but could be adjusted in-year to reflect applicants' own estimates of 2004-05 incomes if they felt these were more accurate. Once the 2004-05 tax year had ended, recipients were able to report their final 2004-05 income at finalisation. However, a £2,500 disregard was in operation which meant that the first £2,500 of any increase in income between 2003-04 and 2004-05 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 2003-04 and 2004-05:

- 2004-05 income is used if income has fallen between 2003-04 and 2004-05;
- 2003-04 income is used if income has not changed, or has risen by up to £2,500, between 2003-04 and 2004-05;
- 2004-05 income, less £2,500, is used if income has risen by more than £2,500 between 2003-04 and 2004-05.

Clearly, this definition of entitlement requires 2003-04 income data to be linked with 2004-05 data on income and other circumstances relevant for tax credit entitlement. To do this, we require 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, but have also modelled entitlement using FACS as a quality check against some of the BHPS figures. The figures from the two surveys are 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:

Entitled non-recipients based on actual (2003-04 and 2004-05) income rules

Entitled non-recipients based on 2004-05 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 2004-05 income is such that they are just above the income necessary to receive a tax credit award, would be entitled if their 2003-04 income was within the range necessary to receive an award, and their income had risen by £2,500 or less between 2003-04 and 2004-05.

4/ 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 2004-05 awards with several “snapshot” datasets extracted throughout 2004-05, 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.

5/ The adjustment for payments reduced to zero

The 2004-05 FRS is unable to identify families who have claimed tax credits, have a positive entitlement in 2004-05, 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 2004-05) or a cross-year overpayment (ie. they were overpaid in 2003-04). There are limits on the reduction in payments due to a recovery of cross-year overpayments – which are currently set at 10% for those entitled to maximum awards and 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. There were no limits on repayments of in-year overpayments in 2004-05.

Based on the FRS question about tax credit receipt, which asks whether families are receiving a tax credit payment, families whose payments have been reduced to zero in this way will be incorrectly classified as non-recipients, even though they have claimed tax credits and are entitled to a positive amount. 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 2004-05 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 formula⁴:

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

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 formula⁵:

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

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.

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

⁵ 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.