HM REVENUE & CUSTOMS
Analysis Team

Child Tax Credit and Working Tax Credit

Take-up rates

2005-06

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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[1]:

- 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 2005-06 financial year.

Entitlement to tax credits in 2005-06 depended on family circumstances in that year (for example, number of children, use of eligible childcare, disability) and incomes in 2004-05 and 2005-06. The first £2,500 of any increase in income between 2004-05 and 2005-06 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 all 2005-06 tax credit records, which was also used to produce the HMRC statistical publication "Child and Working Tax Credits Statistics: Finalised Annual Awards 2005-06". 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 2004-05 and 2005-06 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_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 2005-06 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	1,080	1,240	1,400	80	82	84
WTC	1,770	1,020	1,130	1,240	59	61	63

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
CTC	18,400	1,440	1,890	2,350	89	91	93
WTC	10,170	1,850	2,250	2,660	79	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
2005-06	87	90	93	91	94	97

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	1,410	60	100	140	91	93	96
CTC and WTC	1,500	70	120	170	90	93	96
CTC, more than family element	660	110	190	270	71	78	85
CTC, family element or less	2,100	710	840	980	68	71	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	5,810	180	300	420	93	95	97
CTC and WTC	9,650	310	580	860	92	94	97
CTC, more than family element	1,740	290	500	710	71	78	86
CTC, family element or less	1,200	370	450	520	70	73	76

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	920	10	40	70	93	96	99
£10,000-£20,000	870	120	180	250	78	83	88
£20,000-£30,000	1,070	140	230	310	77	83	88
£30,000-£40,000	850	180	260	330	72	77	83
£40,000-£50,000	410	170	230	300	58	64	71
£50,000+	140	150	220	290	33	39	49

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
£0-10,000	6,630	60	230	400	94	97	99
£10,000-£20,000	3,800	350	580	820	82	87	92
£20,000-£30,000	1,300	130	260	390	77	83	91
£30,000-£40,000	560	140	200	260	68	73	80
£40,000-£50,000	250	100	150	190	57	63	70
£50,000 and over	50	40	60	90	34	43	57

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	120	120	190	250	32	39	49
£500 to £1,000	1,910	500	620	740	72	76	79
£1,000-£2,000	360	60	130	190	65	74	85
£2,000-£4,000	460	50	100	150	75	82	90
£4,000 and over	1,410	60	110	150	90	93	96

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Under £500	30	0	10	30	62	77	100
£500 to £1,000	1,070	280	350	410	72	76	79
£1,000-£2,000	480	80	160	250	66	75	85
£2,000-£4,000	1,390	160	300	430	76	83	90
£4,000 and over	9,620	350	630	910	91	94	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	1,050	10	60	110	90	95	100
Couples with children	3,210	930	1,090	1,240	72	75	77

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Lone parents	5,610	0	0	120	98	100	100
Couples with children	6,990	1,150	1,540	1,920	78	82	86

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	1,920	530	640	760	72	75	79
Two children	1,710	290	390	480	78	81	85
Three or more children	630	60	120	190	77	84	91

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
One child	4,330	450	690	920	82	86	91
Two children	4,870	220	460	690	88	91	96
Three or more children	3,400	90	370	640	84	90	97

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	310	410	520	75	79	83
5-9	1,170	170	250	330	78	83	88
10-15	1,260	230	310	380	77	80	84
16 or over	300	120	180	250	55	62	72

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
0-4	5,170	290	570	850	86	90	95
5-9	3,650	100	310	510	88	92	97
10-15	3,160	160	330	510	86	90	95
16 or over	620	120	290	460	57	68	83

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	50	80	72	82	93
North West	520	80	130	180	74	80	87
Yorks & the Humber	400	30	70	110	79	86	94
East Midlands	330	60	90	130	71	78	86
West Midlands	410	30	80	130	75	83	93
East	380	40	100	160	71	80	91
London	380	130	220	300	56	64	74
South East	520	100	160	220	70	76	83
South West	370	20	70	120	75	84	94
Wales	230	30	60	100	69	78	90
Scotland	370	40	80	120	75	82	90
Northern Ireland	130	10	40	70	65	76	92

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
North East	620	0	40	130	83	94	100
North West	1,660	30	180	330	83	90	98
Yorks & the Humber	1,250	0	80	240	84	94	100
East Midlands	970	10	140	260	79	88	99
West Midlands	1,260	0	130	330	80	91	100
East	1,000	0	120	280	78	90	100
London	1,240	50	340	620	67	79	96
South East	1,340	0	170	340	80	89	100
South West	1,020	0	80	190	84	93	100
Wales	690	20	80	150	82	89	98
Scotland	1,070	30	110	200	84	90	98
Northern Ireland	440	0	60	110	80	89	99

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	270	950	1,010	1,090	21	22	24

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
WTC only	450	1,260	1,440	1,630	26	28	30

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	180	470	500	540	25	26	28
£10,000+	90	480	510	550	14	15	16

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
£0-£10,000	420	940	1,040	1,150	27	29	31
£10,000 and over	30	320	400	480	6	8	9

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	250	280	300	12	13	14
£500 to £1,000	40	180	220	270	14	16	20
£1,000-£2,000	70	200	230	260	20	22	25
£2,000 and over	120	300	320	340	26	28	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	90	11	12	15
£500 to £1,000	30	130	160	190	14	16	20
£1,000-£2,000	100	280	330	370	20	23	26
£2,000 and over	380	830	890	960	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	190	510	560	1,400	24	25	27
Couples without children	80	440	470	490	14	15	16

	Expenditure (£m)	Amount unclaimed (£m)			Expenditure take-up rate (%)		
		Lower bound	Central estimate	Upper bound	Lower bound	Central estimate	Upper bound
Singles without children	330	510	620	740	31	35	40
Couples without children	190	720	820	920	17	19	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, 2005-06"[2]. These figures are based on all 2005-06 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 2005-06 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-0506.pdf

of “entitled non-recipients”; families who were entitled to a tax credit in 2005-06, 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 research[3] 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 2005-06 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.

[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 2005-06 income, which is what we have to assume in our FRS modelling. Following finalisation of 2004-05 awards, 2005-06 tax credit awards were based on 2004-05 incomes, but could be adjusted in-year to reflect applicants' own estimates of 2005-06 incomes if they felt these were more accurate. Once the 2005-06 tax year had ended, recipients were able to report their final 2005-06 income at finalisation. However, a £2,500 disregard was in operation which meant that the first £2,500 of any increase in income between 2004-05 and 2005-06 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 2004-05 and 2005-06:

- 2005-06 income is used if income has fallen between 2004-05 and 2005-06;
- 2004-05 income is used if income has not changed, or has risen by up to £2,500, between 2004-05 and 2005-06;
- 2005-06 income, less £2,500, is used if income has risen by more than £2,500 between 2004-05 and 2005-06.

Clearly, this definition of entitlement requires 2004-05 income data to be linked with 2005-06 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. FACS data has not been used this year as in previous years 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:

$$\frac{\text{Entitled non-recipients based on actual (2004-05 and 2005-06) income rules}}{\text{Entitled non-recipients based on 2005-06 income rules}}$$

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 2005-06 income is such that they are just above the income necessary to receive a tax credit award, would be entitled if their 2004-05 income was within the range necessary to receive an award, and their income had risen by £2,500 or less between 2004-05 and 2005-06.

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 2005-06 awards with several "snapshot" datasets extracted throughout 2005-06, 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 2005-06 FRS is unable to identify families who have claimed tax credits, have a positive entitlement in 2005-06, 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 2005-06) or a cross-year overpayment (ie. they were overpaid in 2004-05 and/or 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 2005-06.

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 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[4]:

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

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 formula[5]:

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

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.