Micro-simulating child poverty in 2010 and 2020

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JOSEPH ROWNTREE FOUNDATION

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Summary

- This paper shows the prospects for child poverty in Britain in 2010/11 and 2020/21, as defined by the current government, under various tax and benefit scenarios. It makes use of a static micro-simulation model, augmented with projections of some key economic and demographic characteristics that affect the income distribution.
- Under present tax and benefit policies, child poverty in 2010/11 will be little different from its current level, with beneficial demographic and economic changes offset by the fact that the income from tax credits and benefits received by low-income families with children will not keep pace with growth in earned income.
- The policy for 2010/11 recommended and highlighted in the Joseph Rowntree Foundation's (JRF's) final report (Hirsch, 2006) relies on increasing the child element of the tax credit by 31%, and introducing new payments for families with three or more children linked to the family element of Child Tax Credit. This would cost around £4.3 billion in 2010/11. Policies that relied less on means-tested benefits and more on universal benefits could cost much more. By way of comparison, the government increased spending on child-contingent support by over £8 billion between 1999/2000 and 2003/04.
- For 2020/21, the single policy highlighted in JRF's final report relies on implementing the 2010/11 package, and then increasing the Working Tax Credit for couples with children by 37%, and increasing all benefits and tax credits received by families with children by 7% a year between 2010/11 and 2020/21. To implement this package, the government would need to find around £30 billion in 2020/21, equivalent to 1.7% of gross domestic product (GDP). This package would reduce child poverty down to 5% – consistent with the lowest levels ever recorded in western Europe – only if the extent of non-take-up of means-tested benefits and tax credits was reduced from current levels.
- The policy packages for 2010/11 and 2020/21 would increase, on average, the effective marginal deduction rates faced by working parents. In addition, the incentive to work at all would be dulled for the second worker in a couple, and these feedback effects – which would increase child poverty or increase the cost to government of meeting its targets – have not been reflected in the modelling.
- The fact that particular tax and benefit policies are analysed in this paper does not mean that the authors are recommending that such policies be introduced; instead, this paper provides further analysis

and supporting materials to the policies discussed in the paper 'What will it take to end child poverty?' (Hirsch, 2006).

1 Introduction

The current UK government has an explicit target for child poverty in 2010, and a goal for 2020 that has not yet been precisely quantified.[1]

This paper was produced as part of a project funded by JRF called ‘What will it take to end child poverty?’. The aim of this paper is to forecast the prospects for child poverty in 2010/11 and 2020/21 under current government policies, and to illustrate the impact of various tax and benefit policies that could be implemented in 2010 and 2020 (however, the fact that policies are analysed in this paper does not mean that the authors are recommending that such policies be introduced). The results from this paper are referred to in the final report of the project (see Hirsch, 2006).

Micro-simulation models based on large-scale household surveys are in principle well suited to forecasting relative child poverty and the cost of policies required to change child poverty. Among other reasons, this is because micro-simulation models explicitly forecast the median income (and therefore the poverty line), and because they explicitly model the impact of tax and benefit changes (and their interactions) on household incomes and therefore measures of relative poverty.[2] In the UK, micro-simulation models have been used considerably in recent years to forecast changes in poverty (both child and the whole population, and both due to specific policy changes and general changes in society) over relatively short periods.[3] The effects on poverty of macro-level changes such as unemployment, increasing earnings inequality and fiscal drag have been explored cross-nationally using EUROMOD (Immervoll et al, 2006), and the same model has examined the effects on child poverty in the UK, Spain and Austria of ‘borrowing’ the systems of support for children from the other countries (Levy et al, 2005). But there have not been examples where poverty has been forecast 15 years in the future.

In principle, forecasting household incomes 15 years in the future can be done by dynamic simulation models, or other models that explicitly ‘age’ a sample of households observed at the present time. In this paper, however, we use techniques that are regularly used by static micro-simulation models to forecast changes over short periods of time – re-weighting of sociodemographic characteristics and up-rating of financial variables – to forecast changes over much longer periods.

The outline of this paper is as follows. Section 2 describes in detail the methods that were used to micro-simulate child poverty, covering issues such as re-weighting, adjusting financial variables, and making adjustments to reflect non-take-up of means-tested benefits and tax credits. The appendices contain more details on some of the key steps involved. Section 3 sets out the set of tax and benefit policies and different socioeconomic scenarios that were used during the project. Section 4 contains the key results, and section 5 contains a set of sensitivity tests performed on a limited number of the tax and benefit scenarios. Section 6 concludes the paper.

Notes

[1] DWP (2003): 2010 should be understood to mean '2010/11' (and equivalently for 2020), because child poverty is measured using the Family Resources Survey, a survey which covers financial years.
[2] See Redmond et al (1998).
[3] See Sutherland (2002); Brewer (2003, 2004); Sutherland et al (2003).

2 Methodology

This describes how future levels of child poverty in the UK were forecast using a micro-simulation model (TAXBEN, which is maintained by the Institute for Fiscal Studies [IFS]).[4]

The first step is to construct an estimate of the population in 2010 and 2020 (we call this the 'synthetic population'). The original data (see section 2.1) is amended in two ways:

- changes in financial characteristics of households (such as levels of private [pre-transfer] incomes) are made by up-rating variables in the data, using our projections of various price indices (see section 2.2);
- changes in other characteristics of households (number and distribution of adults and children across households, employment rates and distribution of earners across households) are adjusted using re-weighting techniques. In other words, we do not adjust the values of these characteristics in our sample, but we do adjust the grossing weights (see section 2.3).

The second step is to use a tax and benefit micro-simulation model (TAXBEN) to estimate entitlement to benefits and tax credits, and liabilities to income tax, council tax and national insurance contributions under hypothetical tax and benefit systems (see section 2.4, but section 3 discusses how we constructed the parameters of the tax and benefit system).

The final step is to calculate a measure of net income that is as similar as possible to that used in *Households Below Average Income* (HBAI), and then to calculate various statistics based on the estimated income distribution (see section 2.5).

2.1 Data

We use data from the Family Resources Survey (FRS) for 2002/03 and 2003/04 combined. After dropping those households who we cannot use (because they are missing crucial information), we are left with 63,590 families, 16,835 of whom have dependent children. Households from Northern Ireland were not used: the data is from Great Britain only. It did not prove possible to use data from the 2004/05 FRS in the micro-simulation modelling, although official estimates of poverty from the 2004/05 FRS are available at the time of writing.

2.2 Up-rating financial variables

In order to take into account changes that are likely to occur between then and 2010 and 2020, we need to up-rate the financial variables (mostly information about households' income) in the data.

We chose to peg most financial variables to a forecast of nominal earnings growth, which we constructed from the Treasury's forecast of inflation (RPI) (see Table A1a in Appendix 1) and an assumption that real earnings grow by 2% a year.

In particular, we assume that:

- earnings from employment and self-employment and incomes from private pensions income are assumed to grow by 2% a year in real terms;
- minor components of income (see Table A1b in Appendix 1 for definitions) are up-rated in line with inflation (RPI);
- we assume that the base rate will remain at 4.75%, which was its level when we started this project. This is used to infer the holdings of financial wealth from data on investment income, and vice versa;
- the total stock of savings and investments held by households is up-rated in line with nominal GDP in TAXBEN (real GDP is assumed to grow at 2.5% per year, in line with the Treasury's assumptions from the fourth quarter of 2006);
- rents, water and sewerage rates, and other deductions from income (see section 2.5) are forecast to increase in line with earnings.

Table A1b in Appendix 1 gives full details.

2.3 Re-weighting to reflect sociodemographic changes

The FRS data that are used for the policy simulations are weighted to adjust for differential non-response to the survey, and to inflate the results to match population totals.[5]

We have re-calculated these weights for two purposes. First, to project the characteristics of the household population to look like they are predicted to be in 2010 and 2020. The other component of the projection – changing the level and distribution of incomes – is done independently within the IFS model.

The JRF project commissioned demographic projections of key characteristics for the UK in 2010 and 2020, and these were used as the basis for control totals for our ‘synthetic population’ in 2010 and 2020. Weights were calculated so that when added up over the whole sample, the number of people or households with certain characteristics matched a set of control totals. The dimensions controlled for simultaneously in this way included age group, household size, numbers of dependent children, lone-parent households, region of residence, employment and worklessness, housing tenure and ethnicity.

Appendix 2 gives more detail on how this was done. In interpreting the modelling results for 2010 and 2020 it should be borne in mind that changing the weights applied to a current sample of households can only provide a ‘guesstimate’ of the characteristics of the future population. Not only are the estimates in each dimension (for example, employment) necessarily subject to prediction error. In addition, controlling for the marginal totals separately (for example, all employment and numbers of children aged under 10) does not automatically mean that the conditional or combined totals (for example, number of young children with parents in employment) will be correctly predicted. The results based on the re-calculated weights are plausible, but should not be assumed to be necessarily precisely correct.

Re-weighting was also used to capture the impact of changing patterns of parental employment (changes beyond those in the baseline forecast for 2010 and 2020) by adjusting the weights attached to households containing parents with and without work (see section 3.2 for details).

2.4 Reflecting non-take-up and mis-reporting of benefits and tax credits

TAXBEN calculates what benefits and tax credits individuals and households are entitled to under hypothetical tax and benefit systems. This does not take into account the fact that not everyone who is entitled to benefits or tax credits will necessarily claim them – some households may be unaware of their entitlement, or may have some reason for not wanting to claim. For example, they may find it too costly in terms of time spent filling in forms to claim, or find claiming means-tested benefits stigmatising, or not like the uncertainty around over- or under-payments that surrounds tax credit receipt.

The most common assumption made by IFS researchers in the past when using TAXBEN was to assume complete take-up of means-tested benefits and tax credits when constructing measures of income. This assumption may mean that the micro-simulation model under-estimates the level of child poverty, since it is generally the poor (rather than the median household) who are eligible to benefits and tax credits, and so who will lose out if not all tax credits and benefits are claimed. Such an assumption will also mean that TAXBEN over-estimates the cost to the government of increasing means-tested benefits and tax credits.

On the other hand, estimates from the FRS of the number of people receiving means-tested benefits and tax credits, and on the total amount spent on such programmes, tend to be lower than those based on administrative data, even when allowance is made for the less-than-full-coverage of the FRS (that is, that it omits people not in private households). This phenomenon might mean that TAXBEN under-estimates the cost to the government of increasing means-tested benefits and tax credits, and it might also mean that TAXBEN over-estimates the level of poverty.[6]

For this project, however, we simulate some non-take-up of means-tested benefits and tax credits by selecting some families who are entitled to means-tested benefits and tax credits at random and assume that they do not receive such benefits. We do not take account of the fact that it tends to be those households with small entitlements – households who are generally not the poorest in society – who are less likely to claim tax credits or means-tested benefits. Simulating random non-take-up as we do, therefore, might lead to an over-estimate of the true level of child poverty. However, by splitting the population up into different groups who have rather different entitlements on average, we can partially take this into account.[7] We ignored any interactions between means-tested benefits and tax credits.

Our data on (non)-take-up rates comes from official data from the Department for Work and Pensions and HM Revenue and Customs for take-up rates of benefits and tax credits respectively for 2003/04.[8] Tables A1c and A1d in Appendix 1 have details of the take-up rates used (we used the midpoints of the upper and lower bounds for benefit take-up and the central estimate of tax credit take-up). As a sensitivity test, we allowed the take-up rate of various means-tested benefits and tax credits to change.

A new concern about using calculated entitlements to means-tested benefits and tax credits has arisen since the Child and Working Tax Credits began in April 2003. Because of the particular way that these tax credits operate, many families are receiving amounts of tax credits that are different from their finalised entitlement to those credits, because they are being under- or over-paid. We do not try to address this phenomenon, partly because we only have data from the first year of operation of these tax credits, and that first year is very unlikely to be an accurate representation of future experience.

2.5 Creating the HBAI definition of income and calculating poverty rates

Given micro-simulated data on private incomes, liability to taxes and receipt of benefits and tax credits, we need to create a measure of disposable income that is as close as possible to that used in HBAI when calculating child poverty rates (the precise definition is given in DWP, 2006b). To construct something broadly equivalent to this, we add together various sources of private (that is, pre-transfer) income, subtract estimated tax liabilities, add estimated receipt of benefits, and then subtract various ‘deductions’ from income. Table A1e in Appendix 1 gives full details of the various components of incomes.

Data on the deductions are derived partly from outputs from TAXBEN (council tax, contributions to a private pension), and partly taken from the official HBAI dataset (because this is based on the FRS, we are able to merge the official HBAI dataset with the dataset produced by TAXBEN). We assume that these latter set of deductions (housing costs, child support paid for non-resident children, and financial support given by parents to children who are students living away from home) increase over time in line with average earnings growth.

We can then create a measure of household equivalised income (by summing this final measure of disposable income across all members of a household, and dividing by various weights corresponding to different equivalence scales). The UK government has said that progress towards its 2010 and 2020 targets will be assessed using a measure of equivalised before housing costs (BHC) income based on the modified OECD (Organisation for Economic Co-operation and Development) scale. However, progress to the 2004 target used the McClements equivalence scale, and was measured using incomes measured BHC and after housing costs (AHC). We construct all three of these measures of household disposable income.

We use this simulated data on the distribution of household disposable income to forecast median income, and thereby the poverty line. As a robustness check, we also forecast the poverty line ‘off model’ – we view this essentially as a sensitivity test to the rate of growth of pensioners’ private income, which is assumed to be identical to average earnings growth in our central forecast.

Notes

[4] The most recent, although dated, description of TAXBEN is Giles and McCrae (1995), although the basic structure has not changed in the past 11 years.
[5] See DWP(2005).
[6] It is not clear whether the FRS under-estimates the number of recipients of means-tested benefits or tax credits. It could be because recipients of means-tested benefits or tax credits are less likely to participate in the survey, and that the grossing weights fail to compensate for this form of differential non-response. On the other hand, it could be because recipients of means-tested benefits or tax credits are participating in the survey but the survey is not recording the fact that they receive means-tested benefits or tax credits.
[7] For Income Support, Housing Benefit and Council Tax Benefit, the groups are: couples with children, lone parents, pensioners and working-age people without children. For tax credits, the groups are: those ineligible for tax credits, working-age people without children eligible for Working Tax Credit, workless families with children, working families with children eligible for Working Tax Credit and Child Tax Credit, working families with children entitled to no Working Tax Credit but more than just the family element of Child Tax Credit and those entitled to only the family element or less.
[8] See DWP (2006a); HMRC (2006).

3 Prospects for child poverty under the policy baseline

This chapter first sets out the three policy baselines used in the report, and then the three employment scenarios. It then shows what these baselines mean for child poverty in 2010 and 2020.

3.1 The tax and benefit policy baselines

We produced two policy baselines for 2010, and three for 2020:

- the Public Finance baseline
- the Current Policies baseline
- the Long-Term Fiscal Forecast (LTFF) baseline (2020 only).

Following Hirsch (2006), this paper uses Current Policies as the main baseline, but we present information in section 4 that allows one to estimate the cost of packages relative to any of the three baselines.

The Public Finance baseline assumes that the usual policies for up-rating thresholds and benefits will continue indefinitely, except where the government has already made other commitments and allowed for these in its public finance forecasts (namely to increase the per child element of Child Tax Credit in line with earnings until April 2009 and the Pension Credit guarantee amount in line with earnings until April 2008). Table A1c in Appendix 1 details what we understand by the ‘usual’ up-rating policies (a mixture of statutory requirements and the ‘usual’ practice in recent years).

After 2010, however, the Treasury’s long-term fiscal forecasts assume that income tax receipts will remain constant as a proportion of GDP, while benefit and tax credit rates are increased only in line with inflation.[9] Therefore, we have constructed the LTFF baseline by assuming that income tax (and national insurance) thresholds are increased in line with earnings between 2010 and 2020.[10] Compared to the Public Finance baseline, the LTFF baseline (that is, indexing income tax allowances to earnings rather than prices between 2010 and 2020) costs £23 billion in 2020, or 1.3% of GDP.

The Current Policies baseline differs from the Public Finance baseline in that the child element of Child Tax Credit, and the Pension Credit guarantee are assumed to rise with average earnings indefinitely (rather than until April 2009 and April 2008 respectively). This mirrors what the government has actually been doing to taxes and benefits since 2003 (when the Child Tax Credit and Pension Credit were introduced). In this paper and in Hirsch (2006), the costs of packages in 2010 and 2020 are presented relative to the Current Policies baseline, but it is important to remember that, although Current Policies reflects the current up-rating practice of the current government, the government has yet to show how it can afford to continue this practice after April 2009. Compared to the Public Finance baseline, the Current Policy baseline costs £1.1 billion in 2010 (£0.2 billion for increasing Child Tax Credit in line with earnings in April 2010, and the remainder from indexing Pension Credit in line with earnings through to April 2010) and £10.8 billion in 2020 (£1.78 billion from increasing Child Tax Credit in line with earnings between April 2010 and April 2020, and the remainder from earnings indexation of Pension Credit).[11]

Official forecasts for spending on tax credits and Child Benefit in 2010 and 2020 are not available,[12] so Table 1 shows the estimate from TAXBEN of spending on these key components of child-contingent support. Unsurprisingly, it shows that spending on Child Benefit is estimated to hardly change in real terms (because the number of children is hardly changing, and the assumption is that the rates are unchanged in real terms). More surprisingly, however, Table 1 shows that, even if the child element of Child Tax Credit continues to rise in line with earnings, spending on tax credits for families with children is forecast to fall by some 13% by 2010 and 25% by 2020. This is primarily because the threshold in tax credits and the family element of Child Tax Credit are both assumed to be fixed in nominal terms. It should be borne in mind, therefore, that the packages presented in section 4 are presented compared to baseline where spending on the two most expensive programmes affecting families with children is set to decline in real terms, let alone as a share of national income.

Table 1: Expenditure on various benefits under Public Finance assumptions and Current Policies (2006 prices)

Year	Child Tax Credit spending	Working Tax Credit spending	Child Benefit spending
2004/05	£10.0bn	£3.8bn	£9.5bn
2010/11 Public Finance	£10.2bn	£1.6bn	£9.4bn
2010/11 Current Policies	£10.4bn	£1.6bn	£9.4bn
2020/21 Public Finance	£7.4bn	£1.2bn	£9.5bn
2020/21 Current Policies	£9.1bn	£1.2bn	£9.5bn

Note: Uses middle employment scenario for 2010 and 2020.

We do not suggest in this paper how the money could be raised to pay for our policy packages. Were the government to use changes in personal taxes or benefits, or changes in other taxes that eventually affected household incomes, or changes to other areas of public spending that eventually affected household incomes, then these might also affect the level of child poverty in 2010 or 2020; these effects are not considered here.[13]

3.2 Employment changes

It is entirely reasonable that the UK government may try to reduce child poverty by seeking to increase the amount of paid work done by parents. Brewer et al (2006) show that the reduced number of children in workless families was a major contributor to the fall in child poverty between 1998/99 and 2004/05.

In a separate paper commissioned for this project, Gregg et al (2006) consider prospects for lone parents' employment rates in 2010 and 2020, both under existing policies (both existing tax and benefit policies and labour market policies affecting lone parents) and under potential policy changes. Drawing on that work, this paper uses three scenarios for parental employment (note that the scenarios do not affect the working patterns of couples with children with at least one worker) (see Table 2).

Table 2: Scenarios for parental employment in 2010 and 2020

	2010	**2020**
Lone parents: % in work		
Demographic changes only	63	65.6
Demographic changes plus welfare to work policies	67.5	70
Demographic changes, welfare to work and up-rating Working Tax Credit in line with earnings	70	73
Couples with children: % workless		
Demographic changes only	4.75	4.5
Demographic changes plus welfare to work policies	4.5	4
Demographic changes, welfare to work and up-rating Working Tax Credit in line with earnings	4.5	4

Note: Based on Gregg et al (2006)

Unless stated otherwise, this paper uses the middle employment scenario.[14]

3.3 What are the government's child poverty targets for 2010 and 2020?

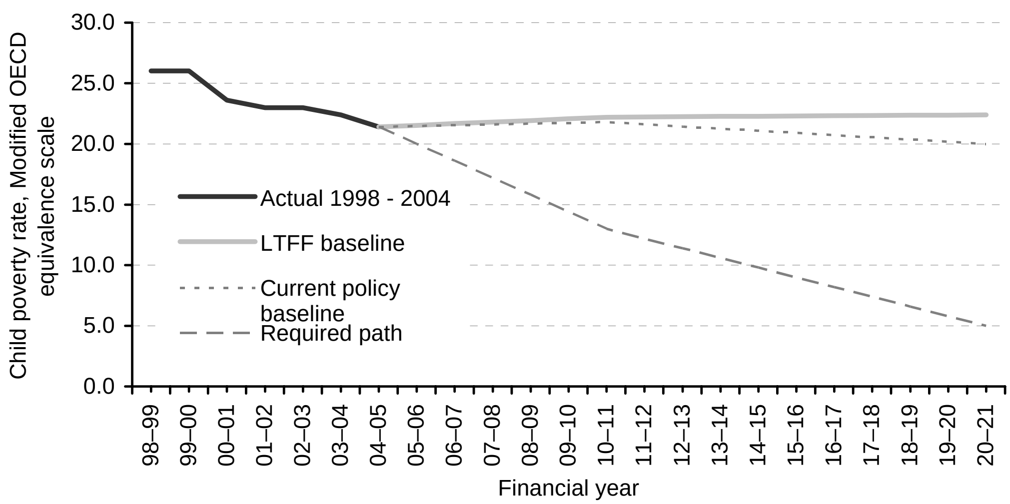
The government has committed itself to halving child poverty from its 1998/99 level by 2010 and to have 'effectively eradicated' it by 2020.[15] The 2010 target will be assessed using a combination of relative poverty, measured BHC, and material deprivation measures. In this paper we focus on the relative poverty measure as the material deprivation element of the 2010 target has not yet been fully defined by the government. The relative poverty measure will use the modified OECD equivalence scale rather than the McClements equivalence scale that has traditionally been used in the HBAI report. The Department for Work and Pensions' Public Service Agreement says that the target will be measured by halving the number of children in relative low-income households by 2010; however, as we do not know for certain how many children there will be in 2010, in this paper we have concentrated on halving the poverty rate, which is likely to mean that there will be an overshoot as the number of children is likely to fall between now and 2010.

For 2020, the target has not yet been explicitly defined. The government has said that it will be impossible to get the HBAI poverty rate down to zero as surveys "always classify as poor some people with high living standards but transitory low incomes".[16] Therefore, "success in eradicating child poverty could, then, be interpreted as having a material deprivation child poverty rate that approached zero and being amongst the best in Europe on relative low incomes". This is clearly a matter of opinion and political judgement. In 2001, three countries in Europe (Denmark, Finland and Sweden) had relative child poverty rates of 10% or less. It could be argued that achieving a child poverty rate of between 5 and 10% in the UK falls some way short of abolishing child poverty; it is not clear, for example, whether Denmark, Finland and Sweden consider that they have abolished child poverty. For the purposes of this paper then we have decided to define abolishing child poverty as meaning that the relative child poverty rate measured BHC on the OECD scale is below 5%, as this is both achievable using our measure of relative poverty as shown by the success of Denmark and Finland in achieving such a poverty rate, and low enough to be consistent with child poverty actually having been abolished.

3.4 What will happen to child poverty under current policies?

Figure 1 shows actual rates of child poverty to 2004/05, and our forecasts for 2010 and 2020 under our two baselines: the Public Finance baseline (where real increases in the child element of Child Tax Credit and Pension Credit stop in April 2009 and April 2008 respectively, and where income tax thresholds rise with earnings after 2010), and the Current Policies baseline (where the child element of Child Tax Credit and Pension Credit rise in line with average earnings indefinitely, and where income tax thresholds rise with inflation indefinitely). Under Current Policies, child poverty will be little different from current levels in 2010 and 2020.

Figure 1: Child poverty measured BHC on the OECD equivalence scale under various scenarios



Note: LTFF and Current Policies baselines both assume the middle employment scenario in this graph (for 2010, LFTT is identical to Public Finance baseline).

Table 3 gives more detail by showing how the employment scenarios affect child poverty, and how median income will change under the baselines. It confirms that there is very little difference (in poverty rates or median income growth) between the LTFF baseline and Current Policies for 2010; this is unsurprising, as the only difference is one year's earnings up-rating of the per child element of Child Tax Credit. However, the difference is more pronounced for 2020 where the Current Policies baseline has another 10 years of earnings up-rating of the child element of Child Tax Credit, and 10 years where tax allowances are increased only with inflation.

Real median income growth under both baselines is slightly slower than real average earnings growth (assumed to be 2% per year), due to the fact that the UK's tax system is progressive, and consistent with average median income growth in the past 10-15 years.

Demographic changes as a whole do significantly reduce poverty rates compared to what they would be if the population remained the same as in 2002/03-2003/04. We can tell this because not all of the incomes of poor parents are being increased in line with earnings (in particular all benefits and tax credits with the exception of the per child element of Child Tax Credit remain constant in real terms), so the poor will fall further behind in the absence of any demographic changes. This is confirmed by the results of one of the sensitivity tests in section 5.

Table 3 shows that higher employment among lone parents does not make much difference to child poverty under the baseline tax and benefit policies.

Table 3: Estimates of child poverty in 2010 and 2020 under current tax and benefit policies

Year	Employment assumption	Policy baseline	Median income growth per year from 2004 (%)	OECD poverty rate (%)	BHC poverty rate (%)	AHC poverty rate (%)
2004				21.0	19.5	27.2
2010	Low	Public Finance	1.9	22.4	20.8	29.1
	Low	Current Policies	1.9	22.0	20.1	29.0
	Middle	Public Finance	1.9	22.2	20.7	28.9
	Middle	Current Policies	1.9	21.8	20.4	28.7
	High	Public Finance	1.9	21.9	20.5	28.6
	High	Current Policies	1.9	21.6	20.2	28.5
2020	Low	Public Finance	1.6	22.8	22.7	28.7
	Low	Current Policies	1.7	20.4	20.2	27.5
	Middle	Public Finance	1.6	22.4	22.2	28.1
	Middle	Current Policies	1.7	20.0	19.9	27.0
	High	Public Finance	1.6	22.2	22.1	27.9
	High	Current Policies	1.7	19.8	19.7	26.8

Notes and sources: 2004/05 level from DWP (2006b). 2010 and 2020: authors’ calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text.

Notes

[9] HM Treasury (2005). There is clearly an inconsistency in the Treasury’s assumptions: although the long-term fiscal forecasts assume that income tax receipts do not rise as a share of GDP, if the government continued to index allowances only to prices and made no other changes to income tax, it is highly likely that income tax receipts would rise as a share of GDP and yet this would not count as a tax-raising discretionary policy change under the rules for presenting Budget tax policy decisions.

[10] The assumption is only that income tax receipts stay constant as a share of GDP; this could also be achieved by increasing tax thresholds only in line with prices, and cutting income tax rates.

[11] In the government's accounts, some spending on the Child and Working Tax Credits is treated as negative tax, and some as positive spending; we ignore this distinction in this paper, and refer to spending on tax credits throughout.

[12] That is, such figures are not routinely published, and HM Treasury have stated that "The Treasury does hold information relevant to part i a) of your request [the likely expenditure on Child Benefit in 2010-11], but we have decided that the information should be withheld. The information relates to forecasts for public expenditure beyond the period announced by the Chancellor in his recent budget, and information relating to policy development. Sections 29 and 35 of the FOI Act permit public authorities to withhold information that relates to the economy and policy development if, on consideration of the public interest, the balance of public interest is determined to be against disclosure" (personal communication; full letter available on request). HM Revenue and Customs have also declined to release any relevant information (personal communication; full letter available on request).

[13] This means that our approach is equivalent to assuming that the government pays for these packages either through increased borrowing (in which case the cost is borne by future taxpayers) or by a tax change (or spending cut) which affects all households equally (as a share of their income) and therefore has no impact on measures of relative inequality or poverty.

[14] Note also that the middle employment scenario assumes tax and benefit policies in line with the Current Policies baseline; the policy packages may themselves affect work incentives and employment, and we consider that impact in section 4.8.

[15] This section draws on Brewer et al (2004).

[16] DWP (2003).

4 Results

This chapter first examines what will happen to child poverty under the two baseline tax and benefit systems and the three employment scenarios. It then looks at five strategies for meeting the 2010 target of halving child poverty from its 1998/99 level, some of which are discussed further in Hirsch (2006).

For 2020, we investigate the impact of different up-rating policies, conditional on implementing the policy for 2010 recommended in Hirsch (2006). Having decided on a preferred strategy for 2010, we look at various up-rating policies to see what we would need to do between 2010 and 2020 if this policy was implemented.

We also look at other policies that have been suggested to help reduce child poverty, the characteristics of the children left in poverty when it is below 5% and the effect of our 2010 policy on work incentives.

It is important to note that the fact that policies are analysed in this paper does not mean that the authors are recommending that such policies be introduced.

4.1 Packages to meet the child poverty target for 2010/11

The five policy packages that would enable us to reach the 2010 target are as follows (all financial values are in today's prices):

- *Child Tax Credit only option:* increase the child element of Child Tax Credit by £16 per week (under the Current Policies baseline, it will be at £37 a week by 2010 in current prices).
- *Child Benefit only option:* increase Child Benefit by £20 per week for all children from £17.45 to £37.45 for the first child and £11.70 to £31.70 for the second and subsequent children.
- *Child Tax Credit plus large family Child Benefit premium:* increase the child element of Child Tax Credit by £11.50 per week, and introduce a higher rate of Child Benefit for the third and subsequent child that is £20 per week higher than that of the second child, that is, the amount received for the third and subsequent children would be £31.70 rather than £11.70.
- *Child Tax Credit plus large family Child Tax Credit premium:* increase the child element of Child Tax Credit by £11.50 per week, and introduce premia for the third and subsequent child paid with the family element of Child Tax Credit of £20 per week (the difference with the above is that the extra support for the third and

subsequent children is tapered away from families with incomes over £50,000).

- *Child Tax Credit plus large family Child Tax Credit premium plus Working Tax Credit for couples:* increase the child element of Child Tax Credit by £11.50 per week, introduce a higher rate of Child Benefit for the third and subsequent child that is £5.35 per week higher than that of the second child so the rate for the third and subsequent child would be £17.05 rather than £11.70, and increase Working Tax Credit for couples with children by £36 a week, from £64 to £100.

In all packages that increase payments for children, the associated allowances in Housing Benefit and Council Tax Benefit are also increased.

In Table 4 we show poverty rates for these five packages under each of the three employment scenarios together with the cost in each case. All costs are relative to the low employment scenario under Current Policies; for the higher employment scenarios, we give the costs net of the savings that arise from more people being in work. This means that we are allowing the government to spend the extra tax revenue and the reduced spending on tax credits and means-tested benefits.

Table 4: Five packages to come close to the child poverty target in 2010

Policy	Employment scenario	No change in tax credit take-up: Cost (bn)	No change in tax credit take-up: OECD poverty rate (%)	Non-take-up of tax credits halved: Cost (bn)	Non-take-up of tax credits halved: OECD poverty rate (%)
Public Finance baseline	Low	–£1.2	22.4	£0.1	21.5
	Middle	–£1.2	22.2	£0.1	21.3
	High	–£1.4	21.9	–£0.1	21.1
Current Policies baseline	Low	£0.0	22.0	£1.3	21.1
	Middle	–£0.1	21.8	£1.2	20.9
	High	–£0.3	21.6	£1.0	20.7
Child Tax Credit option	Low	£4.2	13.9	£5.9	12.4
	Middle	£4.2	13.8	£5.8	12.4
	High	£4.0	13.7	£5.6	12.3
Child Benefit option	Low	£12.6	13.1	£13.9	12.0
	Middle	£12.6	13.1	£13.9	11.9
	High	£12.3	13.0	£13.6	11.9
Child Tax Credit plus large family Child Tax Credit premium	Low	£4.4	13.6	£6.0	12.2
	Middle	£4.3	13.6	£6.0	12.1
	High	£4.1	13.4	£5.7	12.0
Child Tax Credit plus large family Child Benefit premium	Low	£4.8	13.5	£6.3	12.1
	Middle	£4.7	13.4	£6.3	12.1
	High	£4.5	13.2	£6.0	12.0
Child Tax Credit, large family Child Tax Credit, higher Working Tax Credit for couples	Low	£5.7	13.0	£7.4	11.6
	Middle	£5.6	12.9	£7.3	11.5
	High	£5.5	12.7	£7.1	11.4

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Of the £1.1 billion difference between Current Policies and the Public Finance baseline, £0.2 billion comes from increases to Child Tax Credit, and £0.9 billion from increases to Pension Credit (see section 3).

These five policies bring child poverty in 2010 to a level broadly consistent with the government's target, but with differing costs.

The two most cost-efficient policies are increasing the child element of Child Tax Credit, or that in combination with a higher rate of Child Benefit for the third and subsequent child. However, increases in the child element of Child Tax Credit harm financial work incentives, in the same way as any increase in a means-tested benefits would (the impact of these policy packages on effective marginal tax rates [EMTRs] and labour supply is discussed in section 4.6).[17]

The Child Benefit option increases the income of poor families with children by the same amount as the Child Tax Credit option, but uses a universal benefit, and so has no impact on the gain to working or on EMTRs; because it is a universal benefit; however, the cost of this option is much greater than relying on the means-tested child element of Child Tax Credit.

Any change in child-contingent support, and particularly the extra payments of £20 a week for the third and subsequent child, might affect fertility assumptions; we do not allow for such responses in this analysis.

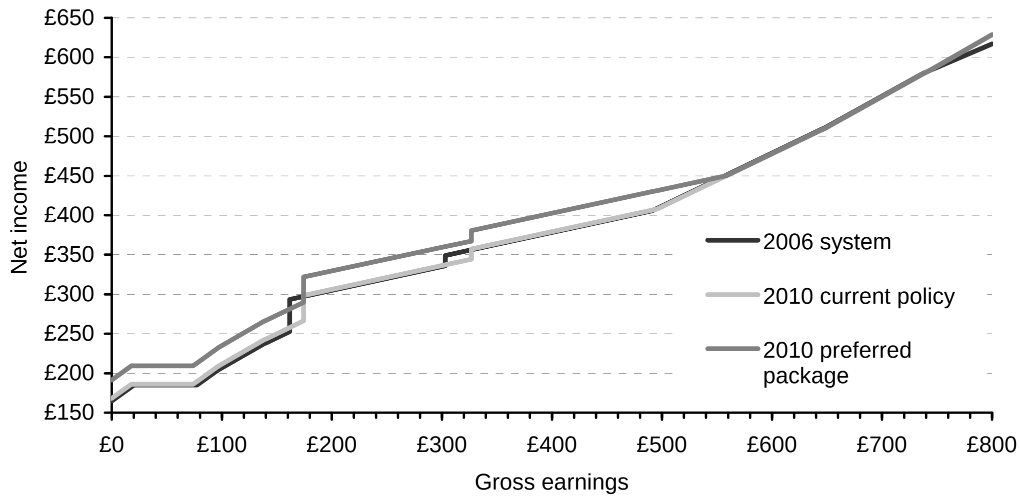
Table 5 shows the impact of the policies under two assumptions about the take-up rate of tax credits: that this remains unchanged from its 2003/04 level, and that the level of non-take-up is halved.[18] It is plausible that non-take-up of tax credits might fall from its 2003/04 level both because that was the first year of operation of Child and Working Tax Credit, and because some of the policy packages involve considerable increases in the generosity of tax credits (which might encourage some families to claim who otherwise would have not). Unsurprisingly, rising levels of take-up increase the cost to the government and reduce child poverty.

Hirsch (2006) recommends a policy package for 2010 that combines increases in the child element of Child Tax Credit with a higher rate of Child Benefit for the third and subsequent children. The effect of the policy on the budget constraints of various family types is shown below.

Figure 2a: Budget constraint for a lone parent with two children earning the minimum wage under 2010 package recommended in Hirsch (2006)

Note: Constant 2006 prices. Minimum wage increased in line with earnings from 2006 to 2010. Assumed no housing costs or council tax liability or spending on childcare.

Figure 2b: Budget constraint for a lone parent with two children earning twice the minimum wage under 2010 package recommended in Hirsch (2006)



Note: Constant 2006 prices. Wage increased in line with earnings from £10.10 in 2006 to £12.25 in 2010. Assumed no housing costs or council tax liability or spending on childcare.

Figure 2c: Budget constraint for a second earner in a couple with two children earning twice the minimum wage under 2010 package recommended in Hirsch (2006)

Note: Constant 2006 prices. Wage increased in line with earnings from 2006 to 2010. Assumed no housing costs or council tax liability or spending on childcare. Partner assumed to work full time and earn £20,000 per year in 2006, increased in line with earnings to 2010.

We can see that the preferred package for 2010 is clearly redistributive as the poor benefit from the higher rate of Child Tax Credit whereas the rich are no better off than they would be if current policies were to continue (these budget constraints obviously do not show the effect of the premium for the third and subsequent child, but if they did there would simply be a parallel shift in the budget constraint except at very high levels of income).[19]

The impact of this package on other measures of child poverty is shown in Table 5. The 2010 package recommended by Hirsch (2006) is predicted to be sufficient to halve child poverty measured under the old McClements equivalence scale but only when measuring BHC incomes; measuring AHC incomes, a similar number of children are lifted out of poverty, but the level of poverty in 1998/99 is higher measuring incomes AHC than BHC, so the decline from the 1998/99 is less than a half, at just over a third.

Table 5: Poverty rates in 2010

Scenario	OECD poverty rate (%)	BHC McClements poverty rate (%)	AHC McClements poverty rate (%)
Memo: child poverty in 1998/99	26.0	24.5	32.5
Public Finance baseline	22.2	20.7	28.9
Current Policies baseline	21.8	20.4	28.7
Child Tax Credit big family option	13.6	12.9	20.7

Note: Uses middle employment scenario for 2010 and 2020.

4.2 Strategies for meeting the child poverty target in 2020

Conditional on adopting the package described above for 2010, we explored the following options for 2020:

i. *Price indexation:* revert to the usual rules for up-rating benefits and tax credits between 2010 and 2020.
ii. *Selective earnings indexation:* up-rate the per child element of Child Tax Credit and the new Child Tax Credit premium for the third and subsequent child in line with earnings, but use the usual rules for up-rating benefits and tax credits between 2010 and 2020 for everything else.
iii. *Doubling the per child element of Child Tax Credit:* the same as (ii) except the per child element of Child Tax Credit is doubled.
iv. *Comprehensive earnings indexation:* up-rate all benefits and tax credits for parents in line with earnings.[20]
v. *Comprehensive earnings indexation plus higher rate of Working Tax Credit for couples:* as (iv), plus introduce a higher rate of Working Tax Credit for couples with children that is 57% higher than the rate for all people with children after this has been earnings up-rated between 2010 and 2020. The rate of Working

Tax Credit for couples would be £121.60 in today's prices compared to £77.50 for lone parents.

vi. *Slight over-indexation:* as (v), but increase Income Support applicable amounts for parents, and the child element of Child Tax Credit by 3% per year in real terms.

vii. *Large over-indexation:* as (v), but increase Income Support applicable amounts for parents, and the child element of Child Tax Credit by 7% per year in real terms.[21]

In all packages that increase payments for children, the associated allowances in Housing Benefit and Council Tax Benefit are also increased.

In Table 6 we show poverty rates for these five packages under each of the three employment scenarios, together with the cost in each case. All costs are relative to the low employment scenario under the Current Policies baseline; for the higher employment scenarios, we give the costs net of the savings that arise from more people being in work. This means that we are allowing the government to spend the extra tax revenue and the reduced spending on tax credits and means-tested benefits.

Table 6: Five packages to move towards the child poverty target in 2020

Policy	Employment	No change in tax credit take-up: Cost (bn)	No change in tax credit take-up: OECD poverty rate (%)	Non-take-up of tax credits halved: Cost (bn)	Non-take-up of tax credits halved: OECD poverty rate (%)
LTFF baseline (without 2010 package)	Low	£12.1	22.8	£13.0	22.4
	Middle	£11.1	22.4	£12.1	21.9
	High	£10.9	22.2	£11.8	21.7
Public Finance baseline (without 2010 package)	Low	–£10.8	22.3	£22.1	28.9
	Middle	–£11.8	21.8	£21.6	28.0
	High	–£12.1	21.7	£21.4	27.8
Current Policies (without 2010 package)	Low	£0.0	20.4	£1.1	19.7
	Middle	–£1.0	20.0	£0.2	19.3
	High	–£1.2	19.8	–£0.1	19.2
Price indexation of 2010 package	Low	£1.5	18.2	£2.7	17.5
	Middle	£0.5	17.9	£1.7	17.1
	High	£0.2	17.8	£1.4	17.0
Selective earnings indexation of 2010 package	Low	£4.0	14.6	£5.5	13.5
	Middle	£3.0	14.3	£4.5	13.2
	High	£2.7	14.2	£4.2	13.1
Doubling of child element of Child Tax Credit after 2010 package	Low	£21.3	7.9	£24.5	5.7
	Middle	£20.2	7.8	£23.3	5.6
	High	£19.9	7.8	£23.1	5.5
Comprehensive earnings indexation of 2010 package	Low	£11.1	11.3	£12.9	9.8
	Middle	£10.1	11.0	£11.9	9.7
	High	£9.8	10.9	£11.6	9.7
Comprehensive earnings indexation of 2010 package plus higher rate of Working Tax Credit for couples	Low	£14.1	10.0	£16.1	8.6
	Middle	£13.1	9.7	£15.1	8.4
	High	£12.8	9.7	£14.8	8.3
Slight over-indexation of 2010 package	Low	£16.4	9.0	£18.6	7.5
	Middle	£15.4	8.8	£18.2	7.2
	High	£15.1	8.7	£17.3	7.2
Large over-indexation of 2010 package	Low	£28.7	6.4	£31.7	4.4
	Middle	£27.5	6.2	£30.5	4.3
	High	£27.1	6.2	£30.2	4.2

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Section 3 explains the difference between the LTFF and the Current Policies baseline. Of the £10.8 billion difference between Current Policies and the Public Finance baseline in 2020, £1.78 billion comes from increases to Child Tax Credit, and the rest from increases to Pension Credit (see section 3).

Please note that, when discussing the packages for 2020, Hirsch (2006) reports only the difference between the total costs of the 2020 packages (relative to Current Policies baseline) and the total cost of the 2010 package in 2020 (relative to Current Policies baseline). By 2020, the cost of the package recommended in Hirsch (2006) for 2010 is estimated to fall from £4.3 billion (in 2010) to £3.0 billion (all in 2006 prices) because the rise in parents' earnings over this period means that fewer parents are eligible for the additional support provided through Child Tax Credit.

As in 2010, current policies will not be enough to significantly alter child poverty by 2020.

Price indexation of the 2010 package recommended in Hirsch (2006) leads to some children brought out of poverty falling below the poverty line by 2020, because the income the poor receive from benefits and tax credits does not keep pace with increases in median income. The same is true if only the per child element of Child Tax Credit and the big family premium are up-rated in line with earnings (selective earnings indexation), but large inroads into child poverty are made if the 2010 levels of Child Tax Credit are doubled.

Comprehensive indexation of all benefits and tax credits for parents does reduce child poverty as all elements of the incomes of the poor are raised at the same rate as earnings, which should only keep child poverty constant but demographic changes tend to reduce the poverty rate. A higher rate of Working Tax Credit for couples does not reduce poverty by much more, and not as much as it did when we examined this policy earlier; this is probably because most working families have already been lifted out of poverty by this point and the poverty line has moved to a less dense part of the income distribution.

Without a rise in take-up, none of these policies can abolish child poverty by 2020. Only if non-take-up is halved does the most expensive of these packages reduce child poverty to below 5%.

Table 7 shows how child poverty would fall under the baselines, and the large over-indexation option. Under the latter package, child poverty would fall to extremely low levels on the McClements scale whether incomes were measured BHC or AHC.

Table 7: Poverty rates in 2020

Scenario	OECD poverty rate (%)	BHC McClements poverty rate (%)	AHC McClements poverty rate (%)
Memo: child poverty in 1998/99	26.0	24.5	32.5
LTFF baseline	22.4	22.1	28.1
Current Policies baseline	20.0	19.9	27.0
Large over-indexation	6.2	6.4	8.6

Note: Uses middle employment scenario for 2010 and 2020.

4.3 Other policies that could help meet the child poverty target in 2010

This section provides brief results of some other policies that were modelled. We have not attempted to make the policies comparable.

4.3.1 Tax changes

Table 8 shows that tax cuts do not help the poorest, whose taxable incomes are below the personal allowance to start with, and who can claim Council Tax Benefit to help with their council tax.

Table 8: Tax changes and child poverty in 2010

Policy	Cost (bn)	OECD poverty rate 2010 (%)	BHC poverty rate 2010 (%)	AHC poverty rate 2010 (%)
Public Finance baseline	£0	22.2	20.7	28.9
Current Policies baseline	£1.1	21.8	20.4	28.7
Increase in personal allowance to cover 10p band	£11.8	22.1	20.7	28.7
Council tax frozen in real terms	£3.4	21.9	20.4	28.7

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Uses the middle employment scenario.

4.3.2 Targeting by family type

This section looks at policies that use family composition, rather than income, as a way of targeting policies more effectively than using Child Benefit alone by targeting on large families, and working couples.

The Fabian Commission on Life Chances and Child Poverty[22] recommended that the rate of Child Benefit for the second and subsequent child be aligned with the higher rate for the first child. This is effectively targeting families with two or more children, and would help to undo the shift towards slanting child-contingent support towards the first child that has taken place since 1999.[23] However, it is also been suggested that policies should target families with three or more children, or four or more children, as both types of families have higher rates of poverty than average.[24]

The recommendation from the Fabian Commission by itself would cost only £2.8 billion and have a modest impact on child poverty. By way of comparison, we have spent roughly the same amount of money increasing the rate of Child Benefit for the third and subsequent child, and the fourth and subsequent child. We have also modelled changes that use the ‘family element’ of Child Tax Credit to deliver these extra payments, which means that families with incomes above £50,000 per year would find the extra support tapered away.

The majority of children in poverty who live in a family where someone works live in a couple family. In order to help working couple families, we have modelled the impact of a higher rate of Working Tax Credit for couples with children; we chose to introduce a rate that ensured that the ratio between the Working Tax Credit rates for couples and lone parents was the same as that between Income Support rates for couples and lone parents. This means that the rate for couples needs to be around 57% higher at £100 per week rather than £64 per week in today’s prices. Coincidentally, this costs around the same (£3.0 billion) as aligning Child Benefit rates. In addition to this, we have a scenario where we increase the amount of Working Tax Credit for lone parents to £110 per week in today’s prices and the amount for couples to £172 (this keeps the ratio between the Working Tax Credit rates for couples and lone parents the same as that between Income Support rates for couples and lone parents). We use the higher employment scenario for this policy as Gregg et al (2006) forecast that earnings up-rating of the Working Tax Credit should have this effect on the employment of lone parents and reduce the number of workless couples.

Table 9: Targeting by family type in 2010

Policy	Cost (bn)	OECD poverty rate 2010 (%)	BHC poverty rate 2010 (%)	AHC poverty rate 2010 (%)
Public Finance baseline	£0	22.2	20.7	28.9
Current Policies baseline	£1.1	21.8	20.4	28.7
Bring Child Benefit rate for second and subsequent children in line with the first	£2.8	20.0	18.8	27.2
Introduce a premium in Child Benefit for the third and subsequent child of £18.50 per week	£2.7	19.1	17.9	26.3
Introduce a Child Benefit premium for the fourth and subsequent child of £55 per week	£2.7	18.6	17.0	25.2
Introduce a Child Tax Credit premium for the third and subsequent child of £18.50 per week	£2.3	19.2	17.9	26.2
Introduce a Child Tax Credit premium for the fourth and subsequent child of £55 per week	£2.4	18.8	17.2	25.3
Introduce a higher rate of Working Tax Credit for couples with children	£3.0	18.8	17.8	25.9
Increase Working Tax Credit and introduce a higher rate of Working Tax Credit for couples with children (uses higher employment scenario)	£9.2	15.7	15.0	21.2

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Uses middle employment scenario unless otherwise stated.

Table 9 shows that targeting benefits at larger families achieves a larger fall in child poverty for a given amount of spending. However, it turns out that it is only when we spend relatively small amounts of money that it is more cost-efficient to targeting extra money on families with four or more children, partly because there are relatively few families with more than three children (3.6 million children in 2010 will live in families with three or more children, whereas only 1.7 million will live in families with four or more). In other words, if the government sought cost-effective ways to reduce child poverty now, then a higher rate of Child Benefit for the fourth and subsequent child would be a very cost-efficient policy. However, when considering policies that can meet the government's challenging targets for 2010, we need to use broader policies.[25]

The table also shows that a higher rate of Working Tax Credit for couples with children is able to achieve a small reduction in poverty, and does not seem to be any less cost-effective than some of the packages that target large families. However, it turns out that when modelling combinations of packages that were sufficient to meet the 2010 target (section 4.2), including a higher rate of Working Tax Credit for couples with children proved rather less cost-efficient.

4.3.3 Targeting by area

As Table 10 shows, child poverty is substantially higher in London than the rest of Britain. One response to this would be to vary tax credit and benefit rates by region. As an example, increasing the per child element of Child Tax Credit by £15 per week, increasing Working Tax Credit by £40 per week and increasing the amount of childcare that can be claimed for by £40 per week in London only. Table 10 reports the impact of these policies.

Table 10: Targeting by region in 2010

Policy	**Cost (bn)**	**Overall OECD poverty rate 2010 (%)**	**OECD poverty rate in London 2010 (%)**
Current policy	£1.1	21.8	24.1
London option	£2.1	20.6	14.1

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Uses middle employment scenario.

This option clearly has a large effect in London, but does not reduce the overall poverty rate by very much. While there may be good reasons for introducing higher rates of Working Tax Credit and higher childcare claimable amounts in London in terms of improving work incentives and increasing employment, we cannot estimate how large these effects will be in a static model. We have therefore chosen not to look at area-specific policies in the rest of our analysis.

4.4 Who might be left in poverty in 2020?

We have taken ‘abolition of child poverty’ to 2020 to mean that child poverty should be below 5%, the best figure that has ever been achieved in western Europe.

Table 11 analyses the characteristics of those children who remain in poverty. It shows that the policy packages suggested are successful in reducing poverty nearly equally for all the family types listed – the composition of poor children (the proportions in the table) change by little when we move from the Current Policies baseline to 2020 package recommended in Hirsch (2006) (the main exception is that child poverty will become slightly more concentrated among workless couples with children).

Table 11 also shows that those children remaining in poverty are overwhelmingly concentrated among those families who do not claim the means-tested benefits and tax credits to which they are entitled to. Because the level of benefits in the recommended 2020 package is generally high enough to ensure that no families with children are in poverty, reducing the extent of non-take-up of means-tested benefits and tax credits has a bigger impact on child poverty than it would now. One inherent limitation of a strategy to abolish child poverty that relies on increased means-tested benefits and tax credits is that such policies can never help those families who do not receive those benefits.

We should also bear in mind that not all children are surveyed by the FRS; children who are asylum seekers, travellers and the homeless are not included in the survey.

Table 11: Who would be left in poverty in 2020?

	Current Policies		2020 package		
Family type	**Non-take-up of tax credits halved, 000s (%)**	**Full take-up, 000s (%)**	**Non-take-up of tax credits halved, 000s (%)**	**Full take-up, 000s (%)**	**Total, 000s**
Unemployed lone parent	332 (14.1)	331 (14.5)	69 (13.4)	44 (18.5)	532
Lone parent working part time	456 (19.4)	418 (18.3)	111 (21.4)	47 (19.8)	1,286
Lone parent working full time	56 (2.4)	53 (2.3)	12 (2.2)	3 (1.2)	866
Workless couple parents	216 (9.2)	200 (8.7)	75 (14.5)	37 (15.5)	337
One-earner couple parents	917 (39.0)	912 (39.9)	175 (33.7)	67 (28.4)	3,310
Two-earner couple parents, one or both part time	362 (15.4)	357 (15.6)	75 (14.5)	37 (15.8)	4,019
Two-earner couple parents, both full time	14 (0.6)	16 (0.7)	1,800 (0.4)	1,800 (0.8)	1,844
Total	2,354 (100)	2,285 (100)	520 (100)	237 (100)	12,195

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Uses middle employment scenario. Percentages in brackets show composition of children in poverty; poverty rates for each family type can be inferred from the absolute numbers.

4.5 The effect of various policies on work incentives

As mentioned above, the policy packages all change the relationship between gross earnings and net income – and therefore individuals' financial incentive to work – in different ways.

The impact of the five policy packages for 2010 on EMTRs is shown below, both of all parents, and on all working parents, alongside the distribution on EMTRs under the Current Policies baseline, and the estimated distribution in 2005/06.[26]

Table 12: The impact of the policy packages on EMTRs in 2010: all parents

Effective marginal tax rate	2005	Current Policies baseline	Child Tax Credit option	Child Benefit option	Child Tax Credit, large family and Working Tax Credit for couples	Child Tax Credit and large family
Over 100%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
90% or more	1.2%	1.6%	1.6%	1.6%	1.0%	1.6%
80% or more	2.8%	3.5%	3.5%	3.5%	3.5%	3.5%
70% or more	8.7%	9.1%	10.9%	9.1%	12.1%	10.5%
60% or more	14.9%	14.7%	18.5%	14.7%	21.3%	17.5%
50% or more	17.8%	17.4%	22.0%	17.4%	25.7%	20.7%
40% or more	30.3%	33.5%	38.1%	33.5%	41.4%	36.9%
30% or more	64.6%	67.8%	70.3%	67.8%	72.3%	69.6%
20% or more	75.2%	79.5%	81.0%	79.5%	82.3%	80.6%
10% or more	77.2%	81.1%	82.4%	81.1%	83.5%	82.1%
0% or more	100%	100%	100%	100%	100%	100%

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Uses middle employment scenario. EMTRs are calculated by increasing weekly earnings by 1p.

Table 13: The impact of the policy packages on EMTRs in 2010: working parents

Effective marginal tax rate	2005	Current Policies baseline	Child Tax Credit option	Child Benefit option	Child Tax Credit, large family and Working Tax Credit for couples	Child Tax Credit and large family
Over 100%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
90% or more	1.3%	1.5%	1.5%	1.5%	1.1%	1.5%
80% or more	3.1%	3.7%	3.8%	3.7%	3.3%	3.8%
70% or more	10.3%	10.2%	12.4%	10.2%	14.1%	11.8%
60% or more	18.3%	17.0%	21.6%	17.0%	25.4%	20.4%
50% or more	21.8%	20.1%	25.7%	20.1%	30.6%	24.2%
40% or more	37.4%	39.2%	44.7%	39.2%	49.5%	43.3%
30% or more	76.7%	77.1%	79.2%	77.1%	80.9%	78.6%
20% or more	89.1%	90.6%	91.5%	90.6%	92.3%	91.3%
10% or more	90.8%	92.0%	92.7%	92.0%	93.2%	92.6%
0% or more	100%	100%	100%	100%	100%	100%

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Uses middle employment scenario. EMTRs are calculated by increasing weekly earnings by 1p.

The tables show the following:

- Under the Current Policies baseline, the proportion of parents facing very high EMTRs (70% or over for all parents, 80% or over for working parents) is set to rise from the estimated level in 2005/06. EMTRs in excess of 70% rise arise only when an individual is entitled to Housing Benefit or Council Tax Benefit as well as Child Tax Credit, and when the individual is on the taper of at least two of these benefits or tax credits. The rise in the proportion of parents facing these very high rates, then, comes from our assumption that rents and council tax will grow in real terms, increasing the range of income over which individuals can face a Housing Benefit or Council Tax Benefit taper.
- However, the proportion of parents facing high EMTRs (50% or more) is set to fall between 2005/06 and 2010/11 under Current

Policies, reflecting that fewer parents will be on a tax credit taper, because the lower threshold in tax credits is assumed to be frozen in nominal terms, and Working Tax Credit is indexed only to prices.

- Compared to the Current Policies baseline in 2010, none of the policy packages cuts EMTRs – the Child Benefit option has no impact on EMTRs, and the other packages act to increase EMTRs.
- The package recommended in Hirsch (2006) for 2010 increases the proportion of all parents (working parents) facing EMTRs of 70% or more by 1.4 ppts (1.6 ppts), or around 170,000 people (159,000 people).
- The package that increases high EMTRs (70% or more) by the most is the one that includes the increase in Working Tax Credit for couples.[27] However, this policy would increase the financial incentive for couples with children to have one adult in work (compared to neither in work), a positive impact on the incentive to work which is not reflected in the tables. This policy would also reduce the proportion of adults who are simultaneously on the tax credit taper as well as the Housing Benefit and Council Tax Benefit taper, and so it reduces the proportion of parents who have very high EMTRs (90% or more).

Tables 14 and 15 repeat this analysis for some of the packages for 2020. It shows that:

- If the Current Policies baseline was followed in 2010 and 2020, the proportion of working parents facing very high EMTRs (70% or over for all parents, 80% or over for working parents) would continue to rise between 2010 and 2020, and the proportion of working parents facing high EMTRs (50% or more) would continue to fall between 2010/11 and 2020/21.
- The policy packages that involve comprehensive indexation or over-indexation both tend to increase the proportion of parents facing high EMTRs. With the ‘large over-indexation’ option, over one in five working parents would face an EMTR of 70% or more, and almost two thirds would face an EMTR of 40% or more. On the other hand, earnings indexing the tax credit thresholds and the Working Tax Credit elements both reduces the proportion of working parents on the tax credit taper as well as the Housing Benefit or Council Tax Benefit taper, and thereby reduces the numbers facing EMTRs of 80% or more.

Table 14: The impact of the policy packages on EMTRs in 2020: all parents

Effective marginal tax rate	2005	Current Policies baseline (2010)	Current Policies baseline (2020)	2010 policy price-indexed	Comprehensive indexation plus higher rate of Working Tax Credit for couples	Plus Income Support and per child Child Tax Credit growing 7% real per year 2010-20
Over 100%	0.0%	0.0%	0.1%	0.0%	0.1%	0.2%
90% or more	1.3%	1.5%	2.3%	2.2%	1.2%	3.1%
80% or more	3.1%	3.7%	4.3%	4.3%	3.7%	6.4%
70% or more	10.3%	10.2%	9.4%	9.8%	14.6%	22.6%
60% or more	18.3%	17.0%	14.4%	15.1%	24.0%	35.0%
50% or more	21.8%	20.1%	17.3%	18.3%	29.3%	40.3%
40% or more	37.4%	39.2%	39.7%	40.6%	50.2%	59.6%
30% or more	76.7%	77.1%	74.2%	67.2%	79.6%	82.9%
20% or more	89.1%	90.6%	80.9%	81.3%	84.6%	86.7%
10% or more	90.8%	92.0%	82.2%	82.6%	85.7%	87.5%
0% or more	100%	100%	100%	100%	100%	100%

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Uses middle employment scenario. EMTRs are calculated by increasing weekly earnings by 1p.

Table 15: The impact of the policy packages on EMTRs in 2020: working parents

Effective marginal tax rate	2005	Current Policies baseline (2010)	Current Policies baseline (2020)	2010 policy price-indexed	Comprehensive indexation plus higher rate of Working Tax Credit for couples	Plus Income Support and per child Child Tax Credit growing 7% real per year 2010-20
Over 100%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%
90% or more	1.3%	1.5%	2.1%	2.1%	1.3%	3.1%
80% or more	3.1%	3.7%	4.5%	4.5%	4.2%	6.9%
70% or more	10.3%	10.2%	10.2%	10.7%	16.9%	26.0%
60% or more	18.3%	17.0%	16.2%	17.1%	28.4%	41.0%
50% or more	21.8%	20.1%	19.6%	20.8%	34.6%	47.2%
40% or more	37.4%	39.2%	45.8%	46.9%	59.7%	69.6%
30% or more	76.7%	77.1%	84.6%	85.0%	88.5%	90.8%
20% or more	89.1%	90.6%	92.1%	92.3%	93.7%	94.6%
10% or more	90.8%	92.0%	93.0%	93.2%	94.4%	95.1%
0% or more	100%	100%	100%	100%	100%	100%

Notes and sources: Authors' calculations based on FRS 2002/03 and 2003/04 using TAXBEN and various assumptions specified in the text. Uses middle employment scenario. EMTRs are calculated by increasing weekly earnings by 1p.

Many of the policy packages analysed in this paper, then, have the clear disadvantage that they reduce financial work incentives in some dimension. This means that the policy packages, while having a direct impact that reduces child poverty, might induce changes in work patterns that act to worsen child poverty.[28]

One way to investigate the possible magnitude of these changes in work patterns is to use a behavioural (or structural) labour supply model. Such models attempt to represent the preferences of parents over working. Brewer et al (2005, 2006: forthcoming) presents such a structural labour supply model, which they use to analyse the labour supply responses to tax and benefit changes between 1999 and 2002.

We have used the same model to predict the labour supply responses to the preferred policy package in 2010. However, the results of this exercise should not be treated as a definitive prediction, for the following reasons:

- The model in Brewer et al (2005) is based on the behaviour of parents observed between 1995 and 2002, and may not be an accurate description of the way that parents behave in 2010.[29]
- The policy packages for 2010/11 involve considerable changes to the budget constraint, meaning that the results from the labour supply model are rather like an 'out of sample' prediction.
- The model in Brewer et al (2005) incorporates non-take-up of Working Families Tax Credit only, and has not been extended to incorporate the Child and Working Tax Credit. Therefore, these simulations assume full take-up of all means-tested benefits and tax credits.
- Although the results in Brewer et al (2005) for the change in labour supply among lone parents that was due to the tax and benefit changes between 1999 and 2002 broadly match the results of other studies that have used different methodologies, the structural model for couples with children has not been validated so comprehensively, partly because the tax and benefit changes between 1999 and 2002 seem to have had rather small (and therefore hard to detect) impacts on the labour supply of couples with children.

With those caveats in mind, the model in Brewer et al (2005) predicts that the preferred policy package for 2010 will reduce the employment rate of lone mothers by 0.7 ppt, and that of women in couples with children by 1.7 ppt.[30] The lower employment rate of women in couples comes arises almost entirely (1.6 ppt) because the 2010 policy package induces some two-earner couples to become one earner couples.

We have not tried to calculate the impact that this decline in employment among parents would have on child poverty. Although the impact on child poverty may be small by 2020 (because poverty rates are very low for all family types if the large over-indexation package is implemented), such a reduction in employment would certainly increase the cost to government of achieving a given fall in child poverty.

Notes

[17] Adam et al (2006: forthcoming) discuss and quantify the conflict between redistributing income to the poor and improving work incentives. For lone parents, increasing the child element of Child Tax Credit reduces the financial gain to working for some high-wage individuals, and leaves it untouched for those on a lower wage. For those lone parents in work, increasing the child element of Child Tax Credit may increase the effective marginal tax rate, or extend the range of income over which an individual faces a tax credit withdrawal, dulling incentives to increase earnings. The first earner in a couple is affected in the same way as a lone parent. The second earner in a couple, however, is much more likely to find that the financial gain to working at all is reduced by increasing the child element of Child Tax Credit (for a longer discussion, see Adam et al, 2006: forthcoming, ch 5).
[18] That is, the difference between the figures in Table A1d and 100% is halved.
[19] The 2010 current policy scenario does not significantly increase out-of-work incomes relative to 2006 because, while the per child element of Child Tax Credit increases in real terms, the family element is frozen in nominal terms and income support increases in line with Rossi, which is assumed to increase more slowly than the RPI.
[20] This includes Income Support, Housing Benefit applicable amounts, all of the Child and Working Tax Credits amounts and thresholds and Child Benefit. The threshold at which the family element of Child Tax Credit is withdrawn was only increased in line with prices; comprehensive earnings indexation would only increase the cost of this policy without helping families in poverty.
[21] This involves Income Support applicable amounts nearly doubling in real terms between 2010 and 2020 and the per child element of Child Tax Credit being slightly more than twice what it would be if present policies were continued to 2020.
[22] Fabian Society (2006).
[23] See Adam and Brewer (2004).
[24] See, for example, Adelman et al (2003); Bradshaw et al (2006).
[25] Of course, it would probably be most cost-efficient to take our preferred package for 2010 – which involves targeting money on the third and subsequent child – and take some of that extra money to focus on the fourth and subsequent children (in other words, to have a higher rate of Child Benefit for the third child than the second, and a higher rate for the fourth and subsequent children than the third). We did not model this option.
[26] Similar estimates are found in Adam et al (2006: forthcoming); the estimates here use a slightly different definition of ‘margin’ when calculating the EMTR (here we use a 1p rise in weekly earnings) and we

use a slightly larger sample than in the two reports by Adam et al (2006: forthcoming).

[27] This result is consistent with the findings in chapter 5 of Adam et al (2006: forthcoming).

[28] Note that we are not suggesting that the latter effect will be larger than the former in aggregate (although it might be among some families: a woman in a two-earner couple with children might decide to stop working after an increase in the per child element of Child Tax Credit, even though the family would have a lower family income (and therefore a greater risk of poverty) were she not to work even after the extra tax credits.

[29] The results mentioned below assumed that the population of parents in 2010/11 looked like those in 2002/03; the new weights discussed in section 2.3 were not used here.

[30] It also predicts an insubstantial decline in the employment rate of men in couples with children (–0.4 ppts). The model does not cover lone fathers.

5 Sensitivities

Our analysis makes several assumptions that may not hold in reality and so we have investigated whether alternative assumptions would dramatically change our results.

We find that the results are altered in the way we would expect, but our results are not overly sensitive to any of these changes:

- higher rent and council tax reduce poverty because the poor are essentially insured against these by Housing Benefit and Council Tax Benefit whereas the median household loses out;
- higher earnings growth and median income increase poverty as the incomes of the poor are more heavily made up of benefits that do not increase in line with earnings;
- lower non-take up of means-tested benefits and tax credits reduces poverty, as we have seen before.

Most interesting, however, is the effect of using the weights provided in the HBAI dataset to gross the data up to the 2002/03 population, which show what our results would be in the absence of any demographic changes. This shows the impact demographic changes have on poverty rates – poverty would be considerably higher without any changes.

Table 16: Results of sensitivity tests for 2010

Scenario	Public Finance baseline (%)	2010 big family Child Tax Credit option (%)	Effect of policy (%)
Baseline	**22.2**	**13.6**	**8.6**
Rents increasing in line with prices	22.8	14.3	8.5
Rents increasing 2% faster than earnings	21.2	13.1	8.1
Earnings growth 2.5% per year	23.1	14.6	8.5
Earnings growth 1.5% per year	20.1	12.9	7.2
Council tax increasing in line with prices	22.0	13.7	8.3
Council tax increasing 2% faster than earnings	21.9	13.5	8.4
Annual median income growth 0.25% slower than model	21.5	12.8	8.7
Annual median income growth 0.25% faster than model	24.0	14.6	9.4

Using 2002/03 and 2003/04 weights	23.9	15.7	8.2
Non-take-up halved	21.3	12.1	9.2
Non-take-up of tax credits halved	21.3	12.1	9.2

The pattern of results is similar in 2020, except that the longer period of forecasting and hence the wider divergence that occurs as a result of following alternative rules for up-rating means that our results are a little more sensitive to different assumptions. In particular, demographic changes become even more important between 2010 and 2020 – under the Public Finance baseline, without any demographic changes child poverty increases to what would be record levels but predicted demographic changes mean that poverty would remain more or less constant between 2010 and 2020 (although it would still be higher than in 2004/05).

Table 17: Results of sensitivity tests for 2020

Scenario	**LTFF baseline (%)**	**2020 over-indexation package (%)**	**Effect of policy (%)**
Baseline	**22.4**	**6.2**	**16.2**
Rents increasing in line with prices	23.7	6.5	17.2
Rents increasing 2% faster than earnings	20.9	5.9	15.0
Earnings growth 2.5% per year	23.9	6.6	17.3
Earnings growth 1.5% per year	21.1	5.9	15.2
Council tax increasing in line with prices	22.4	6.3	16.1
Council tax increasing 2% faster than earnings	22.4	6.1	16.3
Annual median income growth 0.25% slower than model	20.9	5.5	15.4
Annual median income growth 0.25% faster than model	25.4	7.1	18.3
Using 2002/03 and 2003/04 weights	30.1	7.4	22.7
Non-take-up halved	21.9	4.3	17.6
Non-take-up of tax credits halved	21.9	4.0	17.9

6 Conclusions

The current UK government has an explicit target for child poverty in 2010, and a goal for 2020 which has not yet been precisely quantified.[31] This paper was produced as part of a project funded by the JRF programme called 'What will it take to end child poverty?'. The aim of this paper was to forecast the prospects for child poverty in 2010/11 and 2020/21 under current government policies, and to illustrate the impact of various tax and benefit policies that could be implemented in 2010 and 2020.

We have shown that, under present tax and benefit policies, child poverty in 2010/11 will be little different from its current level, with beneficial demographic and economic changes offset by the fact that the income from tax credits and benefits received by low-income families with children will not keep pace with growth in earned income. Fiscal drag – or its equivalent for state handouts – is very important when looking to 2020. Even if successive governments continue to increase the child element of Child Tax Credit in line with average earnings, the way in which other elements of tax credits are at present up-rated means that real spending on tax credits could fall by a quarter by 2020; as a share of national income, the decline would be even greater.

The policy for 2010/11 recommended in Hirsch (2006) relies on increasing the child element of the tax credit by 31%, and introducing new payments for families with three or more children linked to the family element of Child Tax Credit. This would be around £4.5 billion in 2010/11 compared to the assumptions in the government's public finances (or £4.3 billion more than Current Policies: the difference represents that the government has not yet found the money for increasing the child element of Child Tax Credit by more than inflation in April 2010). Policies that relied less on means-tested benefits and more on universal benefits could cost much more. By way of comparison, the government increased spending on child-contingent support by over £8 billion between 1999/2000 and 2003/04.

For 2020/21, the single policy highlighted in the final report relies on implementing the 2010/11 package, and then increasing Working Tax Credit for couples with children by 37%, and increasing all benefits and tax credits received by families with children by 7% a year between 2010/11 and 2020/21. To implement this package, the government would need to find around £30 billion in 2020/21 compared to the assumptions in the government's public finances, equivalent to an increase in public spending of nearly 2% of GDP. This package would reduce child poverty down to 5% – consistent with the lowest levels ever recorded in western Europe – only if the extent of non-take-up of means-tested benefits and tax credits was reduced from current levels.

The policy packages for 2010/11 and 2020/21 would increase, on average, the effective marginal deduction rates faced by working parents. In addition, the incentive to work at all would be dulled for the second worker in a couple, and these feedback effects – which would increase child poverty or increase the cost to government of meeting its targets – have not been reflected in the modelling.

As Hirsch (2006) recognises, this exercise is constrained by what it is possible to model, that is, where a particular policy has a reasonably predictable effect on household incomes. Some policies – such as improving the education levels of tomorrow's parents – may be fundamental to the long-term reduction in child poverty, but their results cannot readily be projected.

Furthermore, like any economic forecast, the results in this paper are subject to considerable uncertainty whose importance is unknown, and these uncertainties are much greater for 2020 than for 2010. Another thing to bear in mind is that the simulation model used in this paper is static: it does not take account of the ways in which individuals move in and out of poverty, only giving snapshots of the characteristics of the whole population at given points of time.

Part of the novelty of this work is the way that re-weighting techniques have been used to control for projected changes in key economic and demographic characteristics which might affect the income distribution. Although re-weighting is not new, this is a rare example where the re-weighting process has had to deal with comprehensive changes in the distribution of characteristics. The fact that the re-weighting has significant impacts on the level of child poverty in 2010 and 2020 tells us both that these forecast demographic changes are non-trivial but also that we need to appreciate the limitations of re-weighting when interpreting these results.

Notes

[31] DWP (2003): 2010 should be understood to mean '2010/11' (and equivalently for 2020), because child poverty is measured using the FRS, a survey which covers financial years.

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Appendix 1: Various tables

Table A1a: Forecast of RPI, Rossi, earnings and GDP growth (%)

Variable	2006/07	2007/08	2008/09	2009/10	2010/11	From 2011/12 to 2020/21
RPI inflation	2.75	3	3	2.75	2.75	2.75
Rossi inflation	2.25	2.25	2.25	2.25	2.25	2.25
Real earnings growth	2	2	2	2	2	2
Real GDP growth	2.5	3.25	3	2.5	2.5	2.5

Source: Table C3, Chapter C, Financial Statement and Budget Report 2006

Table A1b: Up-rating rules used for baseline scenario

Rule	Assumption	What it's used to up-rate
In line with prices	2.75% inflation per year (3% in 2007 and 2008 in line with Treasury forecasts)	War pensions Scholarship income Income from government training schemes Other unearned income Allowances paid other than from spouse
In line with earnings	2% real growth per year	Gross rent Water and sewerage rates Private pensions income Employment income Self-employment income Maintenance payments Allowances from absent spouse
In line with nominal GDP	2.5% real growth per year	Imputed capital from savings, annuities, property, stocks and shares and bonds

Rule	What it's used for
In line with RPI to previous September, rounded to nearest 5p	Child Benefit Severely disabled premiums on Income Support and Housing Benefit Incapacity Benefit Carer's Allowance Disability Living Allowance Attendance Allowance Severe Disablement Allowance Basic State Pension Pension Credit guarantee amounts (from 2009)
In line with RPI to previous September, rounded to nearest £5	All Working Tax Credit amounts Disabled and Severely Disabled elements of Child Tax Credit Per child element of Child Tax Credit (after 2009) National Insurance Upper Earnings Limit
In line with RPI to previous September, increase rounded up to nearest £10	Income tax personal allowances (until 2010) Income tax married couples allowances (until 2010)
In line with RPI to previous September, increase rounded up to nearest £100	Income tax bands (until 2010) Threshold for withdrawal of older person's income tax allowances (until 2010)
In line with Rossi to previous September, rounded to nearest 5p	Most Income Support rates Most Housing Benefit applicable amounts Non-dependent deductions for Income Support, Housing Benefit and Second Adult Council Tax Rebate
In line with Rossi to previous September, rounded to nearest £1	Thresholds for non-dependent deductions for Income Support, Housing Benefit and Second Adult Council Tax Rebate
In line with Average Earnings Index to previous September, rounded to nearest 5p	Pension Credit guarantee amounts (until 2008)
In line with Average Earnings Index to previous September, rounded to nearest £5	Per child element of Child Tax Credit (until 2009)
In line with Average Earnings Index to previous September, increase rounded up to nearest £10 In line with Average Earnings Index to previous September, increase rounded up to nearest £100	Income tax personal allowances (from 2011) Income tax married couples allowances (from 2011) Income tax bands (from 2011) Threshold for withdrawal of older person's income tax allowances (from 2011)
Frozen	Winter Fuel payments to pensioners Income Support and Housing Benefit disregards Family element of Child Tax Credit

	Tax credit thresholds

Note: Parameters in the tax and benefit system that are calculated as a function of other parameters continue to be calculated in the same manner.

Table A1c: Assumed take-up rates for various benefits (%)

Group	Income Support	Housing Benefit	Council Tax Benefit
Lone parents	96	96.5	91
Couples with children	88	81.5	67
Working-age people without children	86	85	74
Pensioners	75[a]	85	56

Note: [a] Pension Credit guarantee credit for pensioners.
Source: DWP (2006a).

Table A1d: Assumed tax credit take-up rates (%)

Group	Child Tax Credit	Working Tax Credit
Working-age people without children	n/a	13
Workless families	87	n/a
Entitled to both Child and Working Tax Credit	88	88
Above Child Tax Credit only threshold, entitled to more than family element	82	n/a
Entitled to family element only	69	n/a

Source: HMRC (2006)

Table A1e: Creating the HBAI definition of income from TAXBEN

The following are added together	Gross employment income Gross self-employment income Imputed income from company cars and other benefits in kind Free school meals Savings income Pensions income Income from property Any other unearned income Maintenance payments from absent spouse Benefits
These are subtracted	Expenses incurred in the course of employment Self-employment net losses Direct taxes Council tax Contributions to personal pensions Maintenance payments made Parental contributions to students

Appendix 2: Re-weighting

Weights have been created to capture key dimensions of population characteristics making use of projections reported in Rees and Parsons (2006). These were calculated using special software, known as GROSS, written by Joanna Gomulka.[32] The method involves using a minimum distance function such that (a) the weighted sums match the control totals and (b) the distance from the starting weight (the original FRS weight, in this case) is minimised.[33]

The dimensions controlled for were chosen on the basis that (a) they were relevant to the chances that a child's household income would be below the poverty line, and (b) it was possible to estimate what the variable would look like in 2010 and 2020, and that the definition of the projected variable could be closely replicated using the FRS data. A number of experiments were carried out, generating many different sets of weights using different combinations of control variables in different forms. The chosen set of controls was that which minimised the dispersion of the size of the weights and which at the same time seemed to capture the most relevant dimensions in a way that would allow re-calculation of the weights to be used to capture additional employment changes. This in particular placed two requirements on the chosen controls and their form.

- First, that everyone within the household needed to have the same weight. This was itself an additional constraint. (Without this constraint an increase in the weight of employed parents would have no effect on the household income level of children.)
- Second, the rates of lone-parent employment and parental worklessness (as well as the individual employment rate overall) are needed as control totals to enable these variables to be changed as part of the policy packages.

As explained in the main text, the re-weighting method simply controls for characteristics in a few dimensions, leaving joint distributions uncontrolled (for example, typically we can get the number of lone parents and the number of children in each age group to match control totals, but the ages of children in lone-parent families are not directly controlled for). Other relevant dimensions, on which we have inadequate information for predictions, are entirely uncontrolled (for example, receipt of child support or hours of work). Furthermore, with a given sample size the number of dimensions that can be controlled for at once is limited. If the number of constraints becomes large it can become impossible to satisfy them, or some households have extremely high weights, making the policy simulation results unstable.

Finally, the greater the difference between the world represented by the FRS data and the world that the re-weighting using projected control totals attempts to sketch out, the more difficult it is to find weights to satisfy many controls simultaneously. Thus it was more difficult to calculate weights for 2020 than for 2010 and the distribution of weights in the 2020 scenarios is much wider than for 2010. The 2020 weighted results should therefore be treated with extra caution.

The dimensions controlled for in both 2010 and 2020 are shown in the table below.

Dimension	**Categories**
Number of households	n/a
Population	n/a
Household size	1, 2, 3, 4+
Region of residence	12 standard regions of Great Britain
Number of dependent children in household	0, 1, 2, 3+
Age of individual	0-9, 10-15, 16-19 (dependent child), 16-19 (non-dependent), 20-24, 25-29, 30-44, 45-59, 60+
Ethnicity (adults only)	5 categories: White, Asian, Black, Mixed, Other
Living in a lone-parent household	n/a
Housing tenure	3 categories: owner, tenant (social), tenant (private)
Total number of people earning	n/a
Number of lone parents earning	n/a
Workless couples with children	n/a

Notes

[32] This software is similar to the Calmar program used by the Department for Work and Pensions in its calculation of weights for the FRS.33
[33] Atkinson et al (1988).