Were we really all in it together? The distributional effects of the 2010-2015 UK Coalition government's tax-benefit policy changes: an end-of-term update

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Were we really all in it together? The distributional effects of the 2010-2015 UK Coalition government's tax-benefit policy changes: an end-of-term update[1]

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Abstract

This paper examines the distributional impacts of the changes to benefits, tax credits, pensions and direct taxes between the UK Elections in May 2010 and in May 2015. It also looks ahead to the longer-term effects of changes and plans that were announced by the 2010-2015 Coalition government, such as the complete introduction of Universal Credit and changes to the ways benefits, pensions and tax brackets are indexed from year to year, modelling what effects these would have after five more years. It shows that the changes 2010-15 did not have a common effect on all household incomes and nor did the direct tax-benefit changes contribute to deficit reduction. In effect reductions in benefits and tax credits financed part of the cuts in direct taxes. We find that the relative extent to which the changes most favoured the rich or the poor is sensitive to a wide range of analytical choices and assumptions, but under most sets of assumptions the main gains were in the upper middle of the income distribution and the main losers were at the bottom and those close to, but not at, the very top. Across most of the distribution the impact of the changes was regressive. Looking forward to the effects that Coalition policies would have had by 2020 we find a more strongly regressive picture but with open questions about the effect of Universal Credit on those not currently receiving their entitlements to means-tested payments, and so potentially increasing some of the lowest incomes.

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1. Introduction

One of the most important issues in assessing the record of the Conservative-Liberal Democrat Coalition government in office between May 2010 and May 2015, is who bore the heaviest burden from the combination of 'austerity' aimed at reducing the public sector deficit and from its reform programmes across the public sector. Who lost, and who gained?

This paper looks in detail at one of the central, and most highly-charged, parts of this – the effects of reforms and other changes to social security benefits and tax credits and to the personal tax system. It updates the analysis published in De Agostini, Hills and Sutherland (2014), which looked at the position up to 2014/15, by taking account of further Coalition policy announcements up to the May 2015 general election, and of revisions to official economic projections. It does not consider the effects of the substantial cuts in spending on certain other public services, such as those provided by local government. Nor does it look at other changes in the tax system outside personal taxes; indeed, its detailed focus is on *direct* taxes (income tax and employee National Insurance Contributions), with some discussion of the effects of the increase in the rate of VAT to allow comparison with other analyses.[2]

Because our focus is on the effects of the *Coalition* Government's policies, we do *not* include the effects of the further changes and reforms announced by the new *Conservative* Government since the 2015 election.

With that restricted focus, it might be thought that this is a straightforward exercise with a clear set of answers: who have been the losers and who the gainers? At the heart of this is that we are trying to isolate how people *were* affected by the tax and benefit system put in place by the Coalition (focussing on the system for 2015/16 at the time of the election) compared with how they *would have been* affected by a system with no reforms and no cuts. There are several ways of approaching what seems like a simple question, depending on the choices made as to what to compare the actual system with, and how this is done. We analyse the effects of some of the key choices.

One issue is what should count as the 'inherited' system? Should it be that in place in May 2010 when the election happened – and so including, for instance, the top income tax rate of 50 per cent, introduced by Labour from April 2010? Or should the comparison be with the system as it was in the previous tax year, 2009-10, when the top rate was still 40 per cent? In this paper we use what was actually in place at the time of the May 2010 election as our starting point on the basis that this was the inherited system that would have continued unchanged without Coalition intervention.

Second, to compare the 'inherited' system with the actual one in place in 2015-16, how should we assume the inherited system would have been changed each year as the overall economy changed? Would a 'neutral' assumption be that the original levels of benefits and tax allowances should increase in line with *price* inflation or in line with some measure of average *income* growth? Or should it be that they would have been increased in line with whatever statutory rules and conventions had recently been followed for different components of the system, referred to in this paper as "business as usual" indexation? Depending on the exact question, each of these might

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[2] It should also be remembered that other factors, generally less under government control (not least, what happens to relative earnings and employment patterns) also affect the overall income distribution.

be appropriate. We show our main results against both price- and earnings-linked bases, but also discuss the effects of alternative approaches.

Third, if we are looking at how different parts of the income distribution, from poor to rich, are affected, how should we rank households? Should we look at them as they were before the changes we explore, or after? Should we include changes in the relative rank position of household incomes or hold the ranking constant? Should the proportional change in income be calculated with reference to income under policies at the start or the end? These decisions can have a major influence on the picture that is drawn of the distributional effects. Our results use the ranking of individuals as they were under the 'pre-reform', base system and calculate the proportional change in income with reference to the starting point.

Further, in presenting distributional analysis, how big should be the income groups that we consider? Are we interested, for instance, in how the top or bottom 10 per cent as a whole have been affected, or in differences – which turn out to be important – *within* the top or bottom groups? We show our main results by vingtile (twentieth) of the population (and some results by percentile in the appendix).

Modelling of this kind can be carried out assuming that everyone who is entitled to benefits and tax credits receives them, or can allow for what is known to be only partial take-up of means-tested benefits and tax credits. In our analysis we allow for partial take-up, as this gives the best representation of what will be the effects of changes on actual (rather than potential) living standards and revenue flow to government.

Finally, should we take account of reforms that were announced but had not yet been implemented by May 2015 – such as the introduction of Universal Credit to replace several existing means-tested benefits, or the long-run effects of measures such as the switch to using the Consumer Price Index (CPI) to adjust most working-age benefits from year to year while, contrastingly, state pensions are being adjusted by the 'triple lock' (the higher of earnings, prices, or 2.5 per cent each year)? In our main analysis we look only at changes that were already in place in 2015/16, but in Section 7 we examine potential effects of these longer-term reforms agreed by the Coalition.

The analysis in the following sections shows that these choices make a considerable difference to the picture painted. But however one looks at it, it is clear that those with low incomes at the start of the period have lost more proportionally than those in the middle and just above it (many of whom have in fact gained). But some at the top have also lost. Some previous analysis has suggested that those in the top fifth or top tenth may have lost as much or nearly as much as the poorest groups, but our analysis suggests that this picture flows from particular assumptions about the appropriate policy reforms to include, the starting point and how it should be uprated, as well as from grouping those near the top with those right at the top.

We look at our results in detail in section 4. Before that, in section 2 we describe the range of policy changes and reforms that are covered by the analysis, and in section 3 the data and methods we use. Following discussion of the main results on distributional effects in section 4 we look at alternative breakdowns in section 5, including by household type, age and region. In these results we concentrate on comparing the systems as they were in 2015/16 with how they were in 2010. In section 6 we compare our results with the distributional analysis provided by the Treasury and by the Institute for Fiscal Studies and illustrate how adopting some of their key assumptions changes the distributional picture that we obtain. Given that so few households were affected by it

in 2015,[3] we do not include the introduction of Universal Credit in our main analysis. However, in the longer-term, this was intended to be one of the Coalition's major reforms, so in section 7 we model what might be the situation in 2020/21, if Universal Credit as envisaged by the Coalition was in place. We also take account in this longer-term view of other changes announced by the Coalition for 2016/17 and the effects of the new regimes it introduced for uprating benefits and pensions from year to year – such as by the CPI (rather than the RPI) for working-age benefits or by the 'triple lock' for state pensions, as well as the effects of the two-year freeze in most working age benefits from 2016/17 announced in the March 2015 Budget. Section 8 summarises the findings and reflects on their implications.

In this analysis there are some general points to bear in mind. First, the modelling does not take account of any behavioural effects of policy change – for instance changed patterns of working as Universal Credit is introduced (with no minimum working hours rule), or changes in how the richest families choose to receive their investment returns with different top levels of income tax. Second, there are important changes which we do not cover,[4] such as the greatly increased level of 'sanctioning' and removal of benefits for a period,[5] or tighter conditions for receiving Universal Credit in the future, compared to existing benefits and tax credits.

Also, the data source we use (see below) has incomplete coverage of those with the very highest incomes. We do not, as in, for instance, the Department for Work and Pensions *Households Below Average Incomes* analysis, adjust for this using data from tax records. The analysis therefore is likely to understate the overall value of the *gains* to the top one or two per cent of the distribution from the cut in the top income tax rate from 50 to 45 per cent.

2. How were policies changed?

The Coalition government introduced some headline-grabbing reforms to taxes and benefits, such as the replacement of most working age means-tested benefits by Universal Credit and a major increase in the income tax personal allowance, made some less-heralded changes that may have a large effect on some households, and announced other changes whose effect will take some years to become fully apparent. The ways in which benefit amounts and tax thresholds were indexed also played a role in reshaping the distributional effects of benefits and taxes. Initially, one of the government's important decisions (or non-decisions) was *not* to cut benefits as real wages fell as, for instance, had been done by the 'National Government' in the early 1930s. This meant that initially people receiving benefits were protected from parts of the effects of the recession, contributing to the way in which overall inequality fell at the start of the recession. But subsequent decisions to freeze benefits (such as Child Benefit and parts of tax credits), to increase many benefits by only 1 per cent for three years, and to switch from RPI-based inflation adjustment to using the CPI, will unwind the effects of this initial decision.

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[3] Just 65,000 by May 2015 (but up from 12,000 in August 2014), compared with the Coalition government's aspiration that 7.5 million households would be on Universal Credit by 2017.
[4] Appendix 1 lists the changes to the system that are taken into account in the modelling, and Appendix 2 includes a description of those that we cannot account for.
[5] By the end of 2013 the rate had reached 900,000 people being sanctioned each year, compared to between 200,000 and 300,000 per year earlier in the 2000s (see Hills, 2015, chapter 9 for more discussion).

Each of these types of change has distributional implications, and in this section we consider them in detail, first for the period in which the full extent of change is known (2010/11 to 2015/16) and then for an additional period (2015/16 to 2020/21) that allows us to assess what could have been the effects of Coalition government changes that were announced but were to be implemented after the 2015 election.

2010/11 to 2015/16

The policy changes implemented in this period and captured in our analysis, in full or in part, are listed in Appendix 1. These should be put in the context of the "business as usual" indexation regime which is set out in Appendix 3. Unless specified in Appendix 1, each element of the system was indexed as specified in Appendix 3. So, for example, the increase in Child Benefit in 2015/16 of 1 per cent was less than what CPI indexation would normally have achieved (2.2 per cent in that year) and less than the increase in the cost of living.

The Coalition government started with a commitment to increase the **income tax** personal allowance to £10,000 and this was achieved (in nominal terms) by 2014/15. The value of the increase was designed to be no greater for higher rate taxpayers than others because the basic rate limit (the top of the basic rate band) was reduced accordingly (although this was not applied in the final year, 2015/16). Taken together, the sum of the personal allowance and the basic rate limit, which is the threshold for higher rate (40 per cent) tax, fell in real terms over the period as a whole. Pensioners gained less from the higher personal allowances, because the more generous 'age allowance' they received was not increased and then abolished. At the same time, the top rate of tax for income above a threshold fixed in cash terms, introduced not long before the Coalition government came to power, was reduced from 50 per cent to 45 per cent.

A further reform to income tax was introduced in 2015/16. This was the introduction of partial transferability of the personal allowance between spouses in married couples. It applies to 10 per cent of the personal allowance and is limited to basic rate taxpayers.

National Insurance contributions (NICs) were increased by 1 percentage point and the lower thresholds for employee and self-employed contributions were increased by more than regular indexation.

Tax credits were adjusted so that they became less generous in real terms, and their reach up the income distribution was reduced. While the maximum amount of Child Tax Credit paid *per child* increased in real terms, the 'family' element was frozen and restricted to low income families, the addition for babies was removed, and the proportion of childcare costs covered was reduced, alongside cuts in the generosity of Working Tax Credit. Hours of work conditions in Working Tax Credit were adjusted to require more from couples with children, but less from older people and those receiving Carer's Allowance.

Child Benefit was cut in real terms and reduced for families with anyone earning more than £50,000 (and withdrawn entirely for those earning £60,000 or more). The **Winter Fuel Payment** was cut substantially in cash terms in 2011 when the Coalition did not continue the temporary increases introduced by Labour.

The conditions to receive benefits for disability and incapacity were made more restrictive, with fewer people entitled, and contributory Employment and Support Allowance was time-limited to one year and means-tested thereafter.

Housing support for private sector tenants (**Local Housing Allowance**) was subject to major restrictions on the maximum amount of rent that may be covered and **Housing Benefit** for public sector tenants was reduced for tenants deemed to be under-occupying their accommodation, and the deductions that are made automatically for resident non-dependants were increased.

A **maximum cap** on all working age benefits was introduced except for those in receipt of disability payments or Working Tax Credit.

While **Council Tax** was frozen for part of the period (and all of it in Scotland) and increases were restricted in the remainder, so that it generally fell in value in real terms, **Council Tax Benefit** was abolished, with local authorities taking responsibility for any replacement "Council Tax support".[6]

In the last three years of the period most working age benefits were **indexed** by 1 per cent instead of the customary index (see below) which would have resulted in larger increases. On the other hand, over the period, the **Basic State Pension** was indexed by the highest of the Consumer Prices Index (CPI), the growth in average earnings and 2.5 per cent, and the Guarantee Credit in **Pension Credit** increased by the same cash amount. The Savings Credit part of Pension Credit saw real reductions, however.

The regime of default indexation was also reformed, generally abandoning the use of the Retail Prices Index (RPI) and the related 'Rossi' index in favour of the CPI. The argument for this was that the technical construction of the RPI can lead to it over-stating the rise in the prices that people actually pay when they have the ability to switch between similar items. Additionally, the CPI omits the effects of inflation in the housing market, which for some benefit recipients is less relevant if, for instance, their housing costs are covered by Housing Benefit.

Aside from the conceptual and principled issues over the choice of index, the switch in the default basis of indexation implies a lower growth in benefit levels and tax thresholds than would have otherwise been the case (see Table 3.1 below). There have been other changes in the basis for indexation, as set out in Appendix 3. In addition, also shown there, some parts of the tax-benefit system are traditionally not indexed at all and have remained the same in cash terms for many years (these include capital limits and earnings disregards in means-tests). Furthermore, some of the thresholds introduced in recent income tax reforms have remained fixed in cash terms (see Appendix 4). The effects of such measures may be small on a year to year basis and when inflation and income growth are low, but accumulate over longer periods to play a significant role in changing the fiscal and distributional effects of policies (Sutherland et al., 2008).

2015/16 to 2020/21

Looking five years further ahead we explore the implications of the indexation regime as set out in Appendix 3, and also capture the effects of reforms that were announced but were not planned to be implemented until 2016/17 or later. These are listed in Appendix 1 and include two further years of freezing of most working age benefits, Child Benefit and Local Housing Allowance, while the personal income tax allowance was set to rise by at least CPI. In addition, in 2016/17 the way savings income is taxed for those with low incomes will be reformed: the 10 per cent tax rate charged on an initial tranche of savings income for those without other income above the tax threshold will be replaced by a wider zero rate band for such income.

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[6] See Appendix 2 for an explanation of how this change is modelled.

The major reform planned to be rolled out in the period (by 2017 according to the Coalition's plans, but only partly implemented before the election) is the replacement of the existing regime of almost all means-tested benefits and tax credits for working age people and their families by the **Universal Credit** (UC). This requires a single application and will replace Income Support, income-based Job Seekers Allowance, income-based Employment and Support Allowance, Child Tax Credit, Working Tax Credit and Housing Benefit. It will also replace Pension Credit for couples where one partner is aged under pension age. The maximum amount is the total of a standard allowance, additions for disabled children and adults and for carers; there are additions for housing costs support and childcare costs support. Each of these components has its own rules of entitlement (which are often similar to their equivalents in the pre-existing means-tested benefits and tax credits). As with the out-of-work benefits it replaces, but unlike tax credits, those with financial capital of £16,000 or more are ineligible.

The amount of earnings that is disregarded depends on the composition of the benefit unit, including the capacity to work of the adults and whether UC includes the housing costs element. The maximum amount less earnings disregard is then reduced by one pound for each pound of un-earned income, and by 65p for each pound of earned income.

A key feature of UC for those in part-time work is that it does not have a minimum hours of work rule, unlike the Working Tax Credit which it would replace. This will mean that some of those working shorter hours than the Working Tax Credit rules specify could gain significantly from the new regime. However, as well as these changes to the way that benefit entitlements are calculated, the conditionality regime faced by UC recipients in work will be substantially different from that which previously applied. In particular, conditionality will apply to two groups of UC recipients who previously faced no forms of conditionality: some part-time workers will face obligations to seek better-paid or longer-hours work, and some adults not in paid work whose partners are in low-paid work will face obligations to look for work. [7]

Under the Coalition's plans for UC, the restriction on childcare costs introduced into Working Tax Credit would be reversed and up to 85 per cent (instead of 70 per cent) of eligible costs will be covered. In addition, eligible childcare costs for those not qualifying for UC and with sole/both parents in paid work but not paying higher-rate tax will become eligible for a top-up equivalent in value to tax relief at the basic rate. Note that our modelling is again based on the *Coalition's* plans for the structure of Universal Credit, not the less generous structure that would follow from the announcements in the *Conservative* Budget in July 2015.

Assessing the effects of the policy changes

Our approach to assessing the effects of these policy changes is to simulate the incomes that a given set of households would have under the policy regimes in place in 2015/16 (and then in 2020/21), and to compare these to what they would have had if no reforms had been made to the policy regime in place in 2010/11. A key question is then is what this "no reform" scenario would look like, given that prices and incomes have changed and will continue to do so. There are a number of options for indexing the 2010/11 system, corresponding to natural interpretations, but no neutral or definitive choice can be made (Hills, Paulus, Sutherland and Tasseva, 2014). For

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[7] For more on UC, see Brewer, Browne and Jin (2012), Pennycook and Whittaker (2012) and Brewer and De Agostini (2013, 2014). For an overview of the issues around the change, see Hills (2015), chapter 4. Up to date information can be found at this website: http://www.dwp.gov.uk/policy/welfare-reform/universal-credit/

example, if all monetary parameters in the 2010/11 regime were adjusted for changes in the price level up to 2015/16, then the benefit system would maintain real living standards (other things being equal) for those at the bottom. On the other hand, if the tax-benefit system kept pace with the growth in market income, then this would achieve fiscal neutrality (and incidentally, would also be close to maintaining incomes at the bottom relative to the middle, so holding relative poverty constant). Both in times of economic fluctuation and also in times of persistent real income growth, it seems important to be aware of the different distributional implications of alternative counterfactuals. In the analysis that follows we create counterfactuals by indexing by the change in both the index of average earnings (which will move similarly to market incomes as a whole) and in the CPI, and we sensitivity-test the price indexation option by also indexing by the RPI. The next section gives the actual values of these indices over the period.

3. Data and methods

To calculate household disposable income under the different policy scenarios, our analysis makes use of the UK component of EUROMOD, the EU tax-benefit microsimulation model and information from the Family Resources Survey (FRS) micro-data. EUROMOD simulates cash benefit entitlements and direct personal tax and social insurance contribution liabilities on the basis of the tax-benefit rules in place and information available in the FRS. Market incomes are taken from the data, along with information on other personal and household characteristics (e.g. age and marital status). Policy instruments which are not simulated are also taken directly from the data: these include most contributory benefits and pensions (due to the lack of information in the data on previous employment and contribution history) and disability benefits (due to the lack of information in the data on the nature and severity of the disability). See Sutherland and Figari (2013) for further information about EUROMOD and De Agostini and Sutherland (2014) for a detailed description of the UK component.

Appendix 2 explains some of the details behind the modelling and the assumptions made. In particular, we have chosen to try to reflect non take-up of means-tested benefits and tax credits because of the importance of representing those not receiving their entitlements in the income distribution. The main effect is through the ranking of people according to their household income. Those not taking up naturally appear at or near the bottom of the distribution. As explained in Appendix 2, we assume (to the extent that is possible) that take-up behaviour remains the same across policy regimes.

More generally, the measure of income that is used to rank individuals in the analysis of the effect of policy change across the income distribution may be critical to the picture that emerges. In this analysis, except where noted otherwise, we use a common ranking by household income from the starting point of our analysis in 2010/11, using 2010 simulated disposable household income and adjusting for differences in household size and composition using the modified OECD equivalence scale. Other analytical choices are made in other studies (as illustrated in section 6 of this paper).

In this analysis we make use of 2009/10 FRS data and update the values of market incomes to 2015/16 levels using appropriate indices. Benefits, pensions and Council Tax which cannot be simulated with the information available in the FRS are also updated to 2015/16 levels using available information on the indexation or change in average amounts of these (see Appendix 2). No adjustments are made for changes in the labour market, household composition or

demographic characteristics of the population over this period. Tax-benefit policies for 2015/16 are then simulated using EUROMOD and the resulting levels of household income are compared with those applying the policy system that the Coalition government inherited in May 2010.[8]

As explained above, we explore the implications of indexing the 2010/11 tax benefit system forward to 2015/16 by a range of different factors. We also evaluate 2020/21 policies in 2015/16 terms. Table 3.1 shows the value of the three indexes, taking 2015/16 as the base year.

Table 3.1 Counterfactual indexation factors

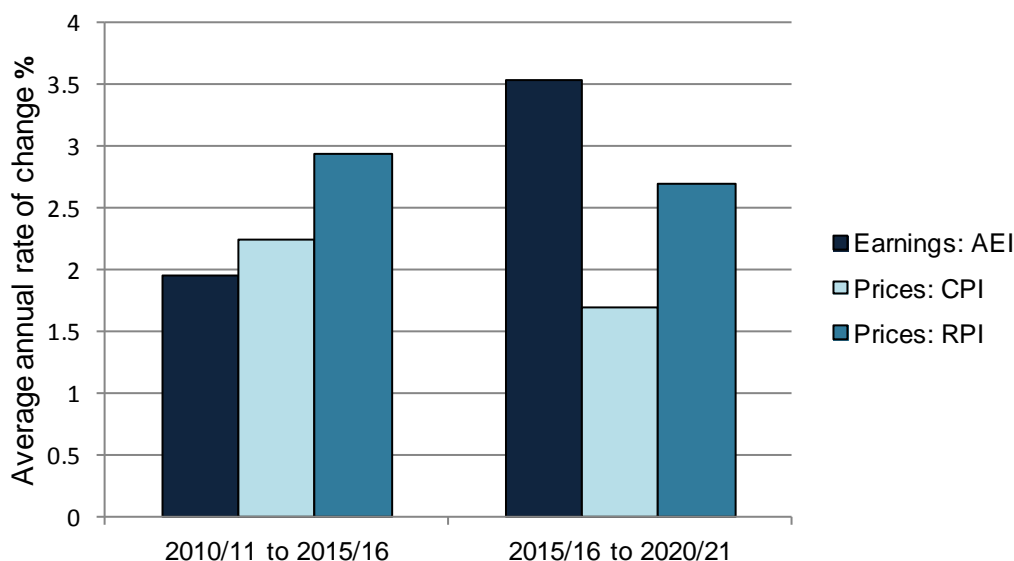|	Earnings: AEI	Prices: CPI	Prices: RPI
2010/11	1.098	1.112	1.147
2015/16	1.000	1.000	1.000
2020/21	0.823	0.915	0.865

Sources: Earnings: Fiscal year average of monthly ONS Average Weekly earnings Index (K54U) http://www.ons.gov.uk/ons/datasets-and-tables/data-selector.html?cdid=K54U&dataset=emp&table-id=AWE15; Consumer Prices Index (CPI): Fiscal year average monthly as from ONS Consumer Price Index reported by OBR Table 1.7 http://budgetresponsibility.org.uk/pubs/150318-Economy_Supplementary_Tables_March_2015.xls ; Retail Prices Index (RPI): Fiscal year average All Items ONS (CHAW). Projections from the latest data to 2020/21 use forecasts from OBR March 2015 http://budgetresponsibility.org.uk/economic-fiscal-outlook-march-2015/ Table 3.5, to 2019/20 and assume that growth in the last year to 2020/21 is at the same rate as in the previous year.

The annual average rates of change of the three indexes in the two time periods are plotted in Figure 3.1. This illustrates how the relative movements of the three indexes are different in the two periods and, generally, differ within periods. The choice of which to use in constructing the counterfactual will clearly affect our assessment of the size of the policy changes.

In the five years of Coalition government real earnings fell on average (adjusted using either price index, as nominal earnings grew more slowly than either). Indexing the 2010/11 system by CPI would make it seem more generous relative to the 2015/16 system than if nominal average earnings growth (AEI) is used. OBR forecasts made in 2015 for 2015/16 to 2020/21 are for earnings to grow faster than CPI and so using earnings indexation will make actual policy changes seem less generous than if we assume price indexation. In both periods RPI rises faster than CPI (for the kind of reasons discussed in Section 2), showing how the policy to change the basis of most indexation from RPI to CPI tends to reduce the nominal rate of growth of benefit levels and tax thresholds.

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[8] We refer to this as the 2010/11 system since the Coalition did not make any major relevant policy changes that were implemented later during the 2010/11 fiscal year.

Figure 3.1: Annual average rate of change of earnings and price indexes 2010/11-2015/16 and 2015/16-2020/21

Sources: See Table 3.1.

The effect of these counterfactuals compared with what actually happened between 2010/11 and 2015/16 for some example tax thresholds and benefit rates is shown in Table 3.2.

Table 3.2: The value of selected benefit levels and tax thresholds in 2010/11 and 2015/16 under a range of assumptions[9]

| | 2010/11 | 2010/11 policies in 2015/16 | | | 2015/16 |
Indexed by:		AEI	CPI	RPI	
Child Benefit: first child £/w	20.30	22.28	22.58	23.28	20.70
Pension Credit Guarantee: single person £/w	132.60	145.55	147.51	152.09	151.20
Income Support single person £/w	65.45	71.84	72.81	75.07	73.10
Income tax threshold £/y	6,475	7,107	7,203	7,427	10,600
Income threshold for higher rate income tax £/y	43,875	48,160	48,809	50,325	42,385

For instance, in 2010/11 Child Benefit for the first child was £20.30 per week. If it had been uprated by the CPI each year until 2015/16 it would have been worth £22.58 by then, or £22.28 uprated by earnings growth, or £23.28 if it had been uprated by the RPI. In fact it was only worth £20.70 in 2015/16. As it was barely increased in nominal terms, its value was cut compared to any of the counterfactual indexes.

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[9] In this table, and in the construction of the counterfactual scenarios used in the analysis, we do not apply rounding (e.g. to the nearest 5 pence per week or £100 per year) as is conventionally used in uprating in practice.

Pension Credit, on the other hand, more than maintained its real value (using CPI) and grew faster than earnings but would have been uprated by more if it had still been linked to the RPI in this period. Income Support (and income-tested Jobseeker's Allowance and Employment and Support Allowance) for working age people out of work also maintained its value relative to the CPI but not the RPI and rose by more than the average earnings of those in work. The income tax threshold was substantially increased when considered relative to any of the counterfactual indexes. The effect of this on reduced tax liability was mitigated for higher-rate taxpayers by a nominal reduction in the level of the threshold for higher rate tax.

The information in Table 3.2 suggests that, other things being equal, children may have lost out relatively to older people and that middle-to-high income households will have gained relative to those at the bottom and the top. However, there are many other monetary parameters within the tax-benefit system, and the net effect of changes in them all for any household will be the result of a complex combination of calculations, the results of which will vary depending on their composition and circumstances. In the following sections we analyse the effects of all the changes across the whole population.

4. Effects of Coalition policy changes 2010/11-2015/16 across the income distribution

Figure 4.1 (a) and (b) show our central results – the effects of Coalition changes to taxes and benefits and indexation decisions compared with what the system they inherited in May 2010 would have become if unreformed but uprated in line with CPI inflation (in the top panel) or with the growth in average earnings (in the bottom panel).[10] The results show average gains or losses from six broad parts of the direct tax and benefit systems, and (as the solid line) the net effect of all of them together combining the various negative and positive effects. Negative effects (downward pointing parts of the bars) are due to increases in tax and contribution liabilities, or to reductions in benefit and pension entitlements, positive effects to tax and contribution cuts or benefit increases. This is shown for each twentieth ('vingtile') of individuals. We divide the population this finely because of the importance of the differences in results between groups right at the top and the bottom of the distribution. There is a limit to how finely we can make these divisions because our results would not be statistically reliable if the sample sizes became too small. Confidence intervals at the 95% level around the net effects are shown on the Figures (and some others later in the paper), indicating that the broad shape of the effect is reliable.[11]
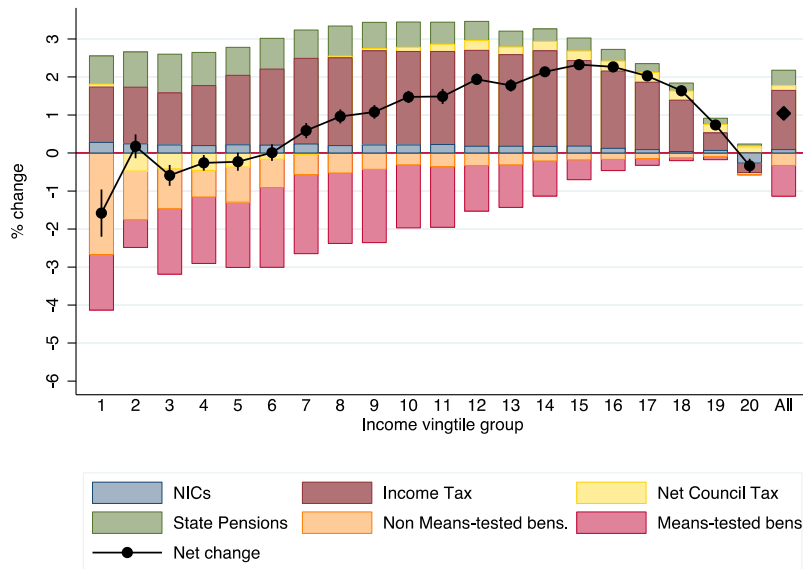
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[10] Figure A4.1 in Appendix 4 shows equivalent results, if the base had been increased in line with the growth in the RPI. This would have been faster than either CPI or AEI-indexation and so shows larger losses, particularly at the bottom of the income distribution.
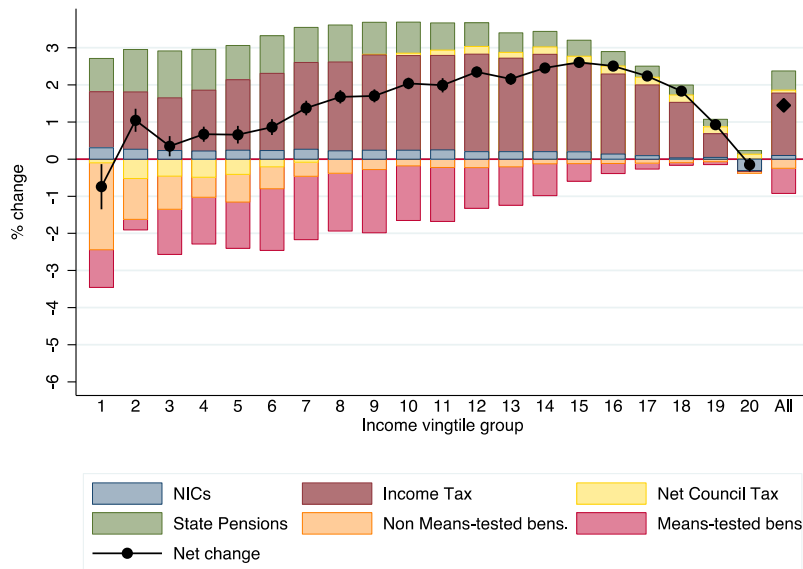[11] We bootstrap the average proportional change in equivalised household disposable income for each vingtile group to estimate its empirical distribution and show the 2.5th and 97.5th centiles.

Figure 4.1: Percentage change in household disposable income by income vingtile group due to policy changes 2010 to 2015/16

(a) Compared with May 2010 policies uprated to 2015/16 using CPI

(b) Compared with May 2010 policies uprated to 2015/16 using AEI

Notes: Observations are ranked into vingtile groups using household income in 2010 equivalised using the modified OECD equivalence scale. The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

The components are: income tax; National Insurance contributions (employee and self-employed); "state pensions" (including the Basic State Pension, War Pension and Widow's Pension); Council Tax, net of Council Tax benefit or Council Tax support (referred to in graphs as Net Council Tax); non means-tested benefits (including Child Benefit, Winter Fuel Allowance, Attendance Allowance, Disability Living Allowance, contributory Jobseeker's Allowance, contributory Employment and Support Allowance, Industrial Injuries pension, Carer's Allowance, Severe Disablement Allowance, Statutory Sick Pay, Statutory Maternity Pay, Maternity Allowance, training allowances, Student

payments, Student Loan); and means-tested benefits (including Working Tax Credit, Child Tax Credit, Income Support, income based Employment and Support Allowance, income based Jobseeker's Allowance, Pension Credit, Housing Benefit and the effect of the benefit cap).[12]

Looking first at the results compared to price-indexation in the top panel, a first observation is that *overall* households *gained* from the changes, by around 1 per cent of incomes on average. Means-tested and other benefits were cut, compared to a price-indexed system. But people paid less net Council Tax (as cuts of what was Council Tax Benefit were more than offset by Council Tax itself falling in value in real terms), and they gained from reduced Income Tax liabilities (with the increased personal allowance) and from state pensions rising faster than CPI-inflation. Remarkably, given that this was a time of austerity, the combined effect of these reforms (not including indirect tax increases) emerges as having a net cost to the public finances.

But this average effect hides a substantial distributional change. Overall, the poorest twentieth lost nearly 2 per cent of their incomes and three of the next four twentieths also lost. But, with the exception of the top twentieth, the income groups in the top half of the distribution were net gainers. From the bottom to four-fifths of the way up, the changes were clearly regressive, hitting those lower down hardest and helping those higher up most as a share of their incomes. This is because benefit reductions were greater for the bottom half than their gains from lower Income Tax.[13] But rising through the top fifth of the distribution the gains from higher income tax allowances were increasingly offset by other changes, so that the top twentieth make a small loss on average – although it should be added that within this, those in the top one per cent represented in this survey emerge as narrow *gainers* as a result in the cut of the top marginal rate from 50 to 45 per cent.[14]

On this basis, the reforms had the effect of making an income transfer to the richer half of households, partly financed by some of those in the poorest third (and some of the very richest), while making no contribution to deficit reduction.

The bottom panel shows the results if the comparison is made with the May 2010 system uprated in line with the growth of average earnings. This would be consistent with preserving a system that had the same *relative* generosity as at the start, and would thus be neutral towards inequality. In times when real incomes are growing, this kind of base usually shows a less favourable position for

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[12] In our treatment, we include the effect of withdrawing Child Benefit from higher-rate taxpayers as an increase in tax rather than a reduction in Child Benefit. State earnings-related pensions, along with private occupational pensions are assumed to be uprated by CPI throughout and hence changes to these income components are factored out of our analysis. In later figures, tax-free childcare is included as part of non means-tested benefits, while Universal Credit is included in means-tested benefits (replacing other means-tested benefits for working age benefit units).

[13] Note that some of the poorest households are those who do not take up benefits they are entitled to. As a result, they are unaffected by changes in the values of those benefits. For instance, some of those who might have claimed Council Tax Benefit are unaffected by its reform, but do gain from the freeze in gross Council Tax.

[14] See Appendix Figure 4A.2 for a version of Figure 4.1a giving its results by percentile, bearing in mind that there are much wider confidence intervals for such results, and that the original data source has both incomplete coverage of those with the very highest incomes, and understates the highest incomes. Also, these estimates assume that there was no forestalling on the part of potential top rate taxpayers, either holding income until the tax rate was lowered or declaring income early, before the 50% rate was introduced in the first place in 2010.

the bottom than when a price-linked base is used.[15] But over this period, when real earnings were falling, the comparison is with a somewhat *less* generous base system – the one that would have emerged if the real value of benefits and tax allowances had been *cut* in line with real earnings. Against this comparator, households as a whole *gain* by an average of 1.5 per cent of disposable income. In other ways, the pattern is similar to that in Figure 4.1(a), but with greater differences for those in the bottom half. The bottom twentieth is still worse off, however, by nearly 1 per cent, while others have net gains, apart from the very top group. The largest gains – up to 2.5 per cent of disposable income on average – are for those in the top half of the distribution, but below the top tenth. On this basis the changes are also shown as regressive until the very top, with larger net gains for the top half of the distribution. On this basis, the better-off half of households were gaining both from the overall system being more generous than it would have been with earnings indexation, and from a net transfer from the poorest households.

Figure 4.1 shows that using either comparator, reductions in the value of both means-tested and non means-tested benefits were the main net contributing factor to income losses. Looking at the detail, the overall net effects are the result of reinforcing changes to components of the system:

- Changes to means-tested benefits have meant the largest proportionate losses to the bottom half of the distribution, particularly to those just below the middle.
- Changes to non means-tested benefits have been straightforwardly regressive – equivalent to 2.5 per cent of income (against a price-indexed base) at the bottom, but with very small effects in the top half.
- Changes to Council Tax and associated benefits have meant losses for most of the bottom third, but gains for the top half of the distribution. Right at the bottom though – including some households that fail to claim means-tested support, and so have not lost through its reform – there are some gains from the freeze in the level of the tax.
- Income tax changes – notably the real increase in personal allowances – have meant gains for all income groups, but have been worth most proportionately for those in the middle of the distribution. It is only the top twentieth that is paying more income tax than it would have done under the old (price-linked) system. Within this group, however, the very top 1 per cent are paying less income tax in this analysis, because of the cut in the highest marginal rate from 50 per cent in May 2010 to 45 per cent by 2015/16.
- National insurance changes (a higher threshold offset by a higher contribution rate) resulted in small gains for all groups apart from the top twentieth, which is paying slightly more.
- The more generous indexation of state pensions meant gains for all income groups, although with the largest proportionate gains to the bottom half of the distribution, and least at the very top.

The regressive overall effect is therefore largely the result of households nearer the bottom losing the most from reduced means-tested and non means-tested benefits, while those in the top half have gained most from lower income tax, with the exception of the very top twentieth, which is paying more in income tax and National Insurance Contributions than it would have done.

These results show the combined effects of five years' worth of policy changes. They are shown broken down year-by-year in Appendix Figure A4.3 (using CPI indexation of the previous year's
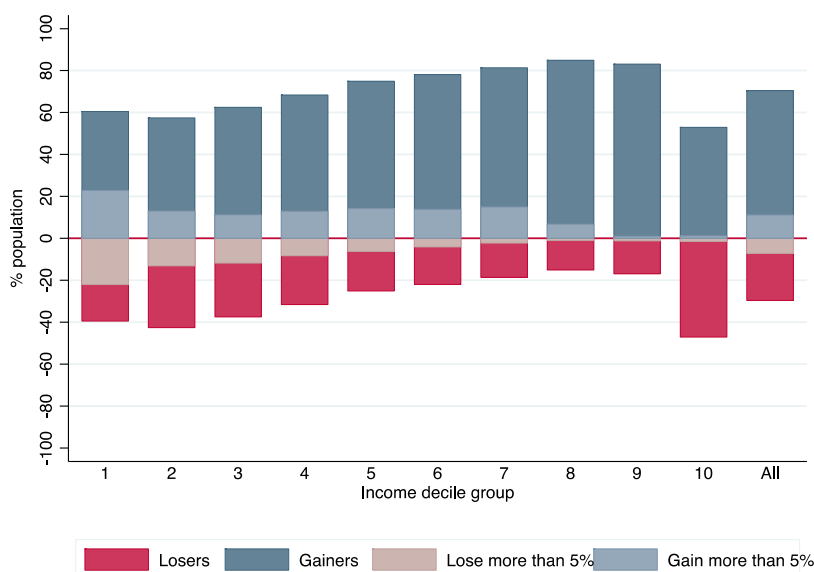
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[15] See, for instance, Sefton, Hills and Sutherland (2009), figure 2.5, or Adam and Browne (2010), figure 3.3, for the Labour period from 1996-97 to 2008-09.

policies, adding up to what is shown in Figure 4.1a). It is striking how on the one hand the major drivers of the reductions in income at the bottom of the distribution — cuts to benefits and increases in net Council Tax — mainly occur in 2013 whereas on the other hand the gains from increasing the income tax personal allowance appear year after year. Furthermore, the restrictions on the indexation of Child Benefit and working age benefits in the later years might have been expected to appear as losses, as would have been shown by analysis at the time using forecast changes in CPI. But this did not happen because very low inflation out-turns in 2014 and 2015 meant that benefits in fact kept pace with the evolution of CPI.

The results in Figure 4.1 show the average position of all of those within each twentieth of the distribution. Within each income group, however, there are gainers and losers, as is shown in Figure 4.2 (by decile group for clarity). Compared with a price-linked base, the first panel shows that overall about 70 per cent gain and 30 per cent lose. However, in the bottom three-tenths and in the top tenth, around 40 per cent are losers. Looking at larger changes (by more than 5 per cent either way) it is striking that more than a fifth of those in the bottom tenth lose amounts equivalent to more than 5 per cent of their incomes, although a fifth of them gain by more than 5 per cent. Compared to an earnings-linked base in the second panel, overall gainers out-number losers more strongly (by 75 per cent to 25 per cent), but even on this comparison, 20 per cent of those in the bottom tenth lose more than 5 per cent of their incomes.
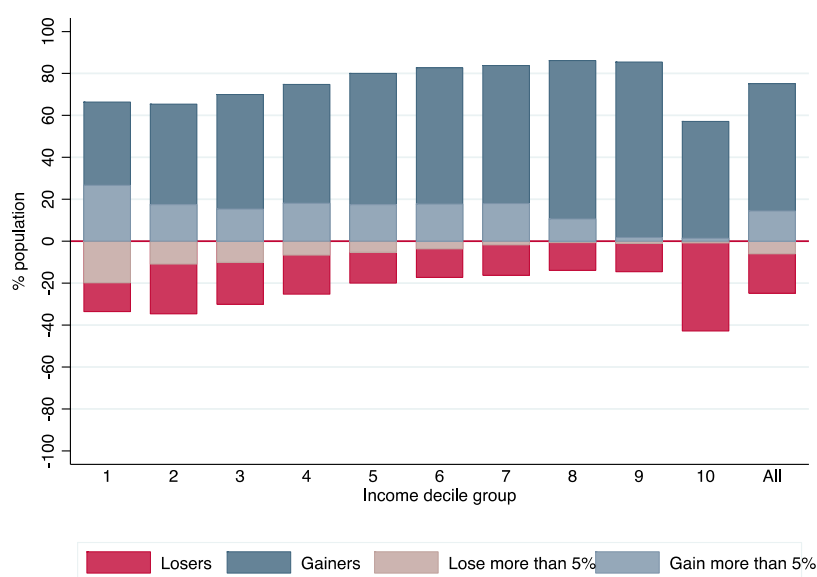
Figure 4.2: Gainers and losers due to policy changes 2010 to 2015/16

(a) Compared with May 2010 policies uprated to 2015/16 using CPI

(b) Compared with May 2010 policies uprated to 2015/16 using AEI

Legend: Losers · Gainers · Lose more than 5% · Gain more than 5%

Notes: Observations are ranked into decile groups using household income in 2010 equivalised using the modified OECD equivalence scale. Source: Authors' calculations using EUROMOD G2.35.

5. Effects of Coalition policy changes 2010/11-2015/16 by household and personal characteristics

As well as being able to break the effects of the changes down by people's position in the income distribution, we examine what they show when households are categorised in other ways.[16] In doing this we concentrate on the results compared with an *earnings*-linked base, that is, equivalent to those in Figure 4.1b (as this is usually the more neutral assumption in terms of fiscal balance as well as income inequality). The results compared to a price-linked base (see Figure A4.4 in Appendix 4 for results by age) show generally similar differences between groups, although with a somewhat less favourable (or more unfavourable) position for those with a large proportion of income coming from benefits or pensions (such as lone parent families or older pensioners).

First, Figure 5.1 shows distributional effects by the age group of each individual, taking account of all income changes in their household.[17] It is clear that children have been the least favourably treated, together with those in their 30s and early 40s (we showed earlier that, overall, households 'gain' around 1.5 per cent of income compared to a base in which the real values of benefits and tax brackets would have been changed in line with average earnings).
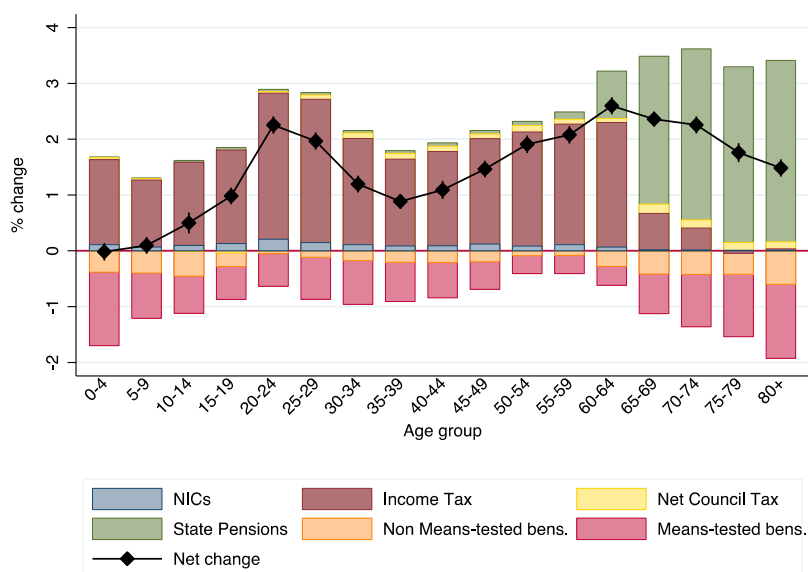
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[16] It would be very interesting to break down the effects by gender, as well as the characteristics discussed here. However, given the underlying assumption that households share their incomes, men and women in couples would be allocated the same change, which might or might not be appropriate, but would dominate the results. Looking at the effects using a range of assumptions on sharing, and focussing on the effects on individual incomes (received in their own right) would be instructive, but is beyond the scope of this exercise.

[17] Note that the analysis assumes that, for instance, in a household consisting of a child or young adult living at home with his or her parents, each person is affected in the same way by the policy changes (as in, for instance, DWP's *Households Below Average Income* analysis). In reality this sharing may represent what will happen within some households, but not within others.

Interestingly – given how badly people in their 20s have done in the labour market since the start of the recession[18] – the changes to taxes and benefits favoured that age group on average, as they tended to gain from direct tax changes, and not to lose much from benefit cuts. Those in their early sixties were the greatest beneficiaries, gaining from direct tax changes and (for some) from favourable indexation of pensions, and with, for instance, 'empty nesters' without children losing less than others from benefit cuts. Those aged over 65 had gains averaging between 2 and 3 per cent of their incomes from 'triple-locked' state pensions rising much faster than earnings, although this was partly offset by cuts to other benefits, particularly for the oldest pensioners. Direct tax changes had little effect on those over 65 (as they originally benefited from a higher tax-free allowance than others, but this was withdrawn when the main personal allowance was increased).

Some of these age-related differences are closely linked to the differences between different kinds of household, shown in Figure 5.2. Two-earner households, and those with elderly members were the most favourably treated, as a result of direct tax changes and state pensions, respectively. By contrast, lone parent families did worst, losing much more through cuts in benefits and tax credits and higher (net) Council Tax than they gained through things like higher income tax allowances. Families with children in general, and large families (with three or more children) in particular also did much worse than the average.
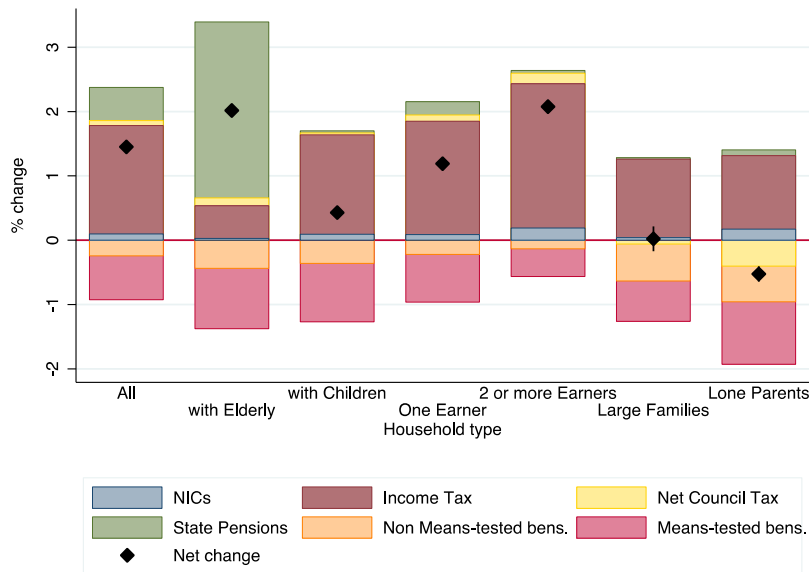
Figure 5.1: Percentage change in household disposable income by age group due to policy changes 2010 to 2015/16 (2010 policies uprated to 2015/16 using AEI)

Notes: The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

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[18] Hills, Cunliffe, Obolenskaya and Karagiannaki (2015), section 3. The gains from direct tax reductions were not enough, however, to prevent continuing falls in their real net incomes, up to 2012/13, at least (ibid. figures 3.8 and 3.9.).
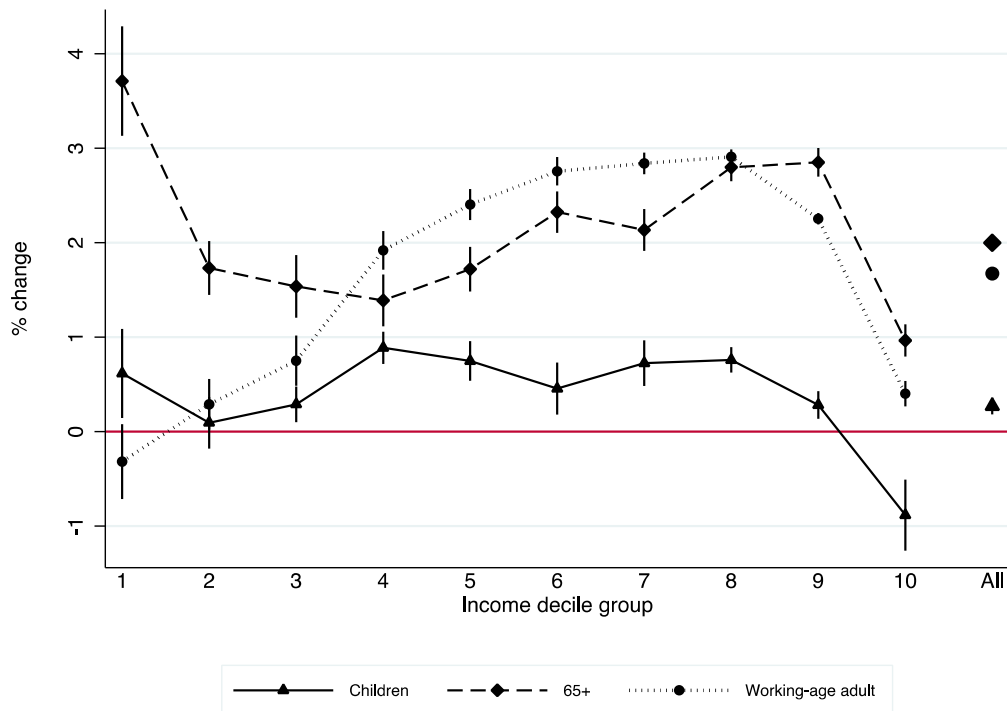
Figure 5.2: Percentage change in household disposable income by household type due to policy changes 2010 to 2015/16 (2010 policies uprated to 2015/16 using AEI)

Notes: "Large families" are households with 3 or more children. Note that the categories are neither mutually exclusive nor exhaustive. The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

These effects were not, however, uniform across each household type or age group. Figure 5.3 shows net effects on individuals (reflecting their households' incomes) in three different age groups by their position in the overall income distribution. The most favourably treated are working age adults and pensioners with higher (but not the highest) incomes, and low income pensioners. The least favourably treated are low income working age adults and children, together with children in the highest income households (at this level of aggregation). In the latter case this is due to smaller gains (or losses) from income tax changes than lower down the distribution, combined with the withdrawal of Child Benefit from higher-rate taxpayers. Indeed, across the distribution apart from the bottom tenth, children fare worse than the other two groups. Gains for their families from reductions in income tax and NI contributions are offset on average by cuts (relative to earnings) in Child Benefit and removal of the family element of the Child Tax Credit.

Figure 5.3: Percentage change in household disposable income due to policy changes 2010 to 2015/16 by household income decile group and age group (2010 policies uprated to 2015/16 using AEI)
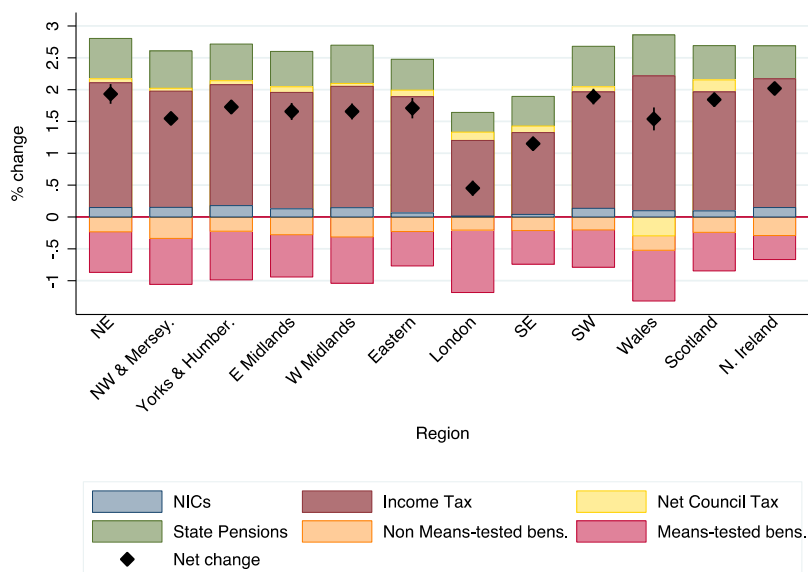

Notes: Observations are ranked into decile groups using household income in 2010 equivalised using the modified OECD equivalence scale. Children are defined as people aged under 16 or under 19 and in full time non advanced education. Working age adults are aged under 65. The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

Finally in this section, Figure 5.4 shows the average effects of the changes by region. In general the differences between regions are small, with one striking exception – London. There are two effects here. First, Londoners gain less from direct tax changes on average than other regions. This is not because Londoners at any given income level are worse treated by the income tax changes, but because the polarisation of incomes in the capital means that fewer of them are in the groups that did best from income tax changes. At the same time, both the lowest-income Londoners and those with middle incomes did particularly badly through reforms to means-tested benefits and tax credits. It was in London that changes such as limits to Housing Benefit and overall benefit receipt had their biggest effects.[19]

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[19] The detailed analysis for London by national income decile group is included in Appendix 4 Figure A4.5. As the confidence intervals indicate, the sample size for London is not large enough for robust conclusions to be drawn about the effects across income decile groups.

Figure 5.4: Percentage change in household disposable income due to policy changes 2010 to 2015/16 by region of the UK (2010 policies uprated to 2015/16 using AEI)

Notes: The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

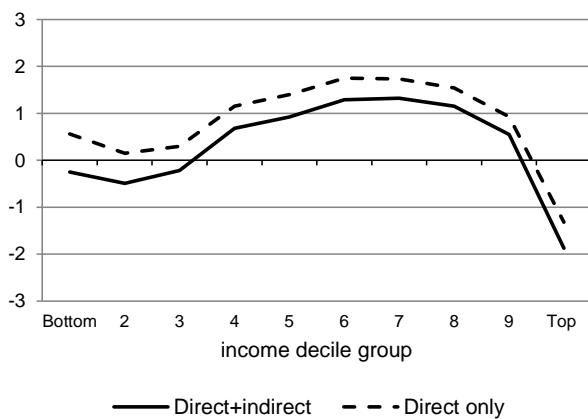## 6. Comparison with other analysis

Either of the comparisons in Figure 4.1 gives a more clearly regressive picture than, for instance, those published by the Treasury or the Institute for Fiscal Studies (IFS).[20] For instance, Figure 6.1a shows Treasury analysis of the cumulative effect of the tax, tax credit and benefit changes that it analyses since May 2010 up to May 2015. Looking at the solid line which includes indirect tax changes this suggests that losses were less than 1 per cent of income for the bottom three tenths of the income distribution, but there were gains for the fourth to ninth tenths, with the top tenth losing most, nearly 2 per cent of its income. The indirect tax changes, excluded from the dashed line, have a bigger income-reducing effect at the bottom than the top.

Figure 6.1b shows IFS analysis of changes between May 2010 and May 2015, also including the effect of indirect tax changes. This also shows a regressive picture between the bottom and seventh tenths of the distribution, with the top tenth losing more than the middle of the distribution but not as much, in proportional terms, as households at the bottom.
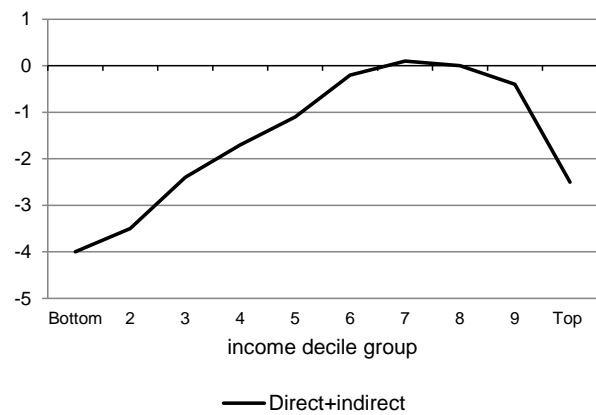
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[20] For example HM Treasury (2015) and Joyce (2015).

Figure 6.1: Percentage change in household disposable income due to policy changes 2010 to 2015/16; estimates from other analyses

(a) HM Treasury (2015) chart 2D

(b) IFS analysis: Joyce (2015) post Budget 2015

Direct+indirect — — Direct only

Direct+indirect

Notes and sources: see text

Both analyses assume that without the Coalition reforms policies from 2010 would have been indexed using a "business as usual" uprating regime as set out in Appendix 3. However, as documented in the appendix, the indexation regime itself changed as part of Coalition government policy. We compare their analysis with ours using a consistently CPI-linked base, as in Figure 4.1a. At the start of the period many elements of the system were indexed using RPI. As shown in Figure 3.1 this rose faster than the CPI over the period, for example making the freezing of the higher rate income tax threshold appear as a larger loss to those affected (at the top of the distribution) than the CPI indexation assumption adopted in our analysis in Figure 4.1a. If all thresholds and benefit levels were indexed using RPI in the base case then the effect of the Coalition's policies would be as shown in Appendix figure A4.1. But the 2010 "business as usual" regime was more complicated: with some thresholds and benefit levels being frozen or indexed in other ways. For example, our analysis shows the freezing (in nominal terms) of the thresholds to both the top rate of tax and the abatement of the income tax personal allowance as losses, right at the top of the distribution, relative to what would have happened if they had been indexed by CPI. But the IFS and Treasury analyses assume that these thresholds were fixed anyway as part of their "business as usual" base case scenario, implying no effect on the income distribution. In addition, whereas the indexes shown in Figure 3.1 and used to construct our alternative base case scenarios refer to the annual average changes in the year in question, "business as usual" indexation uses the annual change in index at the previous September (usually), relative to a year earlier.[21]

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[21] Nevertheless, the RPI also increased by more than the CPI on this basis: by 19.6 percent relative to 15.2 percent.

As well as the counterfactual indexation assumption, a number of differences between each of the three analyses serve to explain differences in the pattern of income change across the distribution, and in particular the relative effects at the bottom and the top.[22]

First, there are differences in the policy changes covered. As well as the inclusion or not of indirect tax changes, the Treasury does not include the effects on the bottom of the income distribution of some important reductions to benefit entitlement that are included in the IFS analysis and in ours.[23] Nor does the Treasury include the effect of reducing the top rate of tax from 50% to 45% in June 2010 on the basis that behavioural reactions would (fully) mitigate the first round effect, given that the 50% rate had only recently been introduced by the previous government.

Secondly, there are varying assumptions about the incidence of policies. The Treasury analysis, like ours, allows for incomplete take-up of benefits, but IFS assumes full take-up. The IFS analysis adjusts the top of the income distribution for non-response and income under-reporting by those with the highest incomes using information from the Survey of Personal Incomes, based on tax records. This is not done in the Treasury analysis, or in ours.

Finally, there are differences in choices about how to analyse the results. Our analysis counts people and ranks them by their household income but the Treasury and IFS analyses count households. In the IFS analysis and ours the percentage change in household income is calculated with reference to the income in the base system, whereas the Treasury calculates the change as a percentage of income under the 2015 system. Our analysis in Figure 4.1a breaks the population down into twentieths by income whereas the Treasury and IFS use ten larger income categories.[24]

Figure 6.2 unpicks the effects of these differences, demonstrating how our own results change when analysed in different ways.
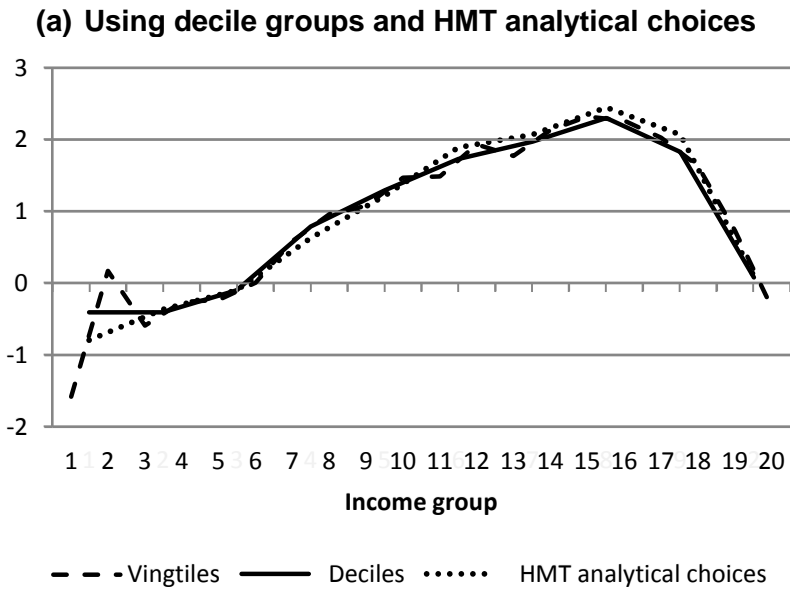
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[22] The IFS analysis, like ours, uses FRS data for the direct tax and benefit changes, but for a different year (2012-13). The Treasury analysis uses data from the Living Costs and Food Survey. Thus we would not expect our results to be identical, even if all conceptual and analytical differences were removed.
[23] The effects of the localisation of Council Tax benefit and restrictions on the rent eligible for Local Housing Allowance and Housing Benefit ("bedroom tax"), as well as the benefit cap. However, these changes are included in a separate Treasury analysis by quintile group, which also includes other "hard to model" changes that we do not include, such as changes to pension contribution tax relief.
[24] There may be other analytical choices that are not fully documented. For example, the IFS usually trims the distribution right at the bottom by omitting a few outlying cases with very low incomes. Our analysis includes all FRS households.

Figure 6.2: Percentage change in household disposable income due to policy changes 2010 to 2015/16: varying the analytical choices and assumptions

(a) Using decile groups and HMT analytical choices

- - - Vingtiles   ——— Deciles   •••••• HMT analytical choices

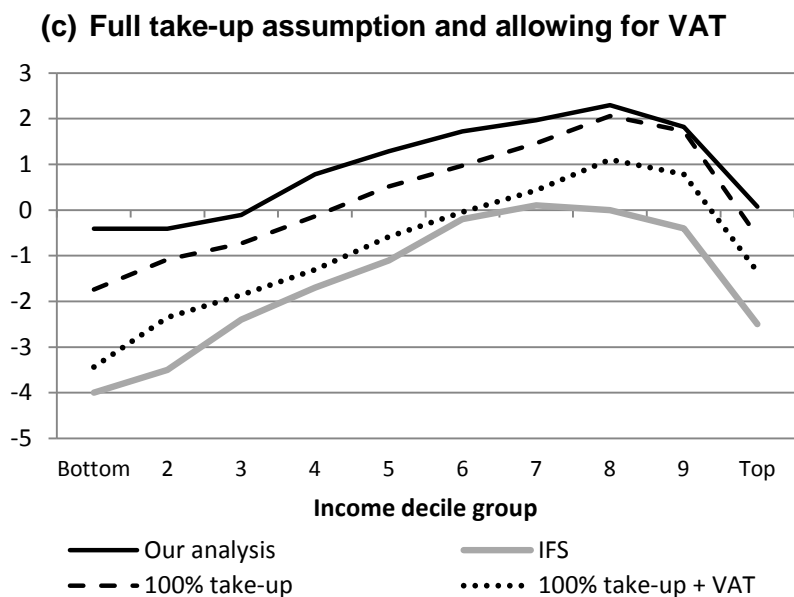Notes: Observations are ranked into decile or vingtile groups using household income equivalised using the modified OECD equivalence scale. "HMT analytical choices" counts households rather than persons and calculates the percentage change with reference to incomes under policies in 2015 rather than 2010. Source: Authors' calculations using EUROMOD G2.35.

(b) HMT coverage of reforms and counterfactual indexation

——— Our analysis   ——— HMT
- - - HMT policies   •••••• HMT policies + indexation

Notes: Observations are ranked into decile groups using household income equivalised using the modified OECD equivalence scale. "HMT" is as in Figure 6.1a (direct only). "HMT policies" does not include the effect of restrictions on Housing Benefit, reductions in Council Tax support, the introduction of the benefit cap and the cut in the top rate of tax from 50% to 45%. "HMT policies + indexation" in addition defines the base case as though tax thresholds were indexed according to 2010 "business as usual" assumptions.. Source: Authors' calculations using EUROMOD G2.35.

Figure 6.2 continued

(c) Full take-up assumption and allowing for VAT

Notes: Observations are ranked into decile groups using household income under the base case scenario, equivalised using the modified OECD equivalence scale. "IFS" is as in Figure 6.1b. "100% take-up" removes our assumption of partial take-up of means-tested benefits and tax credits. "100% take-up +VAT" also adds the effect of the increase in main rate of VAT by 2.5 percentage points. Source: Authors' calculations using EUROMOD G2.35.

The first panel shows the effects of the various analytical choices made by HM Treasury, if applied in our modelling. The dashed line shows our analysis using income divided into twentieths of the population and the solid line shows the same using decile groups (or tenths). The effects of combining the narrower groups are most evident at the bottom and top of the distribution where the particular losses attributed to the bottom twentieth (due to cuts in benefits) and the top twentieth (the net effect of tax changes) are averaged with (small) gains in the second to bottom and second to top vingtiles. As we have discussed above there is a trade-off between showing robust and reliable results and being able to focus on the detailed differences in policy impact across narrowly-defined groups in the income distribution. Analysis by decile, using our other assumptions, suggests that the highest income group that is observed broke even on average; analysis by vingtile suggests that they lost about 0.3 percent of their income; and analysis by percentile (see Figure A4.2) suggests a similar proportion: but as a gain rather than a loss.

The dotted line in Figure 6.2a shows the effect of adopting the Treasury (and IFS) practice of counting households rather than people, and of calculating the percentage change in relation to income under policies at the end (rather than the start) of the period. This makes rather little difference in this instance, except for a small increase in the loss shown for the bottom decile group.

The second panel explores the effects of some of the other differences between our analysis and that of the Treasury which is indicated by the grey line (omitting indirect tax changes, as in the dashed line in Figure 6.1a). The solid black line shows our analysis (as in Figure 4.1a but on a decile basis). The dashed line shows how the effects change if the policy changes omitted from the Treasury analysis are also removed from ours. The changes that are omitted are the reduction in the top rate of income tax from 50% to 45% (45% is assumed throughout) which increases the losses in the top decile group; and restrictions to Housing Benefit (e.g. "the bedroom tax"), and

24

Council Tax benefit/support as well as the introduction of the benefit cap, all of which reduce incomes at the bottom of the income distribution. This tilts the distributional picture from one showing the bottom losing and the top breaking even to one showing the bottom gaining and the top losing. Our results become very close to those of the Treasury in the bottom half of the distribution and also move closer at the top tenth.

To explore the sensitivity of our results to the assumptions made about the indexation of income tax thresholds we follow Treasury practice and replicate their "business as usual" assumptions (retaining CPI indexation for the rest of the tax-benefit system). The effect, (on top of omitting some of the policies we include) is shown by the dotted line. This involves freezing the threshold for the abatement of the personal allowance and the threshold to the top tax rate (removing any losses at the top due to not indexing in practice) and indexing the other tax thresholds (notably the personal allowance and the threshold to the higher tax band) by RPI rather than CPI, which has the effect of making the increase in the personal allowance seem less large and the restrictions on the higher rate threshold seem more negative for those at the top.[25] Overall we see that the main effect is a reduction in the gain attributed to the upper-middle of the distribution. Our results are now quite close to those of the Treasury across the whole distribution with the exception of the top decile group where our estimate of the loss is still about 0.7 percentage points lower than that of the Treasury.

The third panel explores the effects of some of the main differences with the IFS analysis (shown in grey). Again, we start from our own analysis as shown in Figure 4.1a (but by deciles). One of the key differences is the IFS assumption of complete take-up of means-tested benefits and tax credits. The dashed line shows what difference this assumption makes to our analysis. First of all, partial take-up implies smaller losses since if means-tested payments are not reaching those entitled to them, then they do not lose when their value is cut. Secondly, and perhaps unexpectedly, the take-up assumption has an effect right across the income distribution, not only in the bottom half where means-tested payments might be expected to be received. This is for three reasons. First of all, the payments which are assumed to be subject to non take-up include the family element of the Child Tax Credit to which, in 2010, families with quite high incomes could be entitled.[26] Secondly, it is possible for low-income families or individuals, entitled to means-tested payments, to live in high income multi-family households. Thirdly, the take-up assumption affects the ranking of households and the decile groups do not have the same composition under the two take-up scenarios. Nevertheless the assumption of full take up makes the most difference at the bottom of the distribution, increasing the estimated size of the loss from 0.3 percent to 1.7 percent in the bottom decile group.

The IFS analysis includes the effects of indirect tax changes (an increase of 2.5 percentage points in the rate of VAT and some real reductions in some excise duties). While we cannot allow for the effects of all indirect tax changes, the dotted line in Figure 6.2c adds in estimates of the effects of

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[25] Indexation in practice can also involve certain rounding conventions, as listed in Appendix 3. We take account of these in constructing the business as usual base case scenario for tax thresholds, uprating them from year-to-year and applying the rounding at each step. This tends to have a somewhat larger effect than simply applying the increase in index value across the five years as a whole. For example, while the September RPI increased by 19.6 percent over the five year period from 2009 to 2014, the Basic Rate Limit, which is rounded up to the nearest £100 per year after indexation, would have increased by 20.3 percent.

[26] According to HMRC take-up statistics only about 60 per cent of families entitled to the family element and no other component of the tax credits, received their entitlement (HMRC, 2010).

the rise in VAT.[27] This is revenue-raising overall, and has a similar regressive effect to that shown by the Treasury analysis (see Figure 6.1a) which also includes the effects of changes in excise duties. At the bottom of the distribution our results are now close to those of IFS (showing a loss of 3.4 percent compared to 4.0 percent in the bottom decile group). At the top the differences in indexation assumptions would have a similar effect as shown in relation to the Treasury analysis in Figure 6.2b, flattening the gain in the upper-middle part of the distribution and bringing our results close to those of IFS with the exception of the size of the loss at the top of the distribution.

The changes we capture at the top would be even greater if the survey we are using was adjusted for its under-reporting of the highest incomes, as in the IFS analysis, which is part of the explanation for the greater losses shown in Figure 6.2c.

To summarize, each of these approaches has its advantages and disadvantages, but this comparison shows quite how critical such key decisions can be, for instance in judging the proportionate sizes of losses for top and bottom income groups. In this analysis three issues stand out: which policy changes are included (an important reason for the restricted losses shown by HM Treasury in its decile-group analysis, with which we compare, for those with low incomes), accounting for non take-up and how to index the base case policies.

7. What are the effects of policy change in the longer term?

Figure 7.1 shows the main results of extending our analysis into the future, comparing the system that would emerge in 2020/21 with the May 2010 system, if it had been uprated in line with CPI, in the top panel, or average earnings growth in the bottom panel (as projected by OBR) and allowing for the Coalition government's further planned policy changes agreed before the 2015 election. The results can therefore be compared with the position up to 2015/16 shown in Figure 4.1 above. However, we show the results by decile group, rather than by vingtile. As discussed below, some of the gains due to Universal Credit for some of those with the lowest incomes can be very large in percentage terms and would dominate the picture by vingtile, meaning that we could not show the detail of what was happening to other groups.

First, the overall position is strongly dependent on the base case indexation assumption. Assuming a counterfactual scenario in which the tax-benefit system is uprated to keep pace with the average cost of living shows the Coalition policies would have resulted in an average increase in income of nearly 2 per cent. There would have been gains on average from reduced income tax and higher state pensions but losses from reduced benefits and tax credits. On the other hand compared with assuming that taxes and benefits would have kept pace with the projected growth in earnings, the overall position due to Coalition policies is negative: a loss of more than 1 per cent. This difference in overall effect, which is much larger than the equivalent shown for the period 2010-15 in Figure 4.1(b) is driven by the OBR projection of positive real earnings growth over the next 5 years. At the same time, the profile of the net effect across the income distribution is broadly similar using the two different indexation assumptions for 2010 policies, just shifted down in the case of comparison with the earnings-linked base. In the remainder of this discussion we focus on the effect compared to the earnings-linked base since this is more appropriate for assessing effects on fiscal neutrality and inequality in the longer term.

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[27] See Appendix 2 for a description of how this is done.

Figure 7.1: Percentage change in household disposable income by income decile group due to policy changes 2010 to 2020/21

(a) Compared with May 2010 policies uprated to 2020/21 using CPI

(b) Compared with May 2010 policies uprated to 2020/21 using AEI

Notes: Observations are ranked into decile groups using household income in 2010 equivalised using the modified OECD equivalence scale. The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

In these terms the overall position is considerably less favourable for households than under the 2015/16 system, with an average loss of 1.3 per cent of income compared to the 2010 system. In other words, by 2020/21 indexation and other policies agreed by the Coalition would have more than reversed the overall net gain of 1.5 per cent of average household income by 2015/16 (compared to earnings-linking) shown in Figure 4.1b. Households as a whole would have paid the same income tax under the 2020/21 system on average as in May 2010, with reductions that we found for the 2010/11 to 2015/16 period being offset by the effects of fiscal drag in the later period.[28] The overall losses in the value of benefits would have been increased substantially beyond those found for the 2010/11 to 2015/16 period, despite the introduction of Universal Credit, particularly as a result of the freeze in most working-age benefits planned for the two years 2016/17 and 2017/18.

The changes through to 2020/21 would have maintained the same regressive pattern for the bulk of the population between the second and the eighth decile groups as was seen up to 2015/16. Indeed, the regressivity is strengthened with the second poorest group losing 5 per cent of its income overall, compared to a gain of 0.5] per cent up to 2015/16, and the eighth group still gaining by approaching 1 per cent of its income. The figure also shows that the changes would be progressive right at the top, though, with the top tenth losing more than 1.6 per cent of its income, mainly as a result of higher income tax (as a result of fiscal drag), rather than making a slight gain as up to 2015/16.[29]

However, right at the bottom, the picture is rather similar with a net gain of 0.3 per cent for the bottom tenth by 2020/21, compared to 0.4 by 2015/16. This is due to the net effect of two large changes affecting the bottom by 2020/21. On the one hand there is the two-year cash freeze in working-age benefits reducing incomes and on the other, the effects of introducing UC, which is simulated to lead to very large gains as a percentage of income to some households who do not receive all of the benefits that it replaces. These very large changes are chiefly due to the way we have chosen to reflect non-take-up of benefits: we have assumed that a household currently taking-up *any* of the benefits that UC replaces would then take up UC, and this can result in large percentage gains for those only taking up *some* of their entitlements under the old system (e.g. Housing Benefit but not Income Support), who as a result have very low incomes. Although this is a modelling assumption, it reflects one of the main arguments put forward for UC consolidating various payments and claims processes into one.[30] It is possible, however, that this could go the other way if, for instance, UC is seen as more stigmatised than the benefits previously claimed or the increased conditionality puts off potentially entitled claimants. When UC is fully introduced, its effects will depend critically on such behavioural differences.

The differences by age group are also notable, as can be seen by comparing Figure 7.2 with Figure 5.1 above. The losses to children would have been intensified – reaching 3 per cent or more of income, compared to indexation with earnings. Those aged 30-49 and pensioners over 65 also
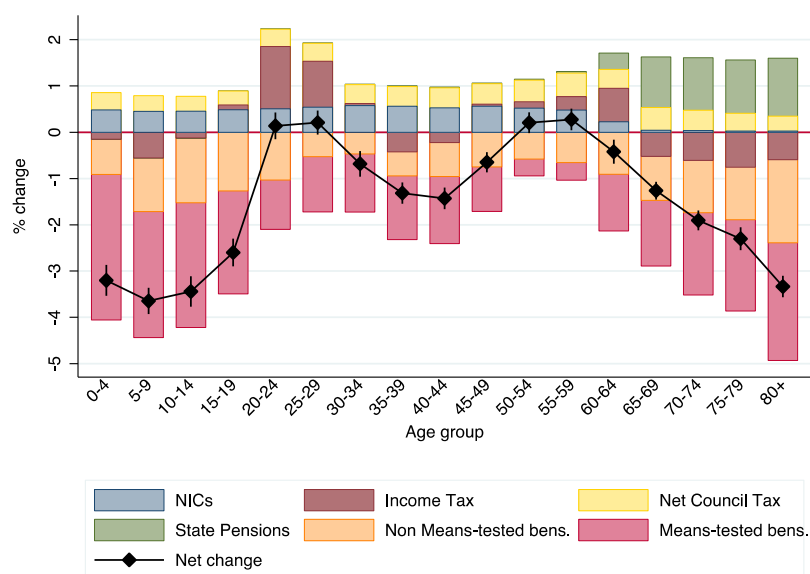
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[28] It should be noted that this analysis does not include the further increases in the personal income tax allowance promised by both Coalition partners in the 2015 election campaign nor changes announced by the new Conservative Government since their election.

[29] The top twentieth (not broken down in this figure) loses 2.1 per cent compared to 0.2 per cent up to 2015/16.

[30] In their modelling of the transition the Treasury make a similar assumption and also add the more optimistic assumption that a proportion of people not taking up any of their entitlements under the old system would still claim and receive UC under the new system (HMT, 2013).

emerge as net losers overall. In the latter case, although the triple lock means that they keep the gains in state pensions relative to earnings-indexation that had accrued by 2014-15, lower indexation of other benefits and tax thresholds more than offset this. On the other hand, those in their 20s and 50s would be left in the same position (relative to earnings) as they were with the May 2010 system (adjusted with earnings). Overall, the effect of these changes over the ten years would have been to reverse some of the way in which age-related income gaps narrowed over the Labour period from 1997 to 2010, particularly because their benefit and pensions policies favoured children and pensioners.[31]

Figure 7.2: Percentage change in household disposable income by age group due to policy changes 2010 to 2020/21; 2010 policies uprated to 2020/21 using AEI
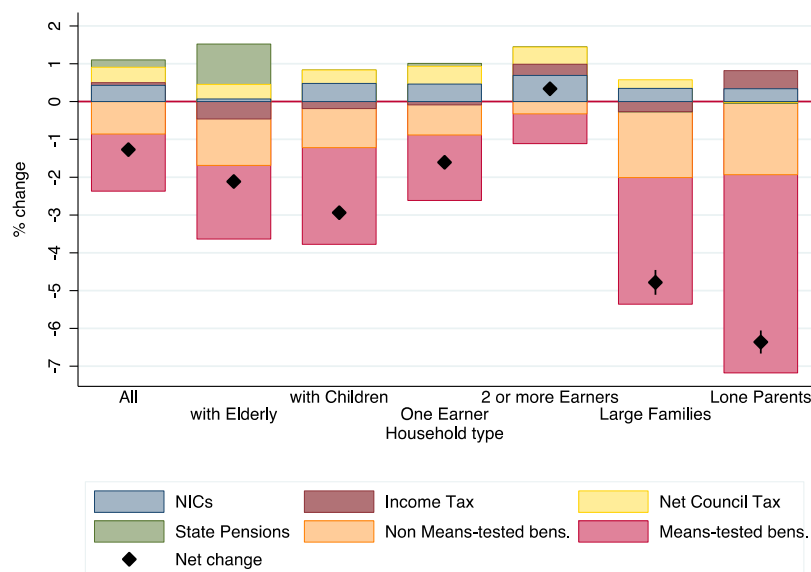

Notes: The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

Finally, Figure 7.3 shows the net position of different household types at the end of the ten years on these assumptions. By comparison with Figure 5.2, lone parents would be the most striking losers – with incomes down by more than 6 per cent compared to the earnings-linked base by 2020/21, despite the introduction of UC, compared to less than 1 per cent by 2015/16. Large families lose nearly 5 per cent of income overall, compared to breaking even by 2015/16. At the same time, reflecting the picture shown in Figure 7.2, households with elderly members emerge as net losers, rather than as net gainers, which they were by 2015/16.

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[31] See Hills (2014), figures 3.8 and 3.9 and associated discussion for analysis of what happened to incomes by age over the Labour period (not all of it due to tax and benefit changes). See also Browne and Phillips (2010) and Joyce and Sibieta (2013).

Figure 7.3: Percentage change in household disposable income by household type due to policy changes 2010 to 2020/21 (2010 policies uprated to 2020/21 using AEI)

Notes: "Large families" are households with 3 or more children. The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

8. Conclusions

Whether we were "all in it together", making equivalent sacrifices through the period of austerity, is a central question in understanding the record of the Coalition government. This paper examines in detail one aspect of this, the distributional impacts of the changes to benefits, tax credits, pensions and direct taxes between the systems in place in May 2010 and in May 2015. We also look ahead to the longer-term effects of changes and plans announced before the May 2015 election, such as the complete introduction of Universal Credit and changes to the ways benefits, pensions and tax brackets are changed (indexed) from year to year, modelling what effects these would have been after five more years, by 2020/21.

As we explain in detail, there are limitations to this analysis. We do not, for instance, look at indirect taxes in our main analysis. Nor do we adjust for the lack of representation of those with the very highest incomes in the survey on which our analysis is based. We therefore tend to understate some of the gains to the top few per cent of the population from the cut in the top rate of income tax from 50 to 45 per cent.

That said, it is clear that the changes did *not* lead to uniform changes in people's incomes. Indeed, it is striking that the overall fiscal effect of the changes between May 2010 and May 2015 compared to either a price- or earnings-linked base system did not contribute to deficit reduction overall. In effect, the reductions in benefits and tax credits financed most of the cuts in direct taxes. Some groups were clear losers or gained little on average – including lone parent families, large families, and families with younger children. Others were gainers, including two-earner couples, and those in their 50s and early 60s. Londoners were, on average, less favourably affected than other parts of the country (as a result both of more of them having very high and very low incomes, and changes and limits on Housing Benefit and other benefits having more effects in the capital).

Looking at the population as a whole, the changes were regressive. Against a price-linked base, the poorest 30 per cent lost or broke even on average and the top half gained, with the exception of most of the top 5 per cent (but excluding the very top). This was the result of the combination of: changes to benefits and tax credits which made them less generous for the bottom and middle of the income distribution; changes to Council Tax and associated benefits from which those in the bottom third (except the poorest 5 per cent) lost but the top half gained; changes to income tax (higher personal allowances) which meant the largest gains for those in the middle, but with some income tax increases for the top 5 per cent; and state pension changes (particularly the 'triple lock') which were most valuable as a proportion of incomes for the bottom half.

Because real earnings fell over the period, an earnings-linked base actually would have been somewhat less generous to households, so by comparison with that, the gain to households as a whole was greater. Looked at this way as well, the results were regressive, apart from the very top.

Other analysis, including that from the Treasury, also shows the tax and benefit changes as being regressive between the bottom of the distribution and middle of the top half (up to the seventh or eighth tenth of the distribution). However, some analysis also suggests that the top tenth lost more proportionately than the bottom tenth. The analysis in this paper suggests that there are four important dimensions for decisions to be made in how to make such comparisons that lead to this kind of conclusion.

The first is how large an income group is grouped together at the top when making this kind of comparison. Most of those within the top tenth are not in fact affected by what has happened to income tax for those with incomes above £100,000. But the incomes of those right at the top are so large, that what happens to them dominates the averages shown for the top tenth as a whole. So for instance, against a price-linked base, the next-to-top twentieth of the distribution are not losers on average.

The second is which policy changes to include in the analysis. At a technical level there is a balance to be found between omitting hard-to-model changes and providing a partial and perhaps biased picture, and making approximations that may themselves introduce bias or inaccuracies. The "hard-to-model" changes come in two forms. On the one hand there are those for which the necessary data are not readily available (e.g. local authority differences in the implementation of Council Tax support). On the other, there are changes that might induce major behavioural effects (e.g. forestalling in the case of top tax rate changes) such that the first round distributional effect is considered not to be a good guide to the final outcome. The most basic requirement is to document in detail what has, and has not, been included and assumed. Our analysis has shown that this can make a critical difference to the conclusions that are drawn.

The third dimension of importance is the very many analytical choices that have to be made when considering the effects across the income distribution that can have a major effect on conclusions. We illustrate some of them in Section 6 of this paper. The issue that stands out is whether or not all households entitled to benefits are assumed to receive them. This has an effect both because households not taking up benefits are automatically located near the bottom of the distribution, and because changes to the level of payments that people do not receive cannot change their household incomes. Allowing for non-take up therefore usually reduces the scale of changes – whether positive or negative – for low income groups, relative to an analysis that assumes complete take-up.

Fourth, we have demonstrated the importance of the assumption that is made about how policies would have been indexed in the absence of policy reform. We consider four possibilities: comparing policies against a base indexed by prices (CPI) or by earnings, in our main analysis, using the RPI index as a variant (reported in Appendix 4), or by replicating the indexation regime that is in place (the "business as usual" scenario), the effect of which is illustrated in Section 6. This applies factors differentially across tax-benefit components, it necessarily involves using an index lagged from the previous year, incorporates rounding conventions which tend to increase the uprating factors somewhat and, historically, relied on a price index which indicates faster growth than that currently used. Adoption of such a counterfactual is complicated by the fact that the indexation regime has itself been reformed, something that one might wish to capture in the analysis rather than factor out.

More generally, the higher the value of the indexation factor that is used the less favourable the actual policies will seem for households. In the period 2010-15 earnings grew somewhat more slowly than CPI and the difference in the scale or distribution of effects is relatively small. In the period up to 2020 it is predicted by OBR and others that earnings will grow significantly faster than prices and this makes a substantial difference to our judgement about whether tax-benefit changes have made households better off (gains in real terms) or worse off (losses relative to average earnings). In analysis of the effects of policy changes it is important not only to be clear about the counterfactual indexation that is used and to interpret results appropriately, but also to appreciate that the aggregate and distributional effects may look somewhat different from those calculated using predictions of economic indicators, once the final statistics are available.

We also look ahead at whether changes that had already been announced or planned by the Coalition before it left office, such as fully introducing Universal Credit and changes to indexation agreed by them,[32] if carried through to 2020/21, would have changed this picture. Overall, we find that they would have intensified the distributional effects seen by 2015/16. There would be increases in the losses of lone parent and large families, children in general and most of the bottom half of the income distribution. With the Coalition's planned two-year freeze in most working-age benefits from 2016/17, losses for the second and third poorest tenths would have increased to 5 per cent of their incomes compared to an earnings-linked base. Notably, looking over the whole period from May 2010 to 2020/21 people aged over 65 in general, and those aged over 80 in particular would lose. This is because they would be losing from much lower indexation relative to earnings growth for other benefits and parts of the tax system which would outweigh their gains from the 'triple lock' on state pensions. With losses both for pensioners and for children, some of the narrowing of age-related income differences achieved by the previous Labour government would be reversed.

There is one potentially striking exception to this, however. While all other income groups in the bottom half would be losers on average over the ten years as a whole, the bottom tenth would break-even on average as a result of some of them receiving the new Universal Credit who would not currently be receiving all of the benefits and tax credits which it will replace. This effect is driven by the assumptions we make regarding take-up behaviour through the transition to UC: that take-up of *any of* the existing means-tested payments will lead to take-up of UC. This in turn reflects

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[32] We therefore do not take into account the Conservative's election manifesto aspiration that the personal income tax allowance should reach £12,500 in nominal terms by 2020 (with the threshold for higher rate tax increased) nor changes announced by the Conservative Government after its election in May 2015.

one of the main motivations for consolidating several claims and payments into one. It remains to be seen whether, in practice, take-up of means-tested payments improves in this way if UC is fully implemented.

Again, this illustrates the need to distinguish between broad conclusions and the subtleties of how particular groups are affected by complex combinations of reforms. *Overall*, the changes were regressive, with smaller proportionate gains (or greater proportionate sacrifices) from those with lower than those with higher incomes. The analysis behind Figure 7.1 suggests that on their own (and compared with a base indexed by earnings) they implied a two percentage point increase in the poverty rate (using a threshold of 60% median equivalised household income, measured before housing costs), But within this picture there were important variations, such as the less favourable treatment of some of those at the top, or the more favourable treatment of some of those at the very bottom if Universal Credit is introduced as planned and has the intended effect on take-up.

Finally, while this paper has focused on the policies of the Coalition government 2010-2015 it is clear that the effects of reforms by 2020 that we analyse here will be subject to further major changes introduced by the Conservative government. Based on the announcements made in the post-election July 2015 Budget (including extension of the working-age benefit freeze to four years and cuts in tax credits, especially for those with three or more children) we can anticipate an intensification of the picture shown in Figure 7.1: more cuts in the real value of non-pension benefits and no real increase in taxation resulting in a more steeply regressive picture, with a question mark still remaining around the effects of Universal Credit on incomes at the bottom.

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Appendix 1 Modelled tax-benefit policy changes implemented 2010/11-2015/16 and 2015/16-2020/21

Reforms		When first implemented
Reforms 2010/11-2015/16		
Income tax	Increase personal allowance and associated reduction in basic rate limit[33]	2011/12
Income tax	Reduce top tax rate from 50% to 45% (50% introduced from 2010)	2013/14
Income tax	Age related personal allowance restricted to existing recipients and frozen permanently at 2012/13 levels	2013/14
Income tax	Higher-rate tax threshold increased by 1%[34]	2014/15
Income tax	Introduce transferable personal allowance for married couples without a higher rate taxpayer	2015/16
Income tax	Savings tax: abolish 10% rate and extend the 0% band to £5,000.	2015/16
NI contributions	Increase employee and self-employed NIC lower thresholds	2011/12
NI contributions	Increase in employee and self-employed NIC rates by 1 percentage point	2011/12
NI contributions	Reduction in contracted out rebates	2012/13
NI contribution	NI upper earnings and upper profits limits to increase in line with the higher rate tax threshold.	2011/12
Pensioners	Basic State Pension indexed by highest of earnings, prices (CPI) and 2.5% (known as "triple lock")	2011/12
Pensioners	Increase PC Guarantee Credit by same cash amount as Basic State Pension (ongoing)	2011/12
Pensioners	PC Savings Credit maximum payments frozen for 4 years (and a cash reduction in 2012/13)	2011/12
Pensioners	Winter Fuel Payment reduced from £250 to £200 (from £400 to £300 for those age 80+)	2011/12
Working age/Pensioners	Hours of work required for WTC reduced from 30 to 16 for people aged 60+ and those on Carer's Allowance	2011/12
Working age	Cash freeze in basic and 30 hours elements of WTC for 3 years	2011/12
Working age	Cash freeze in couple and lone parent element of WTC	2012/13
Working age	Increase child element of CTC by £180 above inflation	2011/12
Working age	Baby element of CTC abolished	2011/12
Working age	Increase withdrawal rate of tax credits from 39% to 41%	2011/12

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[33] So that higher-rate taxpayers do not benefit more than basic rate taxpayers.
[34] i.e. basic rate limit reduced since personal allowance increased

Reforms		When first implemented
Working age	Family element of CTC tapered at 41% from the lower threshold instead of 6.67% from a high threshold	2011/12
Working age	Increase weekly hours requirements for WTC from 16 to 24 for couples with children	2011/12
Working age	Reduce proportion of eligible childcare costs covered by tax credits from 80% to 70%	2011/12
Working age	Freeze Child Benefit in cash terms for 3 years	2011/12
Working age	Increase Child Benefit by 1% only in 2014/15, 2015/16	2014/15
Working age	Taper Child Benefit away from families with anyone with taxable income in excess of £50,000; extinguished for those with £60,000 or more.	2012/13 (Jan 13)
Working age	Increase most working-age benefits by 1% only instead of CPI in 2013/14, 2014/15, 2015/16	2013/14
Working age	Introduce benefit cap (maximum payment of working age benefits, except for disabled and WTC recipients)	2013/14
Disability	Replace DLA with PIP, reassessing health conditions in the process, reducing the numbers entitled	2013/14
Housing support	Change LHA: remove £15 per week addition (and limit max claim to the smaller of the LHA rate and actual rent)	2011/12
Housing support	Set LHA maximum rent to 30th percentile instead of 50th percentile of local rent	2011/12
Housing support	Cap total rent claimable for a given family composition under LHA and abolish rates above the 4-bedrooms rate	2011/12
Housing support	Cut LHA for single adults aged 25-34 without children	2011/12 (Jan 12)
Housing support	Increase LHA rates by 1% only in 2014/15, 2015/16	2014/15
Housing support	Increase HB deduction for resident non-dependents in April 2011 and uprate them with CPI in later years	2011/12
Housing support	Cut HB for people under-occupying socially rented accommodation	2013/14
Council tax and benefit	Council tax freeze for 2 years (3 in Scotland)	2011/12
Council tax and benefit	Replace CTB with local support (assumed to reduce payments by 10.6%)	2013/14
Default indexation	Uprate most benefits by CPI rather than RPI/Rossi (permanently)	2011/12
Default indexation	Index some direct tax thresholds in line with CPI inflation instead of RPI (permanently)	2012/13

Reforms		When first implemented
Default indexation	Increase LHA rates in line with CPI rather than movement in actual rents (permanently)	2013/14
VAT	Increase in main VAT rate from 17.5% to 20%	2010/11 (Jan 11)
Additional reforms 2016/17-2020/21		
Income tax	Introduce savings allowance	2016/17
Working age	Introduce UC to replace WTC, CTC, IS, income-related JSA, income-related ESA and HB	Phased in
Working age	Change childcare support within UC from 70% to 85% of eligible costs	2016/17
Working age	Introduction of tax-free childcare for 2-earner families paying formal childcare costs	2015/16 (Oct 15)
Working age	Freeze most working-age benefits and Child Benefit from April 2016 for two years	2016/17
Working age	UC work allowance frozen at the 2016/17 level for 2017/18	2017/18

CPI – Consumer Prices Index; CTB – Council Tax Benefit; CTC – Child Tax Credit; DLA – Disabled Living Allowance; ESA – Employment and Support Allowance; HB – Housing Benefit; IS – Income Support; JSA – Job Seeker's Allowance; LHA – Local Housing Allowance; NIC – National Insurance contribution; PC – Pension Credit; PIP – Personal Independence Payment; UC – Universal Credit; VAT – Value Added Tax; WTC – Working Tax Credit.

Appendix 2 Modelling details and assumptions

Updating to 2015/16
Our simulations are based on FRS data collected between April 2009 and March 2010. Income variables are updated to 2015/16 levels using source-specific indexes as described in Table A2.1. Relevant expenditures, such as housing costs, childcare costs and maintenance payments are also updated as shown.

Table 2.1 Adjusting 2009/10 FRS levels of income and expenditure to 2015/16.

Income source	Updating factor	Factor Source
Employment income, self-employment income	Average weekly earnings index	ONS financial year (March-April) annual average K54U; extrapolated beyond available statistics using OBR earnings forecast Table 3.5[35]
Non-simulated benefits (disability, carer's and maternity benefits) and Basic State Retirement pension	Change in main rate of benefit	
Earnings-related pension income (state, occupational and personal)	CPI	
Mortgage interest payment	Change in the mortgage interest rate (annual average)	Bank of England IUMTLMV[36]; extrapolated assuming moves with trend (2 years)
Rent paid or received	Rent element of CPI	ONS[37]; extrapolated to 2015 using same method as for earnings
Childcare expenditure	As employment income	
Maintenance paid or received	As employment income	
Other private transfers	As employment income	
Council tax	Change in average band D Council Tax by country	

Generally, no other adjustments are made to the composition of market income or to the characteristics of the population in terms of labour market participation or demographic change. However there are some important changes in the period 2009/10 to 2015/16 that we account for approximately through adjustments to the data, and which are held constant across the policy scenarios that are simulated. In all cases they are not "Coalition" policy changes, but rather changes that were initiated by previous governments and continued by the Coalition. They include:[38]

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[35] http://cdn.budgetresponsibility.independent.gov.uk/March2015EFO_18-03-webv1.pdf

[36] http://www.bankofengland.co.uk/boeapps/iadb/index.asp?first=yes&SectionRequired=I&HideNums=-1&ExtraInfo=true&Travel=NIxIRxSUx

[37] http://www.ons.gov.uk/ons/rel/cpi/consumer-price-indices/march-2015/consumer-price-inflation-reference-table.xls

[38] For more information on the details of these adjustments see section 3 of De Agostini and Sutherland (2014).

- In the period 2008 to 2014 **Incapacity benefit** (IB) was gradually replaced by **Employment and Support Allowance** (ESA). This involved more stringent tests of capacity to work, time limits on receipt of the non means-tested benefit and the establishment of a means-tested element. The remaining cases in the 2009/10 FRS receiving IB have been adjusted so that they receive the 2015/16 ESA to which they would be entitled. In our simulations of policy change only indexation of the contributory element of ESA is captured. Changes to the income-related component are simulated in the same way as Income Support.

- **Female state pension age** (announced in 1995) is in the process of gradually rising from 60 (in 2009/10) to 65 (in 2018/19) and both male and female state pension ages are then set to rise to 66 by 2020. Since in 2015/16 the state pension age for women was 62, we adjust the data so that women aged 60 and 61 no longer receive state pensions and are assumed to be in work, unoccupied or on working age benefits in the same patterns as shown by women aged 59 in the data. A state pension age of 62 for women and 65 for men is assumed throughout our analysis.

- In 2011 the maximum rent covered by **Local Housing Allowance** (Housing Benefit for private tenants) were reduced from the median of local rents to the 30th percentile. In our analysis we assume the latter limit (applying in 2011) throughout, but indexed according to prevailing policy (See Appendix 1 and 3).

Under-representation of high incomes

Also we do not make adjustments to allow for the fact that survey data commonly under-represent households with very high incomes and/or under-reports those high incomes.[39] This means that the size of the effect of tax changes on top income quantiles will typically be under-estimated. This should be borne in mind when comparing with analysis that does make top income adjustments (section 6).

Policy changes

The following policy changes are not included in our analysis because the information in the FRS data is not sufficient: (i) abolition of the 50+ element of WTC for those returning to work; (ii) changes in welfare-to-work and lone parent obligation regimes, or benefit sanctions regimes; (iii) changed treatment of within-year changes in circumstances in WTC; (iv) restricting Sure-Start Maternity Grant to first babies; (v) introduction of UC extra conditionality; (vi) restrictions on pension contributions eligible for tax relief (reduced from £50,000 to £40,000 per year in 2014/15 and from £1.5 million to £1.25 million on a lifetime basis).[40] In addition, while we include the estimated effect of the 2.5 percentage point standard rate VAT increase in our analysis in section 6 we base this on a separate study (see below) and neither VAT nor other indirect taxes are included in EUROMOD. In the period 2010/11-2015/16 there were also changes to Insurance Premium Tax and excise duties on alcohol, tobacco and fuel that are not included.

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[39] See appendix 2 of De Agostini and Sutherland (2014).
[40] These tend only to affect people with the very highest incomes, and may affect their savings patterns and incomes in the long run, rather than immediately, depending on how they adjust their behaviour, which is hard to allow for. In addition, there are transitional protection schemes in place.

A further set of changes can only be modelled approximately. These include:

- The conditions of receipt of **Disability Living Allowance** – DLA (to be replaced by the Personal Independence Payment) were tightened in 2013/14 such that it was expected, at the time of the announcement in the June 2010 Budget, that 20 per cent of recipients would lose their entitlement. We approximate this by randomly setting the DLA personal care component to zero for 20 per cent of individuals receiving (in the 2009/10 FRS data) the lowest or middle rate allowance. Otherwise, our simulations only capture the effects of indexation.

- In 2013/14 **Council Tax Benefit** (CTB) was abolished and responsibility for supporting low income households with their Council Tax was devolved to local authorities. In this analysis we follow Adam and Browne (2013) and assume that local authorities chose to apply a scheme similar to the old CTB, but cutting by 10.4% the maximum amount of support that non-pensioners can claim when liable for Council Tax. This is based on the average reduction made by local authorities in England in 2013–14, in response to the cut in funding from central government. Council Tax Support (CTS) is assumed to remain as CTB would have done for pensioner households.

- The effect of the increase in the standard rate of **VAT** by decile group of household disposable income is approximated by using information from ONS "The Effects of taxes and benefits on household income 2011/12" using the Living Costs and Food Survey (LCF), appendix table 14.[41] This provides information on VAT as a proportion of disposable household income. The addition due to the increase from 15 per cent to 17.5 per cent is simply calculated as a proportion. It should be noted that this assumes that (a) there is no change in pre-tax consumption expenditure nor in pre-tax relative prices (usual static incidence assumption), (b) the effect of ignoring reduced rates of VAT that were not changed (mostly 5% on domestic fuel) is minor, (c) Deciles and the measure of household disposable income are the same in LCF as in the EUROMOD (FRS) output. This will not be precisely the case because two different surveys with slightly different income concepts are being used.

In modelling the introduction of Universal Credit (UC) some further assumptions have been made, including:

- The treatment of limits on the amount of **housing cost support** for owner occupiers with mortgages who are not in paid work and the treatment of waiting time for this support are assumed to mirror what is done in the corresponding element of Income Support (IS). (In each case the limits and waiting times are not modelled.) This avoids spurious gains or losses due only to different treatments, even if the treatments themselves are both too generous, which will to some extent affect where the household is situated in the income distribution.

- The definition of **non-dependants** in Housing Benefit for pensioners and in Council Tax support (which is assumed to follow the same structure as Council Tax benefit) assumes that assessed income includes income from UC (as was the case for CTC and WTC but not IS).

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[41] http://www.ons.gov.uk/ons/dcp171780_317858.pdf

- **Council Tax support** is assumed to be automatically passported to those on UC who would have been eligible for IS (or income-related JSA or ESA) under the pre-reform system.

Non take-up of means-tested payments

In simulating entitlement to means-tested tax credits and benefits we make some adjustment for non take-up of these payments based on statistics provided by DWP (2010) for Income Support, Pension Credit and Housing Benefit and HMRC (2010) for the tax credits. Making such adjustments involves selecting randomly within client groups and benefits such that a proportion of those entitled, based on the official statistics, do not receive their entitlement. Clearly this is a rather approximate process and such adjustments are not always made in UK microsimulation analysis of policy changes. However, we believe that it is important to represent those not taking-up their entitlements in the income distribution and in the analysis of policy changes. In adjusting for non take-up of Universal Credit, which cannot yet be measured, we seek to minimise the effect on the results of any spurious changes in take-up assumptions, while recognising that there will be some positive effect on the amounts taken up due to a single application procedure. If any of the pre-reform elements (CTC, WTC, Income Support, Housing Benefit etc.) to which a particular benefit unit might be entitled are assumed to be taken up then it is assumed that UC would be taken up under the new regime. This is similar to the assumption used in Treasury modelling (HMT, 2013) although they additionally make the more optimistic assumption that some of those not taking up any of their entitlements to the old benefits and tax credits will nevertheless claim UC (20% of the employed in this group and 10% of the self-employed). In our analysis, if a family becomes newly-entitled to means-tested support through UC then probabilities are applied as for IS under the old system. The resulting average take-up rate of UC (calculated as the number of benefit units modelled to be receiving divided by the number simulated to be entitled) is approximately 70 per cent.

Appendix 3 Default indexation assumptions

Tax-benefit element	Default indexation for the fiscal year starting April 2011[42]	Changes up to April 2016	Assumptions from April 2017 onwards	Rounding conventions
Income tax personal allowance[43]	RPI	From April 2015: CPI	CPI	Rounded up to nearest £10 pa
Income tax Basic Rate limit	RPI	From April 2014: CPI	CPI	Rounded up to nearest £100 pa
Income tax starting rate limit for savings income	RPI	From April 2014: CPI	CPI	Rounded up to nearest £10 pa
Income tax threshold for additional (top) rate	Fixed in cash terms		Fixed in cash terms	
Income tax income limit for tapered withdrawal of personal allowances	Fixed in cash terms		Fixed in cash terms	
Income tax threshold for Child Benefit clawback	n/a	From April 2013: Fixed in cash terms	Fixed in cash terms	
NICs lower earnings limit	Minimum of 2.5% or RPI	From April 2014: CPI	CPI	Rounded down to the nearest £1 pw
NICs Primary Threshold/Lower Profits Limit	RPI	From April 2014: CPI	CPI	Rounded down to the nearest £1pw/£5pa
NICs Upper Earnings Limit/Upper profits Limit	RPI	Aligned with the income tax Higher Rate Threshold[44]	Aligned with the income tax Higher Rate Threshold	
NICs small Earnings Exception	RPI	From April 2014: CPI	CPI	Rounded up to the nearest £10 pa
NICs Class 2 rate	RPI	From April 2014: CPI	CPI	Rounded to the nearest 5p pw
Disability, Carer's and Maternity benefits	RPI	From April 2013: CPI	CPI	
Income-tested benefits	Rossi	From April 2013: CPI	CPI	
Basic State Pension	RPI	Highest of earnings, CPI or 2.5%	Highest of earnings, CPI or 2.5%	

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[42] In practice many elements of tax credits and benefits were indexed by less than the default amount in 2011 and the period up to 2015/16. See Appendix 1

[43] From 2015/16, when it is introduced, the transferable marriage tax allowance will be uprated in proportion to the personal allowance.

[44] This is equal to the Personal Allowance + Basic rate Limit.

Tax-benefit element	Default indexation for the fiscal year starting April 2011[42]	Changes up to April 2016	Assumptions from April 2017 onwards	Rounding conventions
Pension Credit Guarantee Credit	Earnings		Earnings	
Pension Credit Maximum Savings Credit	RPI	From April 2013: CPI	CPI	
Child Benefit	RPI	From April 2013: CPI	CPI	Rounded to the nearest 5p pw
Child Tax Credit and Working Tax Credit most elements	RPI	From April 2013: CPI	CPI	Rounded to the nearest £5 pa
Child Tax Credit family element	Fixed in cash terms		Fixed in cash terms	
Working Tax Credit maximum eligible childcare costs	Fixed in cash terms		Fixed in cash terms	
Most earnings and other disregards in benefit assessments; capital limits in income related benefits; minimum payments of benefits and tax credits	Fixed in cash terms		Fixed in cash terms	
Non-dependent deductions from Housing Benefit	CPI		CPI	
Winter Fuel Allowance	Fixed in cash terms		Fixed in cash terms	
Local Housing Allowance local reference rent caps by size of accommodation	Fixed in cash terms		Fixed in cash terms	
Benefit cap	n/a	Introduced April 2013: CPI		
Tax-free childcare support	n/a	n/a	Fixed in cash terms	
Council Tax			OBR assumptions	

Notes: RPI – Retail Prices Index calculated as the annual change up to the previous September; Rossi – RPI without the elements for housing costs, calculated as the annual change up to the previous September; CPI – Consumer Prices Index calculated as the annual change up to the previous September;
For projections to 2015/16 and beyond, OBR assumptions about the evolution of CPI, earnings and Council Tax (by country) are used. Sources:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/295067/PU1638_policy_costings_bud_2014_with_correction_slip.pdf Ref: ISBN 978-1-909790-83-4, PU1638 Budget 2014 policy costings Annex A
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/221895/budget2013_policy_costings.pdf
Budget 2013 policy costings Annex A
http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/d/junebudget_costings.pdf
Budget 2010 (June) policy costings Annex A (first time this was published)
http://webarchive.nationalarchives.gov.uk/20100407010852/http://www.hm-treasury.gov.uk/d/budget2010_annexa.pdf Budget 2010 (April) Annex A2

Appendix 4: Additional figures

This appendix provides some additional figures. Figure A4.1 is equivalent to Figure 4.1 in the main text but uses RPI instead of CPI or AEI to uprate 2010 policies to 2015/16 levels.
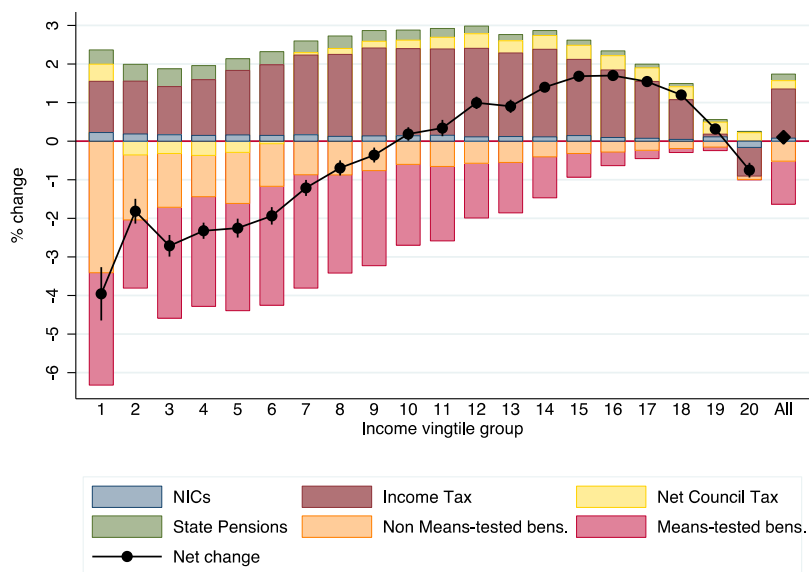
Figure A4.2 is equivalent to Figure 4.1a in the main text but classifies people by percentiles of their equivalised household income rather than vingtiles.

Figure A4.3 is equivalent to Figure 4.1a in the main text but breaks down the changes year-by-year and classifies people by deciles of their equivalised household income rather than vingtiles.

Figure A4.4 is equivalent to Figure 5.1 in the main text but uses CPI instead of AEI to uprate 2010 policies to 2015/16 levels.
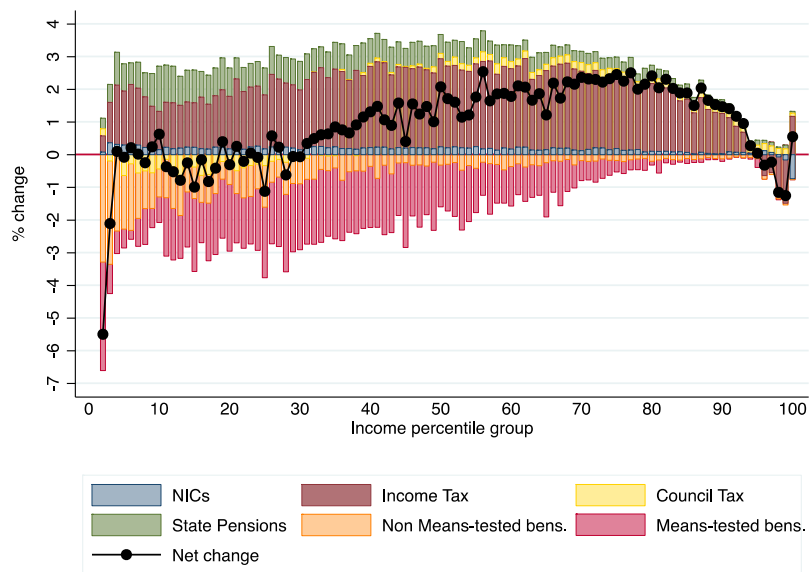
Figure A4.5 shows the effect of policy changes across the income distribution in London. Note that the confidence intervals are generally wide and robust conclusions cannot be drawn from this figure about distributional effects in London.

Figure A4.1: Percentage change in household disposable income by income vingtile group due to policy changes 2010 to 2015/16, 2010 policies uprated to 2015/16 using RPI

Notes: Observations are ranked into vingtile groups using household income in 2010 equivalised using the modified OECD equivalence scale. The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

Figure A4.2: Percentage change in household disposable income by income percentile group due to policy changes 2010 to 2015/16 (2010 policies uprated to 2015/16 using CPI)
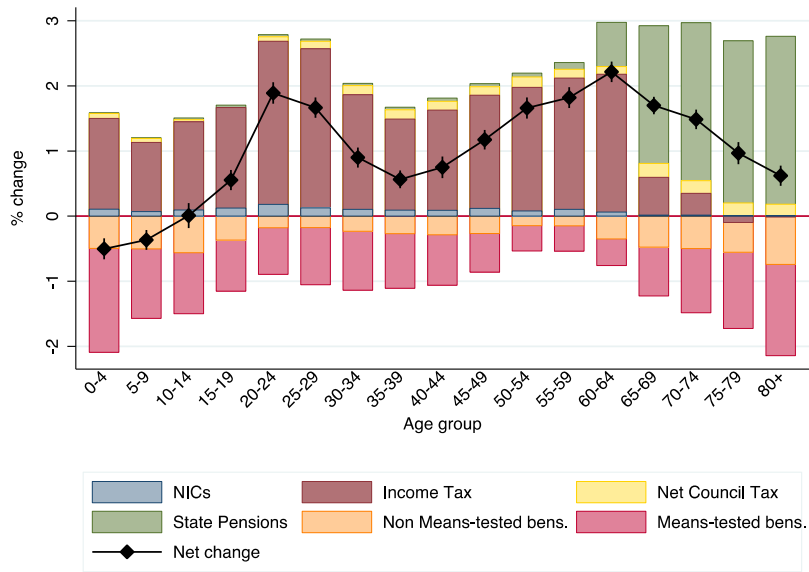

Notes: Observations are ranked into percentile groups using household income in 2010 equivalised using the modified OECD equivalence scale. The bottom percentile is not shown because of the very large percentage changes (in both directions) in particular components, given the very small reported incomes for this group. Note that the volatility by percentile group is in part due to small sample sizes and comparisons across groups are unlikely to be statistically significant. Source: Authors' calculations using EUROMOD G2.35.

Figure A4.3: Percentage change in household disposable income by income decile group due to policy changes 2010 to 2015, year-by-year with previous year's policies uprated using CPI
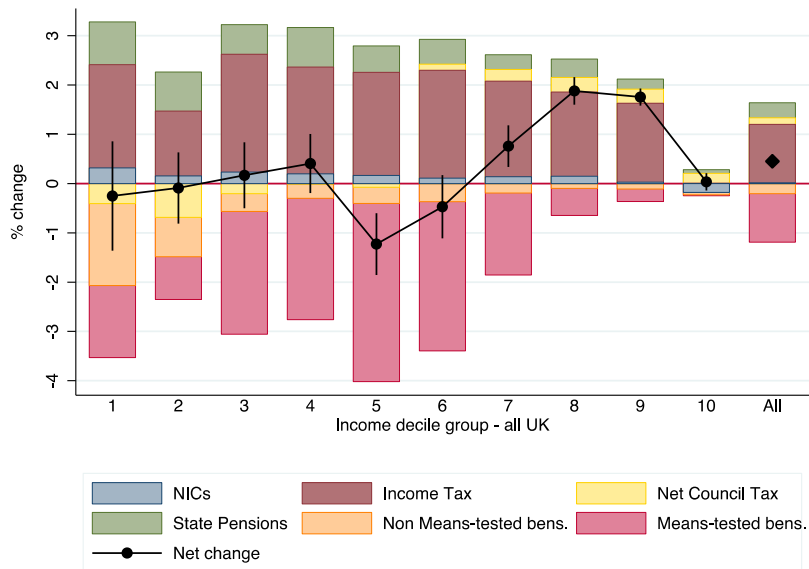

Notes: Observations are ranked into decile groups using household income in 2010 equivalised using the modified OECD equivalence scale. Changes are calculated as a percentage of incomes in 2010. The elements of this graph add up to those shown in Figure 4.1a. Source: Authors' calculations using EUROMOD G2.35.

Figure A4.4: Percentage change in household disposable income by age group due to policy changes 2010 to 2015/16; 2010 policies uprated to 2015/16 using CPI

Notes: The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

Figure A4.5: Percentage change in household disposable income by income decile group in London due to policy changes 2010 to 2015/16; 2010 policies uprated to 2015/16 using AEI

Notes: Observations in London are classified into UK decile groups using household income in 2010 equivalised using the modified OECD equivalence scale. The net change is shown with a 95% confidence interval, calculated using bootstrap. Source: Authors' calculations using EUROMOD G2.35.

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