



HM Treasury

Impact on households:

distributional analysis to accompany
Autumn Statement 2016

November 2016



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Executive summary

The government makes decisions about how to raise revenue and where to spend it, and these often directly affect households' incomes. As part of an open and transparent policy-making process, the government is publishing detailed analysis of how such changes to tax, welfare, and spending policy impact upon households of different incomes. This includes analysis of decisions taken by the Chancellor in Autumn Statement 2016.

While the direct impact of tax and spending measures forms an important part of the impact of government decisions on households, it does not give a complete picture of changes in household living standards. More important are the impacts of economic growth and changes in productivity, employment and wages, as well as the ability to access good quality public services. These often have a considerably greater impact on household lifetime incomes than the direct effect of a government's decisions on tax and spending. Fiscal policy must also be sustainable so that current interventions do not build up debts for future generations.

As well as considering direct impacts, this document therefore sets out this wider fiscal and economic context. For future fiscal events the government will continue to consider how best to present the impact of changes on households consistent with the aim of providing transparent and useful analysis.

Key findings include:

- households in the lowest income deciles are now much more likely to be in employment than at the start of the previous Parliament. In the bottom half of the income distribution, the percentage of families¹ who were in work increased from 60.3% in 2010-11 to 65.7% in 2014-15 while for the top half the percentage did not change²
- the National Living Wage (NLW) benefits low income households. From April 2017, the NLW will be £7.50, marking a gain of over £1,400 a year in earnings for a full-time worker previously on the National Minimum Wage (NMW) since its introduction
- the introduction of Universal Credit ensures that it always pays to work
- Autumn Statement 2016 measures included in the distributional analysis have a modest but positive overall impact on households at most levels of income, with the exception of households in the highest income decile who experience modest losses
- overall, the state remains highly redistributive. The 10% of households with the lowest income receive over four times as much support in spending as they contribute in tax

¹ Families are here defined as working-age benefit units. A benefit unit means a single adult or a couple living as married, including same-sex partners (civil partners and cohabitants), and any dependent children. It does not indicate receipt of benefits.

² Details of the sources of all numerical references, including National Statistics, used in this document, can be found in 'Autumn Statement 2016 data sources' in Chapter 2.

1 Impact on households

The economic context

1.1 The government aims to improve lifetime earnings prospects by supporting economic growth and raising productivity, creating more and better paid jobs and ensuring that work always pays. This also requires a fiscal policy that is sustainable and does not store up debts for future generations, creating a stable macroeconomic environment through control of the public finances.

Employment

1.2 The living standards of households are strongly determined by their ability to move into and remain in work. High employment rates, along with reductions in unemployment and economic inactivity, are key to raising living standards sustainably for households at the bottom of the income distribution.

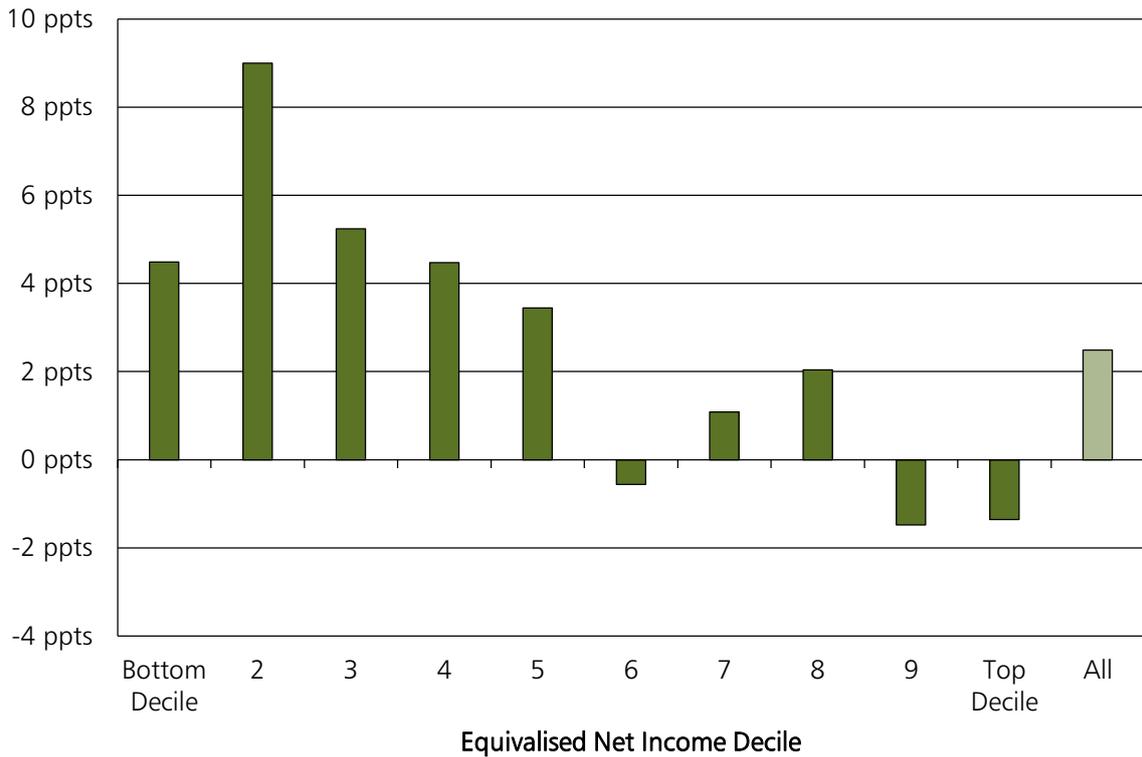
1.3 The employment rate has been rising since 2010 and reached a record high of 74.5% in the three months to September 2016, with employment at 31.8 million. Over the same period, the unemployment rate was 4.8%, the lowest since 2005. The inactivity rate stood at 21.7%, down from 23.6% in early 2010.

1.4 According to the Office for National Statistics (ONS), there are over 2.7 million more people in work and 865,000 fewer workless households since 2010. The fall in worklessness particularly benefits households in the bottom half of the income distribution. Chart 1.A shows the percentage point change in the share of families¹ in work, in each equivalised² income decile, between 2010-11 and 2014-15. In the bottom half of the income distribution, the percentage of families who were in work increased from 60.3% in 2010-11 to 65.7% in 2014-15, while for the top half the percentage did not change.

¹ Families are here defined as working-age benefit units. A benefit unit means a single adult or a couple living as married, including same-sex partners (civil partners and cohabitees), and any dependent children. It does not indicate receipt of benefits.

² The process of equalisation is explained later in the chapter.

Chart 1.A: Percentage point change in working-age families in each income decile that contain an individual in work (2010-11 to 2014-15)



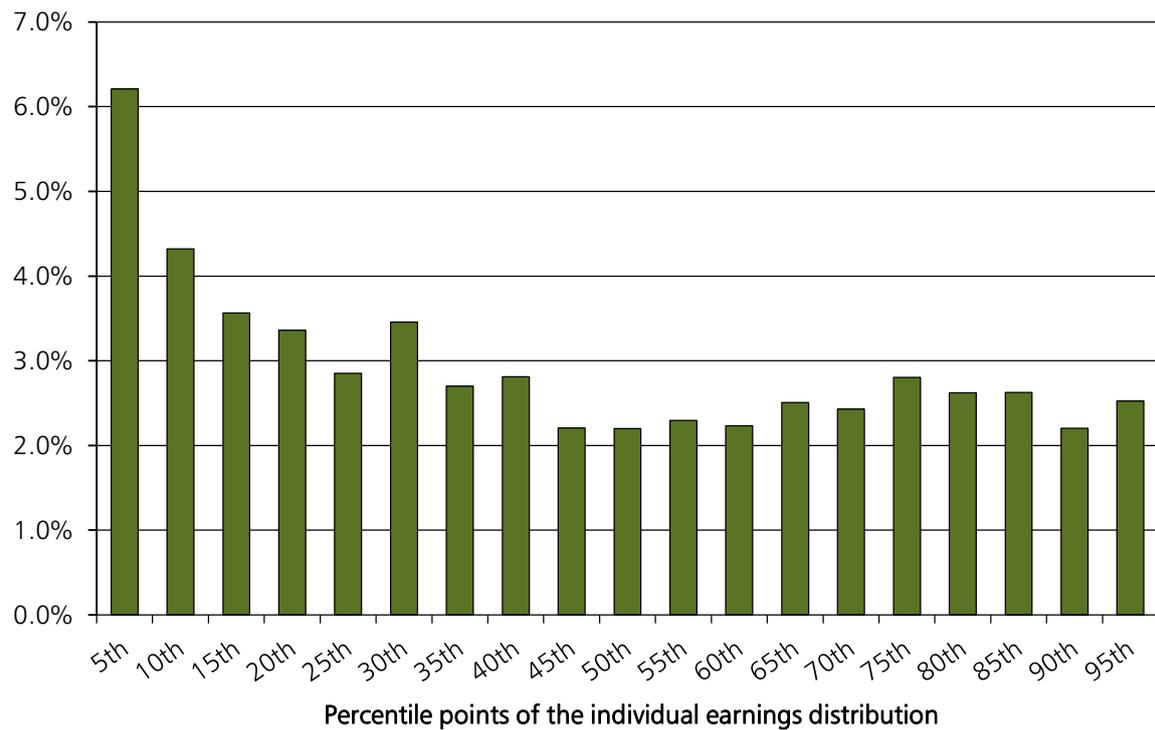
Source: *Households Below Average Income, 2010-11 to 2014-15*

Earnings

1.5 Productivity determines living standards in the long term and improving it is key to increasing wages. Total pay rose 2.3% in the year to the three months to September 2016 in nominal terms, and by 1.7% in real terms, marking 2 full years of positive real wage growth. Living standards, as measured by real household disposable income (RHDI) per capita, grew 2.8% in 2015, the fastest rate of growth in 14 years. RHDI per capita has continued to increase in 2016, rising 2.0% in the year to Q2 2016.

1.6 Chart 1.B shows that workers at the 5th income percentile saw their wages grow by over 6% in the year to April 2016. This was the highest growth at this point in the distribution since the introduction of the National Minimum Wage (NMW) in 1999, likely supported by the government taking action to increase the earnings of the lowest paid through the National Living Wage (NLW).

Chart 1.B: Percentage change in individual full-time gross weekly nominal earnings 2015-2016 at example percentile points

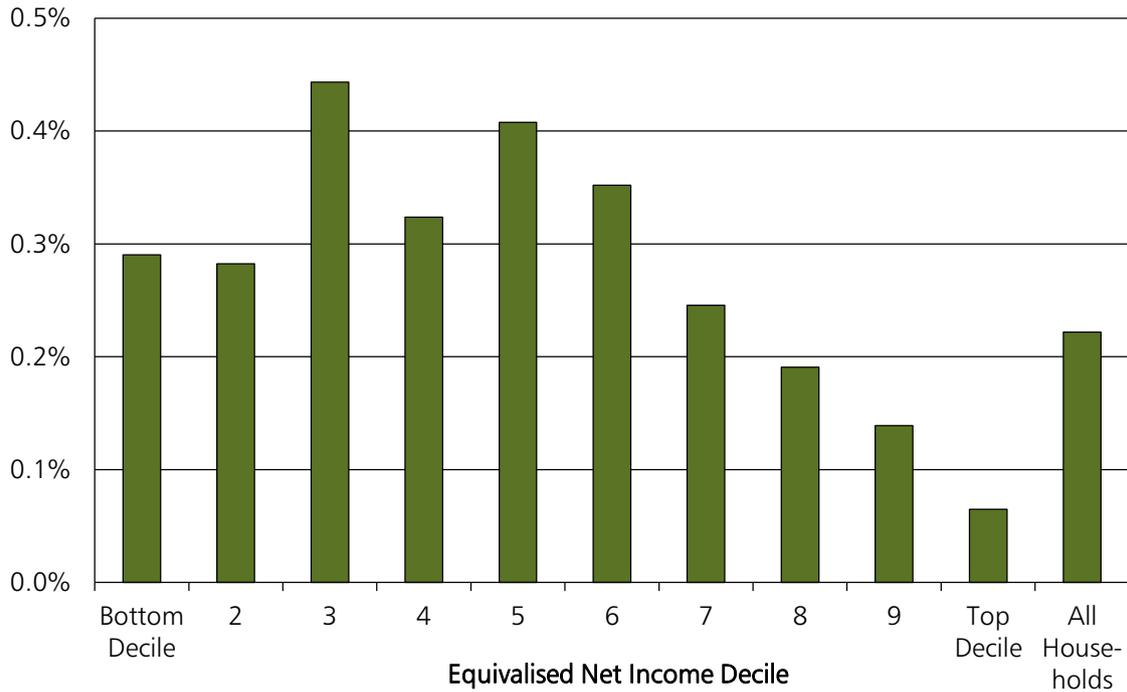


Source: ONS, Annual Survey of Hours and Earnings: 2016 provisional results

1.7 The NLW was introduced in April 2016 at £7.20. Following the recommendations of the Low Pay Commission, the government will increase the NLW by a further 4.2% to £7.50 in April 2017. This will benefit over 1 million workers and means an increase of over £1,400 a year in earnings for a full-time worker who was previously on the NMW since the introduction of the NLW in April 2016. As shown in Chart 1.C below, gains from the NLW as a percentage of net household income tend to be strongest for households in the lower half of the income distribution.³

³ Note that average gains in the bottom two deciles of the distribution are smaller relative to some higher deciles. This partly reflects a higher concentration of workless households in this part of the distribution, who by definition cannot benefit from a higher minimum wage, as well as a higher proportion of part-time workers.

Chart 1.C: Impact of the National Living Wage on households in 2019-20, as a percentage of net income, by income decile



Source: HMT distributional analysis model

1.8 It is important that the tax and benefit system supports people to enter and progress in work. Under the legacy benefit system people can face very poor financial work incentives. The introduction of Universal Credit (UC) will ensure work pays. UC will affect both the incentive to enter work and the incentive for people in work to increase their earnings. In both cases, the impact will depend on exact family circumstances, but the majority of individuals in employment will see an improvement in their incentives to earn more as a result of the introduction of UC. In particular, all of the 800,000 individuals in employment who in the legacy benefit system would lose between 80% and 100% of an additional hour of earnings in taxes and withdrawn benefits will see an improvement in their incentives.⁴ The reduction in the rate at which UC awards are withdrawn as earnings rise (the taper rate) from 65% to 63% announced at Autumn Statement 2016 further improves incentives to earn more.

1.9 In terms of incentives to enter work, there will also be improvements for many of those who currently face weak incentives. For example, under the legacy system, 300,000 workless families would lose between 80% and 100% of their earnings in withdrawal of benefits if one of the family members were to take a job at 10 hours a week on the National Living Wage.⁵ UC will increase the gains from entering work for virtually all of these families.

Sustainable public finances

1.10 Decisions on fiscal policy also have an impact on households. Controlling public debt reduces the burden on future generations, who would otherwise need to service higher debt interest payments, paid for by lower public spending or higher taxation.

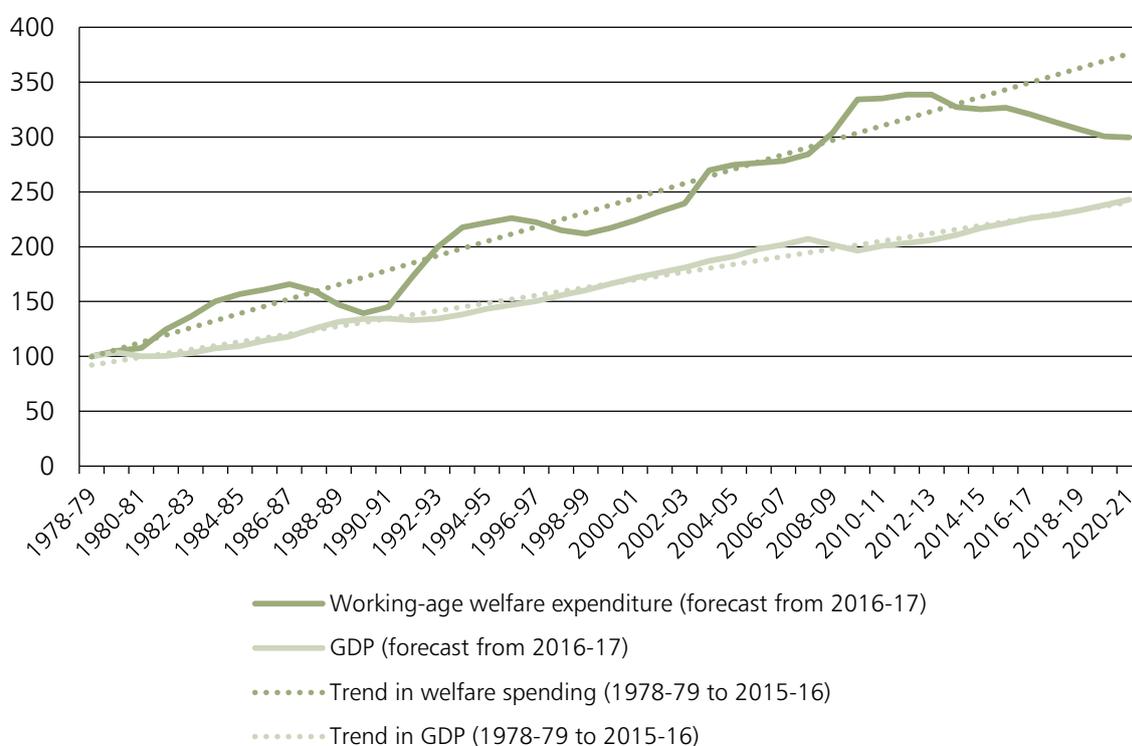
⁴ Estimates have been modelled for the policy rules as they will be in 2020-21. Full methodological details are in Chapter 2.

⁵ Estimates have been modelled for the policy rules as they will be in 2020-21. Full methodological details are in Chapter 2.

1.11 According to the International Monetary Fund (IMF), between 2007 and 2010 the UK experienced the largest increase in public debt in the G7 and in 2009-10 it faced a post-war peak deficit of 10.1% of GDP. However, over the last six years the deficit has been cut by almost two-thirds from its 2009-10 level to 4% of GDP last year. This has been critical in slowing the rise in public debt as a share of GDP. Despite significant progress, the UK still had one of the highest deficits among advanced economies in 2015, and further work remains to be done to bring the public finances under control.

1.12 Controlling spending on welfare remains an important part of controlling the public finances. Spending on working-age benefits had been rising strongly for several decades, trebling in real-terms from 1980 to 2014, as Chart 1.D highlights. Chart 1.D also shows what would have happened if the government had allowed working-age benefit spending to rise at its pre-2015 rate. This is shown compared to the Budget 2016 working-age welfare forecast as the breakdown of the Autumn Statement welfare forecast by age is not yet available.

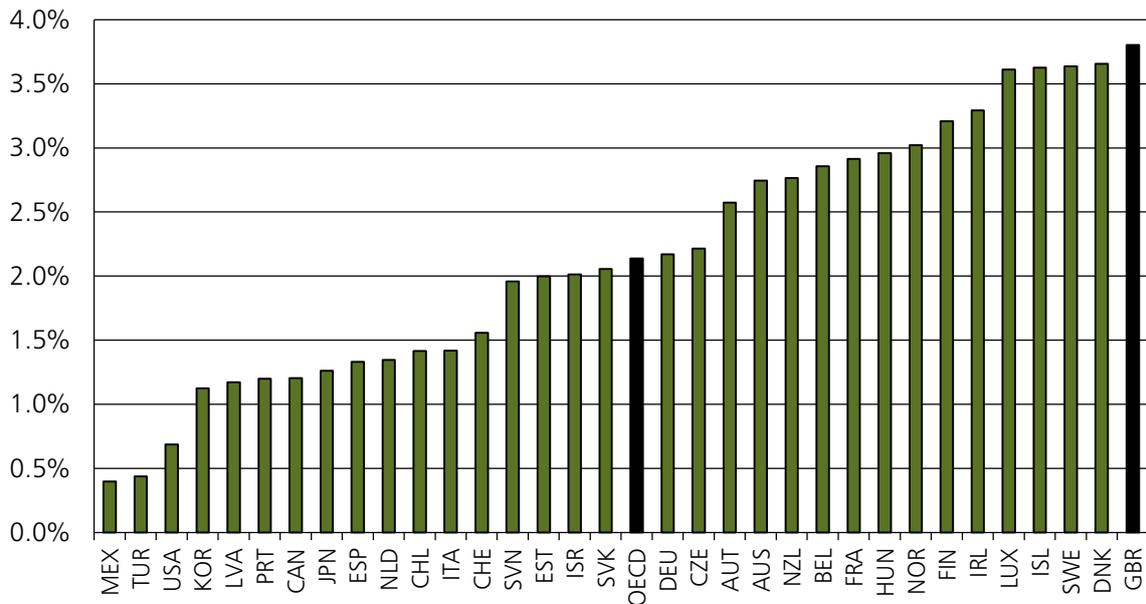
Chart 1.D: Real terms percentage changes in working-age welfare expenditure to 2020-21, if pre-2015 growth had continued (indexed to 1978-79 = 100)



Source: DWP expenditure and caseload forecast at Budget 2016; ONS

1.13 In its 2016 *family benefits public spending indicator*, the Organisation for Economic Co-operation and Development (OECD) showed that in 2013 the UK had the highest spending out of all OECD countries as a percentage of GDP on family benefits (including childcare), as shown in Chart 1.E. This spending in the UK was over 3.5% of GDP, while the OECD average was just over 2%. The 2013 data remains the most up to date and therefore does not reflect the welfare reforms the government has introduced.

Chart 1.E: Spending on family benefits as a percentage of GDP, OECD countries, 2013



Source: OECD

Tax, welfare and public service spending decisions

1.14 Alongside these wider economic impacts on households, this section looks at the tax, welfare and spending changes that carry a direct quantifiable impact on households.

1.15 The analysis captures decisions on tax, welfare, and spending on public services, (where the cash value spent on the public service is converted into an identical cash gain to households) and looks at the impact of such changes on different household net income deciles. To create these deciles, households are ordered by their net income from lowest to highest, and then divided into 10 equally sized groups. Households of different sizes are compared on a consistent basis, known as equivalisation. Equivalisation is a process that adjusts a household's net income to take into account the size and composition of the household. This reflects the fact that larger households will require a higher net income to achieve the same economic well-being and standard of living as a household with fewer members. To help understand where different households sit in the income distribution, Chapter 2 includes the median gross income within each decile.

1.16 HM Treasury continue to update the microsimulation modelling which underpins this analysis. Since the publication that accompanied Budget 2016, the following methodological changes have been made:

- the model now includes capital gains tax, and any relevant policy changes to capital gains tax
- to align with the income definition used in the "Households Below Average Income" statistics, income from student loans, and student loan repayments, are now included in the definition of household income. Student loan income and repayments are reflected in the "benefits-in-kind from public services" bars
- the input data underpinning the model, based on the Office for National Statistics Living Costs and Food survey (LCF), has been updated to cover the period 2011-12 to 2013-14

- the model has been updated in line with the OBR's latest economic forecast

1.17 The analysis presented reverts to a format similar to that published between 2010 and 2015. Every format of distributional analysis has advantages and disadvantages and it remains important to note that the charts presented here take no account of the effect of additional government borrowing. An additional pound of borrowing will show up in these charts as an unequivocal gain for households, which it is not.

1.18 Box 1.A sets out further detail on the analytical approach taken in this document. More detailed explanations of the data sources, methodologies, the equalisation process and criteria for including measures in the analysis can be found in Chapter 2.

Box 1.A: Methodological choices in distributional analysis

Distributional analysis is a broad term: for the purpose of this document, it means analysing the direct impact of government policies on households at different points across the household income distribution. The government has published distributional analysis alongside fiscal events since June 2010, and has kept the methodology and format under constant review.

Choice of counterfactual

In order to understand the impact of tax, welfare and public spending decisions on households, it is necessary to form a view as to what household incomes would be in their absence. There is always a level of judgment involved in forming these assumptions.

For this analysis, the net income of households in 2019-20 after policies have been implemented is compared to a counterfactual world in the same year in which the same policies have not been implemented.

Choice of data source

To provide as complete a picture as possible of the impact of this government's measures, HM Treasury's analysis is based on data from the LCF, a survey run by the Office for National Statistics that aims to estimate the level of household income and expenditure in the UK. It is not the only large survey of income available, although it is the only available large survey of household expenditure which allows, for example, for the modelling of changes in indirect tax.

Take-up of benefits

Not all households take up all of the benefits to which they are entitled, and so the modelling in this document adjusts for this by using information on the take-up of benefits in the underlying survey data. By doing this, the estimates in this document move closer to the real world impact on households. Analysis which does not make adjustments for the incomplete take-up of benefits will less accurately capture the impact of welfare changes.

Benefits-in-kind from public services

HM Treasury's modelling also captures the benefit to households of public services such as the NHS, schools, and social care. This allows for a more complete understanding of the trade-offs between, for example, spending on cash transfers through the welfare system, and spending on these public services. HM Treasury's public services modelling only captures spending in England on frontline public services with a direct benefit to households. Capital spending, devolved spending, pay, and administrative spending are outside the scope of this model.

Analysis of decisions taken at Autumn Statement 2016

1.19 Charts 1.F and 1.G set out the impact of decisions taken by the Chancellor at Autumn Statement 2016 in isolation. This does not include changes to inherited policy.⁶

1.20 This analysis shows the impact of measures in 2019-20, while Table 2.1 in the Autumn Statement document and the fiscal and economic forecast presented at the Autumn Statement now extend to 2021-22. As the detail of departmental spending is included in the model,

⁶ These measures are included under the heading 'Changes to inherited policy' in Table 2.1 of the Autumn Statement 2016 document.

analysis is only presented to the end of the Spending Review period, as departmental spending is currently allocated to 2019-20.

1.21 Autumn Statement 2016 measures included in the charts are:⁷

- Fuel Duty: freeze in 2017-18
- National Savings & Investments Investment Bond
- Insurance Premium Tax: 2ppt increase from June 2017
- Disguised Remuneration: extend to self-employed
- Salary Sacrifice: remove tax and National Insurance Contributions advantages
- Universal Credit: reduce taper to 63%
- Off-payroll working: implement consultation reforms

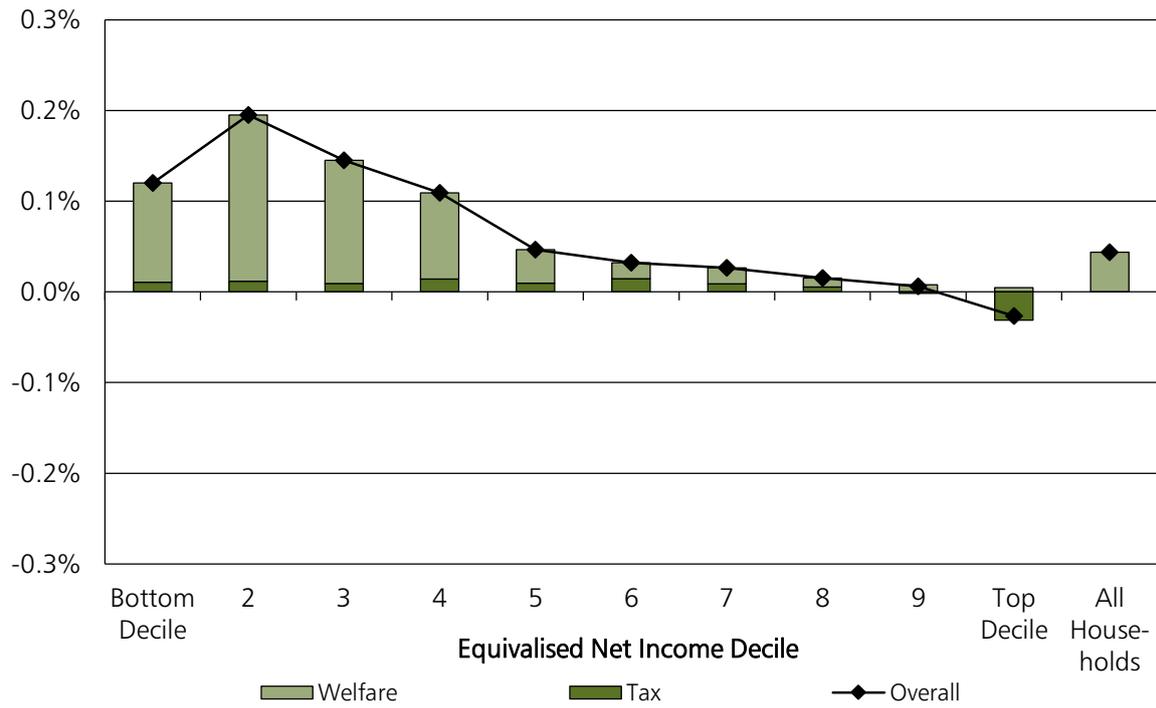
1.22 A number of Autumn Statement measures are not in scope for this analysis. The criteria for measures excluded from the analysis are listed in Chapter 2. The analysis of public service spending presented here captures the frontline services from which households benefit, but does not cover capital investment, public goods or central administration costs. The analysis also does not include the indirect impact of regulations. Measures excluded can nevertheless have a tangible impact on households' living standards. Autumn Statement 2016 measures that are not captured in Charts 1.F and 1.G include:

- capital spending: For example, a National Productivity Investment Fund, including over £2.5 billion invested in housing in 2019-20
- changes to regulation: For example, a 4.2% increase in the National Living Wage and consulting on reforms to reduce the number of whiplash claims and allow insurers to cut premiums
- fiscal savings from reduced tax evasion and improved enforcement: For example, expanded resource for HMRC litigation and settlement

1.23 Chart 1.F shows the impact as a percentage of net household income (including benefits-in-kind from public services), while Chart 1.G shows the impact in annual cash terms. While there have been no quantifiable changes in public service spending with a direct impact on households at this Autumn Statement, change in income is expressed as a proportion of income including benefits-in-kind. Autumn Statement 2016 measures included in the analysis have a modest but positive overall impact on households. Gains are concentrated on the four deciles with the lowest household incomes, while there are modest losses for households in the highest income decile.

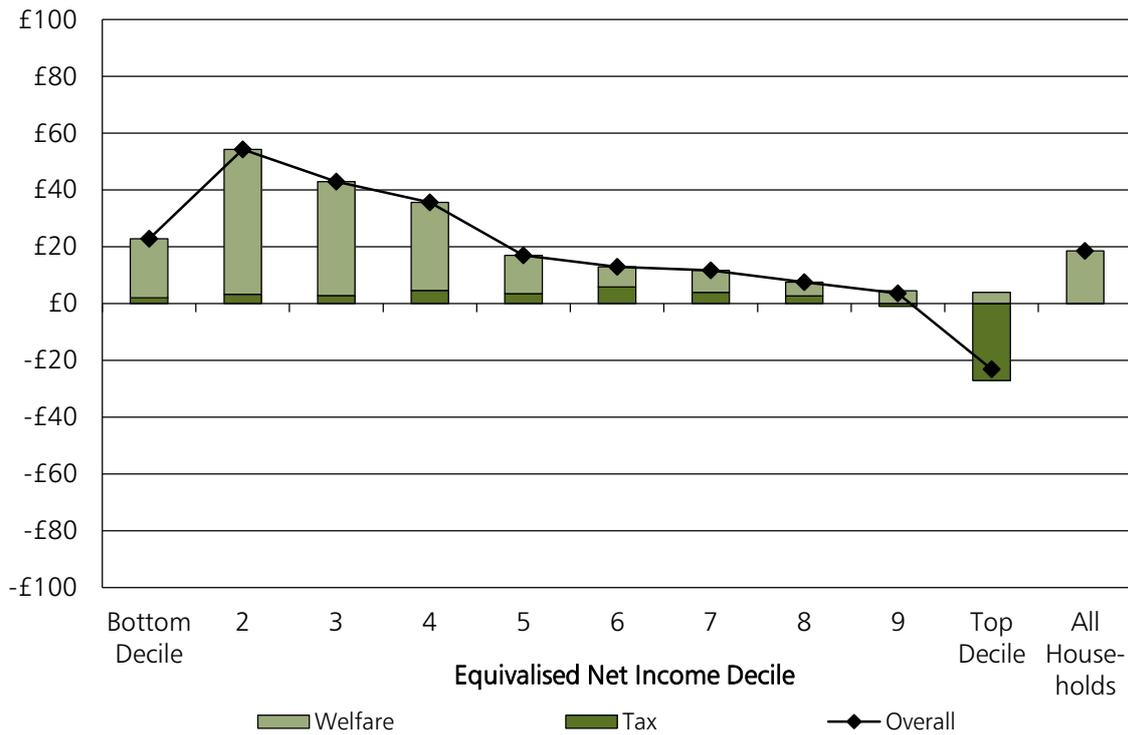
⁷ The Money Purchase Annual Allowance reduction to £4k remains out of scope of this analysis due to data and modelling constraints. All other measures in scope have been included.

Chart 1.F: Impact of Autumn Statement decisions on households in 2019-20, as a percentage of net income (including households' benefits-in-kind from public services), by income decile



Source: HMT distributional analysis model, DWP & HMRC modelling

Chart 1.G: Impact of Autumn Statement decisions on households in 2019-20, in cash terms (£ per year), by income decile



Source: HMT distributional analysis model, DWP & HMRC modelling

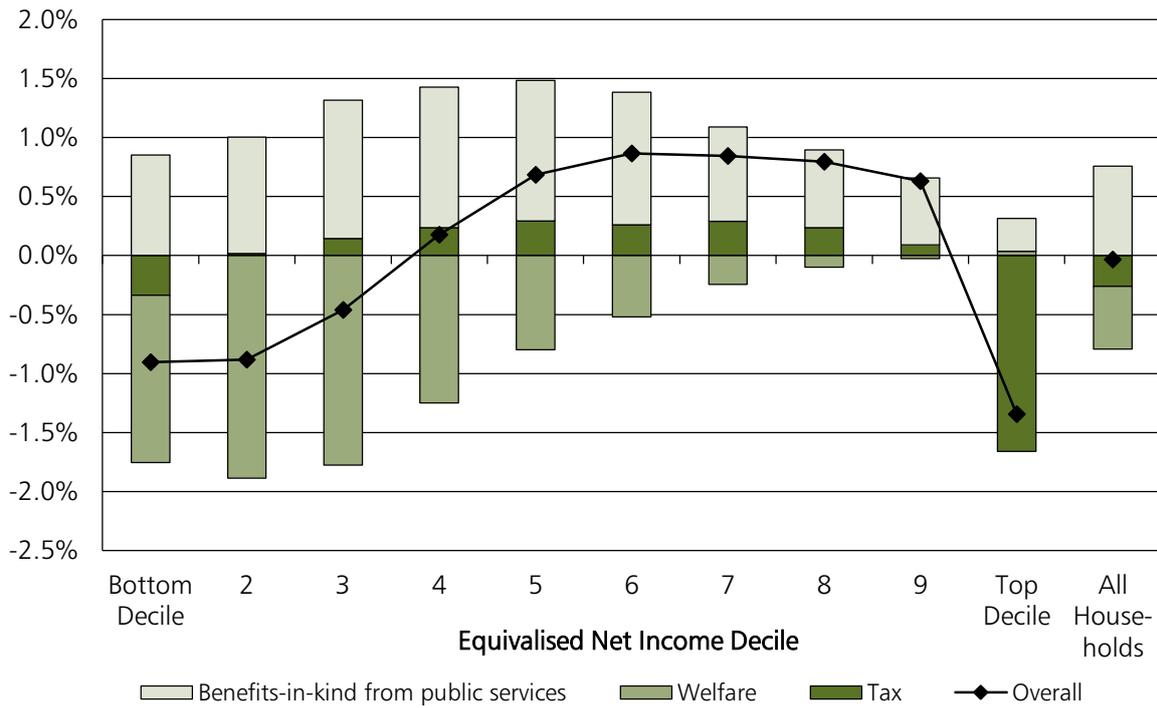
Analysis of measures implemented during this Parliament

1.24 Charts 1.H and 1.I show the cumulative impact of measures implemented (or planned to be implemented) over the course of this Parliament, up to 2019-20. They show the impacts on households in 2019-20 compared to a hypothetical world in which modelled government policies implemented since May 2015 had not been introduced. This includes changes that were announced before the Summer Budget 2015 but have been implemented (or will be implemented) during this Parliament. As in the case of Charts 1.F and 1.G, this analysis excludes measures such as capital spending, regulations and reduced tax evasion. Chart 1.H shows the impact as a percentage of net household income, while Chart 1.I shows the impact in cash terms.

1.25 Charts published at consecutive fiscal events are never directly comparable, as they are based on the OBR economic forecast, which is updated at every fiscal event.

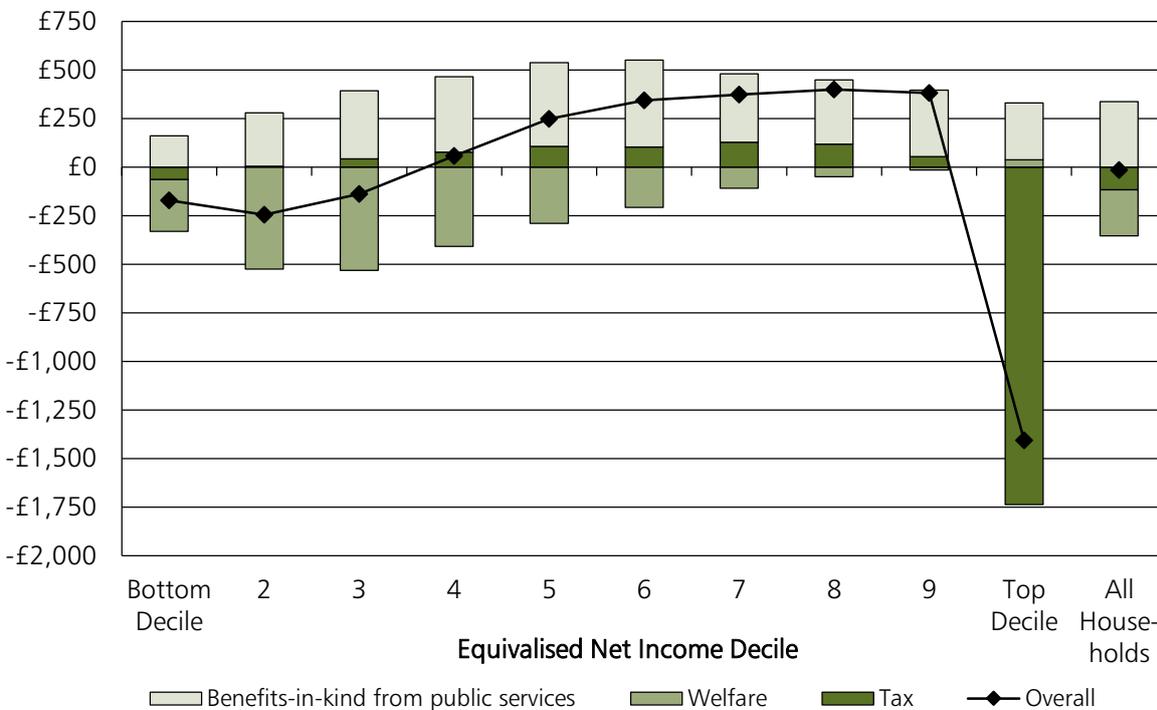
1.26 The overall direct impact of modelled policy changes on household incomes is, on average, broadly neutral. Welfare savings have had a negative effect on those households in receipt of welfare, who tend to be concentrated towards the bottom of the income distribution. Households on the highest incomes are contributing significantly more in tax, leading to a net reduction in their household income.

Chart 1.H: Cumulative impact of modelled tax, welfare and public service spending changes on households in 2019-20, as a percentage of net income (including households' benefits-in-kind from public services), by income decile



Source: HMT distributional analysis model, DWP & HMRC modelling

Chart 1.I: Cumulative impact of modelled tax, welfare and public service spending changes on households in 2019-20, in cash terms (£ per year), by income decile

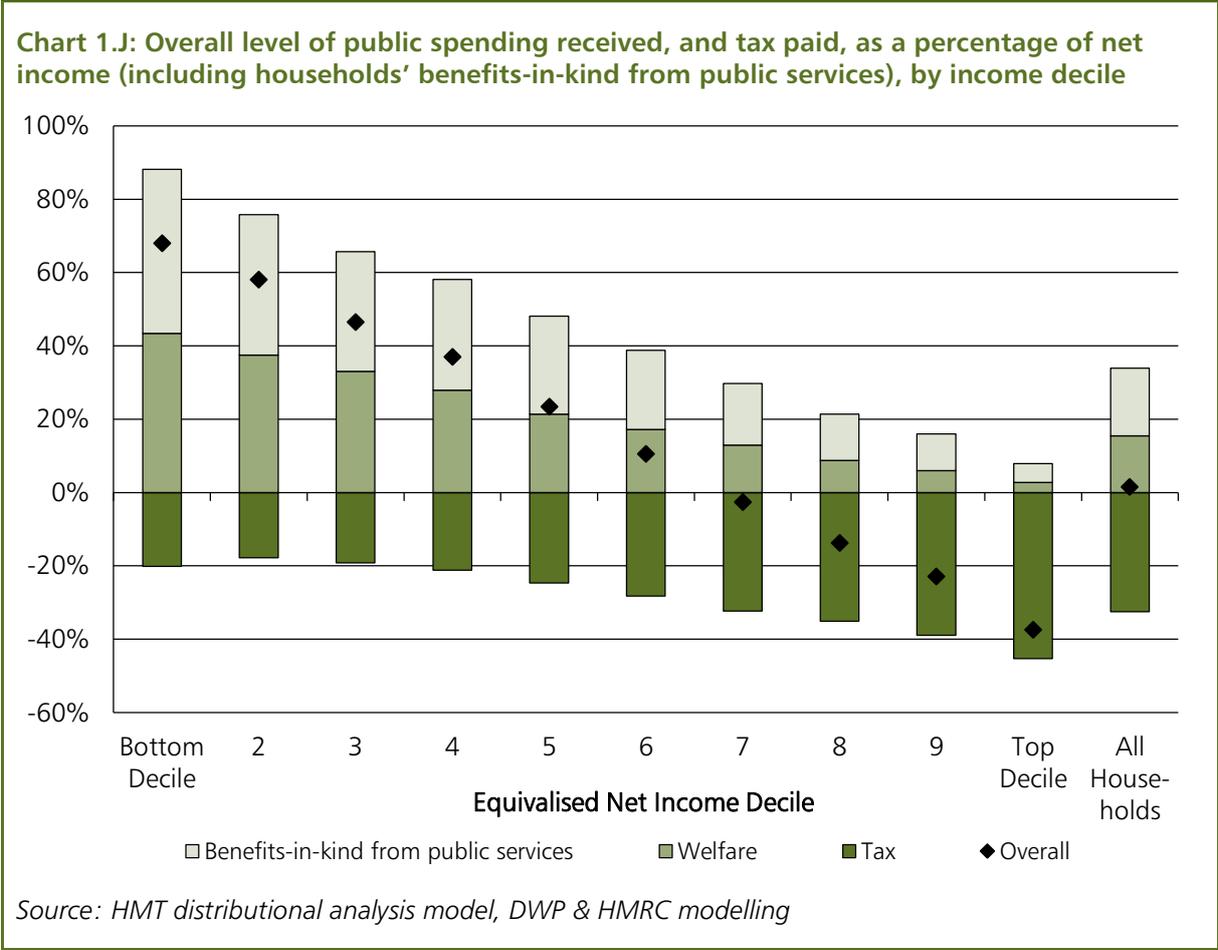


Source: HMT distributional analysis model, DWP & HMRC modelling

Overall level of tax, welfare and public service spending

1.27 Overall, government policy continues to be highly redistributive. Chart 1.J shows the overall level of public spending received, and tax paid, by households. The chart shows that:

- the 10% of households with the lowest income receive over four times as much support in spending as they contribute in tax
- the 60% of households with the lowest incomes receive more in public spending than they contribute in tax
- the 10% of households with the highest incomes contribute over five times as much in tax as they receive in spending



2 Data sources and methodology

2.1 The tables below set out the data sources and methodology used to produce the charts and statistics presented in this document. All figures in this document are calculated as economic estimates and are therefore not official statistics.

Table 2.A: Data sources for charts

Chart	Source
1.A	Analysis of Households Below Average Income statistics, 2010-11 to 2014-15. Families are here defined as working-age benefit units.
1.B	ONS data series: Annual Survey of Hours and Earnings (2016 provisional results)
1.C	HMT distributional analysis model. See 2.8-2.35 for more information
1.D	DWP Benefit Expenditure and Caseload tables from Budget 2016, with ONS real GDP (series ABMI), plus OBR projections to 2020-21, with HMT calculations of a pre-2015 linear trend line extrapolated forward to 2020-21
1.E	OECD (2016), Family benefits public spending. Data refer to spending in 2013.
1.F	HMT distributional analysis model. See 2.8-2.35 for more information
1.G	HMT distributional analysis model. See 2.8-2.35 for more information
1.H	HMT distributional analysis model. See 2.8-2.35 for more information
1.I	HMT distributional analysis model. See 2.8-2.35 for more information
1.J	HMT distributional analysis model. See 2.8-2.35 for more information

Table 2.B: Data sources for statistics

Paragraph	Statistic	Source
1.3	Employment Rates	ONS, UK Labour Market: November 2016
1.4	Workless households	ONS, Working and workless households & DWP, Households Below Average Income
1.5	Pay	ONS, UK Labour Market: November 2016
1.5	Living Standards	ONS, Economic well-being (Q2 2016)
1.7	Total number of NLW beneficiaries	OBR Economic and Fiscal Outlook (November 2016)
1.7	NLW benefits to full time worker	HMT calculations
1.8	Number of people with MDR of 80%-100%	DWP, Policy Simulation Model, see 2.2 and 2.3 for more information
1.9	Number of workless families with PTR of 80%-100%	DWP, Policy Simulation Model, see 2.2 and 2.3 for more information
1.11	Public debt increase	IMF World Economic Outlook Database
1.11	UK deficit	ONS Public sector finances September 2016
1.13	Transfers to families	OECD family benefits public spending indicator

Work incentives analysis

2.2 The number of individuals with a Marginal Deduction Rate (MDR) of 80% - 100% under the legacy system in 2020-21 as set out in paragraph 1.8 is estimated using DWP's Policy Simulation Model (PSM). MDRs are defined as the proportion of an additional hour of earnings that is lost to tax or benefit withdrawal. Analysis is on an entitlement basis and compares a policy world in which all individuals are on the legacy system to one with full roll-out of UC (including the application of the 63% taper). Childcare, council tax benefit, passported benefits, and removal of housing support for 18-21 year olds in UC are not included in the modelling of MDRs. The population used for the analysis is all individuals in employment who are entitled to a means-tested benefit under either the legacy or UC system, and excludes self-employed people, students, people receiving statutory maternity or paternity pay and people on contributory benefits.

2.3 The number of workless families with a Participation Tax Rate (PTR) of 80% - 100% in the legacy system in 2020-21 if one adult enters work at 10 hours a week on the NLW (£8.80 an hour), as set out in paragraph 1.9, is also estimated using the PSM. Both policy worlds are as defined for MDR analysis. PTR is defined as the proportion of total gross earnings lost through tax or lower benefits when an individual enters work. The families used for this analysis are all workless households with a member aged 16 – 64, excluding students, people receiving statutory maternity or paternity pay and people on contributory benefits.

Constructing Charts 1.C, and 1.F to 1.J

Defining income

2.4 This distributional analysis uses equivalised net household income, before housing costs, as the key measure through which to rank households from lowest income to highest income. This measure comprises a number of details:

- **Equivalised:** equivalisation is a process that adjusts a household's net income to take into account the size and composition of the household. This reflects the fact that larger households will require a higher net income to achieve the same economic well-being and standard of living as a household with fewer members. The equivalisation factors used in the analysis are the modified OECD factors (as used in the DWP's Households Below Average Income publication)
- **Net:** household incomes are ranked after deductions from direct taxes, and after additions from welfare benefits. Deductions from indirect taxes, or additions through benefits-in-kind from public services, are not used to rank households
- **Household:** incomes are assessed in aggregate at the household, not individual, level. A household can comprise a single individual, a single family (referred to as a benefit unit), or multiple families
- **Before Housing Costs:** housing costs such as rent or the cost of servicing a mortgage are not deducted from household incomes

The household income distribution

2.5 The household income distribution is created by ranking households from the lowest equivalised net income to the highest equivalised net income, and then dividing this ranking into ten equally sized groups called deciles, across which the analysis is produced.

2.6 Table 2.C below shows median gross (pre-tax) incomes (private income including earnings, private pensions, savings and investments, plus benefit income) within each decile, which gives a

less precise estimation of a household’s position on the income distribution than net income but, because many people think about their incomes or salaries in gross rather than net terms, is easier to understand.

2.7 Table 2.C should therefore be used to approximate where a household will be found in the income distribution. For example, if a household consisting of two adults earns £21,400 per year between them, there is a high likelihood that this household will be found in the third income decile. However this is not guaranteed, as different gross household incomes can result in different net household incomes, depending on how many earners there are in the household, the size of the household, and which benefits the household qualifies for.

Table 2.C: Median gross income for each quintile (£ per year, 2019-20) for different household compositions

Median gross income of households in decile	1 adult (£)	1 adult and 1 child (£)	2 adults (£)	2 adults and 1 child (£)	2 adults and 2 children (£)
Top decile	66,700	93,700	95,600	124,500	159,200
Ninth decile	42,800	57,300	62,700	81,900	100,300
Eighth decile	33,700	49,600	49,400	65,300	81,000
Seventh decile	28,000	41,500	40,800	54,300	65,900
Sixth decile	23,100	34,000	34,600	45,600	56,300
Fifth decile	19,800	26,900	29,400	38,800	47,300
Fourth decile	16,400	22,100	25,100	32,700	40,100
Third decile	14,300	18,700	21,400	28,000	33,300
Second decile	11,800	15,100	18,100	23,700	26,600
Bottom decile	8,900	12,500	13,700	16,900	20,000

Source: HM Treasury microsimulation model

Modelling methodology

2.8 Charts 1.F to 1.J are created using an internal HMT model which combines analysis of tax, welfare, and public services spending changes. These charts compare the effect of policy changes in tax, welfare and public service spending against a counterfactual of no policy changes. In Charts 1.F and 1.G policy decisions taken by the Chancellor in this Autumn Statement are compared to a world where these decisions had not been taken. In Charts 1.I and 1.J policy changes implemented since the start of this Parliament are compared to a counterfactual of no policy changes since May 2015. This information is presented both as a percentage change in net income, and the cash impacts in 2019-20. For public service spending, the cash value spent on public services is converted into an identical cash gain to households. The analysis of public services spending captures the frontline services from which households benefit, but does not cover capital investment, public goods, or central administrative costs. All public service spending analysis is for England only.

2.9 Tax and welfare policy changes included in these distributional analysis charts have either been modelled at a household level using HMT’s microsimulation model or apportioned to income deciles at an aggregate level.

Microsimulated analysis of the tax and welfare system

2.10 Where possible, tax and welfare policy changes are analysed using HMT's Intra-Governmental Tax and Benefit microsimulation model (IGOTM), which is underpinned by data from the ONS's Living Costs and Food survey (LCF). The small sample size of the LCF means that in order to produce robust analysis three years of data have been pooled together, specifically 2011-12 to 2013-14. This data is then projected forward to reflect the financial year being modelled, using historical Annual Survey of Hours and Earnings (ASHE) data on earnings growth at different points across the income distribution as well as the latest OBR average earnings and inflation forecasts.

2.11 Throughout the analysis, individual employees are assumed to be paid at least the appropriate level of the National Minimum Wage or National Living Wage, which has been uprated from announced levels to 2019-20 based on the OBR forecast for average earnings. The model makes no changes to the underlying demographics, employment levels, or expenditure patterns in the base data.

2.12 The impact of tax and welfare measures that can be modelled robustly at a household level are derived using this projected data. Two policy settings are modelled. The first is a view of 2019-20 that reflects all government policy changes implemented across the 2015-2020 Parliament, up to and including those announced at this Autumn Statement. This includes policies that were announced in the previous Parliament but implemented in this Parliament. The second is a counterfactual scenario. For Charts 1.F and 1.G, this counterfactual reflects the policy world as it would have been in 2019-20, without any Autumn Statement 2016 decisions. For Charts 1.H and 1.I, this counterfactual assumes that the system as it was before Summer Budget 2015 continued, where tax and benefit thresholds are increased in line with the policy at the time.

2.13 This type of comparative analysis does not capture:

- the impact of changes to regulation (e.g. the National Living Wage), which are not changes to the distribution of tax receipts or public spending
- "windfall" income, such as inheritances, where the receipt of the income would temporarily shift the household's position in the income distribution
- Exchequer impacts resulting from reduced fraud, error, or debt in the welfare system, as full compliance with the rules of the welfare system is assumed throughout the modelling
- Exchequer impacts resulting from reduced tax evasion, as full compliance with the rules of the tax system is assumed throughout the modelling; avoidance measures are captured where they result in a change in tax liability in the year being analysed
- levies, such as the soft drinks industry levy or apprenticeship levy, that do not have a direct impact on households

2.14 Not all households take up all of the benefits to which they are entitled. HMT microsimulation modelling takes this into account when calculating the effects of policy changes by using information on the take-up of benefits in the underlying survey data. By doing so, this analysis provides a more accurate estimate of the real world-impacts on households.

2.15 Within the tax system, the main taxes microsimulated in this analysis are: income tax, employee National Insurance Contributions, council tax, VAT, insurance premium tax, fuel duty, alcohol duty, tobacco duty, stamp duty land tax, and air passenger duty.

2.16 Within the welfare system, the most significant welfare benefits microsimulated in this analysis are: the state pension, pension credit, winter fuel payments, attendance allowance, jobseeker's allowance, employment and support allowance, income support, working tax credit, child tax credit, child benefit, disability living allowance, personal independence payments and housing benefit.

Apportioned analysis of tax and welfare measures

2.17 Not all measures can be reliably modelled using IGOTM due to data and/or modelling constraints. Tax and welfare changes that cannot be modelled robustly using microsimulation modelling are apportioned to household equivalised income deciles, according to the Exchequer costs or savings from the measures, based on assumptions about where the impacts are likely to fall.

2.18 Where there is insufficient data to make reasonable assumptions on how to apportion the distributional impact, these measures are excluded from analysis. For this reason, analysis in this document excludes the measure to reduce the Money Purchase Annual Allowance to £4,000 per annum, and the abolition of contracting out for members of defined-benefit pension schemes.

2.19 The IGOTM model is currently a model of the legacy welfare system. As such HMT microsimulation modelling cannot currently capture the effects of UC, or any changes to it. Instead these impacts are apportioned across household income deciles using analysis from DWP's PSM to ensure that the impact of policy is fully reflected in the charts.

2.20 The fact that UC will be partially rolled out by 2019-20 means that many households will be receiving different welfare payments in 2019-20 than they would have done without UC; this is referred to as the marginal impact of UC over the legacy system. In order to capture this marginal impact in 2019-20, DWP's microsimulation modelling of the legacy benefits that people would have received is compared to DWP's estimate of what the same households will receive in 2019-20 after the partial rollout of UC. These impacts are then apportioned in HMT's distributional analysis charts.

2.21 The net impact used for this analysis excludes Exchequer savings from reductions to fraud, error, and debt which result from the introduction of UC, because the modelling assumes full compliance with the rules of the tax and welfare systems. Transitional protection for claimants who are managed migrated onto UC, as well as UC's increased sensitivity to changes in claimants' earnings, are included in the distributional impacts.

Analysis of spending on public services

2.22 The analysis of the benefits-in-kind provided by public service spending is also derived from HM Treasury's IGOTM model. However, the modelling approach taken for public services is slightly different. There are two general approaches to the modelling of resource spending on public services (referred to as Resource Departmental Expenditure Limits: RDEL) depending on whether service use is reported in the LCF, which underpins the modelling. Where this is the case, no additional data is required and the approach is similar to that used for most tax and welfare modelling. An example of this is spending on schools, which can be modelled directly because the LCF contains information on the number of children by age in each household who attend a state-funded school. The spending on schools is then allocated between all those households who are expected to use this public service, in proportion to each household's expected use of the service.

2.23 Where the LCF does not contain information about use of the service, additional data sources are required. This additional data is used to identify characteristics associated with the use of the service and then to derive probabilities of service use conditional on these characteristics. This could include a wide range of characteristics, although the variables

considered must be common to both the additional data and the LCF data used in the microsimulation model. For example, use may vary by age, income, family composition, and geographic location.

2.24 As an example, the likelihood of an individual using a service such as visiting a GP will be influenced by factors such as the individual's age, sex, level of income, family composition, and so on. Through regression analysis of ONS surveys, it is possible to estimate how strongly these factors affect the likelihood of an individual visiting a GP over a given timeframe. This regression analysis shows, for example, that the older an adult is, the more likely he or she is to visit the GP. The regression model estimated on ONS survey data is then applied to the LCF data that underpins the rest of HMT's distributional analysis modelling. The adjusted-LCF data, therefore, then contains estimates of each individual's likelihood of using this particular public service.

2.25 Where possible the probability of using a given public service is estimated through the regression approach above. However, because of data limitations, this is not always possible and many probabilities have instead been estimated by cross-tabulating these various factors which predict service use, and using this cross-tabulation to weight the survey population's likelihood of service use accordingly.

2.26 Spending (both actual and for the baseline) is then allocated according to each household's relative likelihood of using the service, where the relative likelihood of use acts as a weight to allocate total spending to individual households. Therefore, the spending will be skewed to those individuals and households who are most likely to use a public service over a given time period. In the example of visiting a GP above, the total public spending on this service will be skewed (but not allocated entirely) to those individuals who are estimated to be most likely to use this service over a given time period. Impacts of changes in RDEL spending are calculated alongside tax and welfare and presented across the income distribution.

2.27 The analysis covers the services delivered by the Department of Health, the Department for Education, the Department for Work and Pensions, the Department for Communities and Local Government, the Department for Business, Energy & Industrial Strategy, the Department for Transport, Local Government, the Ministry of Justice, and the Department for Culture, Media and Sport.

2.28 This RDEL analysis only includes spending on frontline public services with a direct benefit to households. The analysis excludes:

- administrative spending
- capital spending, and the depreciation of capital assets
- spending funded through the reserve
- public sector pay and public service pensions policy
- administrative spending or spending on public goods because it is not possible to identify the direct benefits from these areas of spending for specific households

2.29 To align with the definition of income used in the Households Below Average Income survey, the analysis of spending on public services also includes one financial transaction: student loans. To account for this source of income, estimates of student loan outlay in a given financial year are counted as household income from public spending. Likewise, estimates of student loan repayments in that same financial year are reflected as a loss to households, again through the public spending bars. Where a policy change affects the relative generosity of student loans, either by affecting the amount an individual can borrow, or the amount individuals will repay, this will be reflected as a change to household income.

2.30 Charts are on a United Kingdom basis, but only include RDEL spending in England. RDEL spending is devolved to the governments in Scotland, Wales, and Northern Ireland, and is not reflected in this analysis. This has two effects. First, any changes to devolved spending – whether positive or negative – have no impacts in this analysis. Second, where change is expressed in income as a proportion of household income, the income denominators which underpin this calculation do not include any income from spending devolved to Scotland, Wales, and Northern Ireland.

2.31 This analysis of RDEL spending compares spending in 2015-16 and 2019-20. For the counterfactual, spending in 2015-16 is assumed to increase in real terms to 2019-20, in line with the OBR's latest forecasts for the GDP deflator.

Chart 1.C

2.32 This chart is constructed using the HMT microsimulation model and compares the net income of households in 2019-20 against a counterfactual world where the National Living Wage (NLW) does not exist, and instead the lowest legal per hour pay rate for all employees 25 or over is the National Minimum Wage (NMW). In this analysis, both the NLW and the NMW are in line with the rates forecast by the OBR for 2019-20. Unlike Charts 1.F to 1.J, the change in income in this chart is expressed as a proportion of income *excluding* benefits-in-kind from public service spending.

Charts 1.F and 1.G

2.33 These charts compare the incomes of households in a world in which all policy decisions up to and including this Autumn Statement have been implemented against a counterfactual of a world in which all policy decisions up to but not including the Autumn Statement have been implemented. This analysis does not show any change due to measures which are “changes to inherited policy,” as set out in Table 2.1 of the Autumn Statement document. Both systems are projected forward to the year 2019-20. Chart 1.F expresses this change as a proportion of household income (including benefits-in-kind from public services), while Chart 1.G shows the cash change in each income decile. While there have been no quantifiable changes to public service spending with a quantifiable impact on households at this Autumn Statement, income from benefits-in-kind from public services is still counted within the income denominator for Chart 1.F.

Charts 1.H and 1.I

2.34 These charts have been constructed using the same methodology as the Autumn Statement-only distributional analysis charts (Charts 1.F and 1.G). However the counterfactual scenario in these charts exclude all tax, welfare, and public service spending measures announced at Summer Budget 2015, Spending Review and Autumn Statement 2015, Budget 2016, and Autumn Statement 2016. This counterfactual also excludes a small number of measures announced at fiscal events prior to Summer Budget 2015, but implemented across the 2015-2020 parliament. Chart 1.H expresses this change as a proportion of household income (including benefits-in-kind from public services), while Chart 1.I shows the cash change in each income decile.

Chart 1.J

2.35 This chart estimates the tax paid and public spending (including welfare) received by households under a single policy scenario in 2019-20, reflecting all policy decisions up to and including this Autumn Statement. Tax, welfare, and benefits-in-kind from public services are aggregated within each equivalised net income decile, and expressed as a proportion of net

household income (including benefits-in-kind from public services). The “overall” marker within each decile reflects the net transfer to or away from households in that decile, as a proportion of net household income.

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