



HM Treasury

# Impact on households: distributional analysis to accompany Budget 2018

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October 2018





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# Executive summary

This document sets out the impact on household finances of the government's decisions at Budget 2018 and at previous fiscal events, including changes to health spending, the income tax Personal Allowance and higher rate threshold, and the work allowances in Universal Credit. Households' living standards are affected both by the general performance of the economy and by the direct impact of government decisions. A strong economy means there are more job opportunities, wages are higher, and savings and investments perform better. The government's stewardship of the economy, such as through fiscal policy and the regulatory environment for businesses, influences these factors. In addition, policy decisions, for example about whether to raise or cut particular taxes, or to invest in public services, have a direct impact on household living standards.

This document is split into three sections: Chapter 1 describes the recent trends in living standards, inequality, earnings, and employment; Chapter 2 estimates the direct impact of policy decisions on households' living standards; and Chapter 3 details the data sources and methodology used for this analysis.

The analysis in this document shows that:

- disposable household incomes are now higher than at the start of the financial crisis, especially for those on lower and middle incomes
- in 2016-17, income inequality was lower than it was in 2010, and close to its lowest point since 1986
- since 2007, employment has risen by 3 million and at over 32.4 million stands near its record high, with the employment rate at 75.5%
- growth in employment rates has overwhelmingly benefitted the poorest 20% of households, whose employment rate is now more than 7 percentage points higher than in 2007-08
- supported by the National Living Wage (NLW), the lowest earners (full-time workers at the 5th percentile) have seen their wages grow by almost 8% above inflation between April 2015 and April 2018
- on average, in 2019-20, households in the lowest income decile will receive over £4 in public spending for every £1 they pay in tax
- on average, in 2019-20, households in the highest income decile will contribute over £5 in tax for every £1 they receive in public spending
- households in each income decile are better off as a result of decisions taken under this government

# Chapter 1

## Trends in the distribution of household incomes

- 1.1 This chapter describes recent trends in living standards, inequality and the labour market. These trends provide the context for the decisions which the government has taken, and demonstrate that changes outside of fiscal policy also determine a household's standard of living.
- 1.2 Looking at the overall trend in household incomes (see Box 1.A), the analysis presented here shows that:
  - since the financial crisis, incomes have grown more strongly for those on lower and middle incomes than for those on the highest incomes
  - in 2016-17, income inequality was lower than it was in 2010, and close to its lowest point since 1986
  - since 2007, employment has risen by 3 million and at over 32.4 million stands near its record high, with the employment rate at 75.5%
  - work remains the best route out of low income.<sup>1</sup> Children in workless households are around 5 times more likely to live in a low income household than those where all adults work

### Box 1.A: Measuring household incomes

The analysis in this document uses household income as the measure of a household's standard of living. While this is the standard measure, some households experience periods of low income temporarily, or finance their standard of living through utilising wealth rather than through income. Therefore, income may not always best represent their general standard of living. Such individuals are often students, the temporarily unemployed, or the self-employed. The most recent analysis by the Department for Work and Pensions has shown that, of those surveyed in 2015-16, 53% of those in the bottom quintile in 2010-11 were in a higher income quintile in 2015-16.

Alternative approaches have used household expenditure to better approximate a household's standard of living. Approximately 20% of those in the bottom income decile are in the top half of the distribution when households are ranked by their total expenditure. Due to limitations in the data, an expenditure-based approach is not used here, but the impacts of

<sup>1</sup> Low income is defined here as relative low income, meaning a household with less than 60% of current median net household income, after housing costs (AHC).

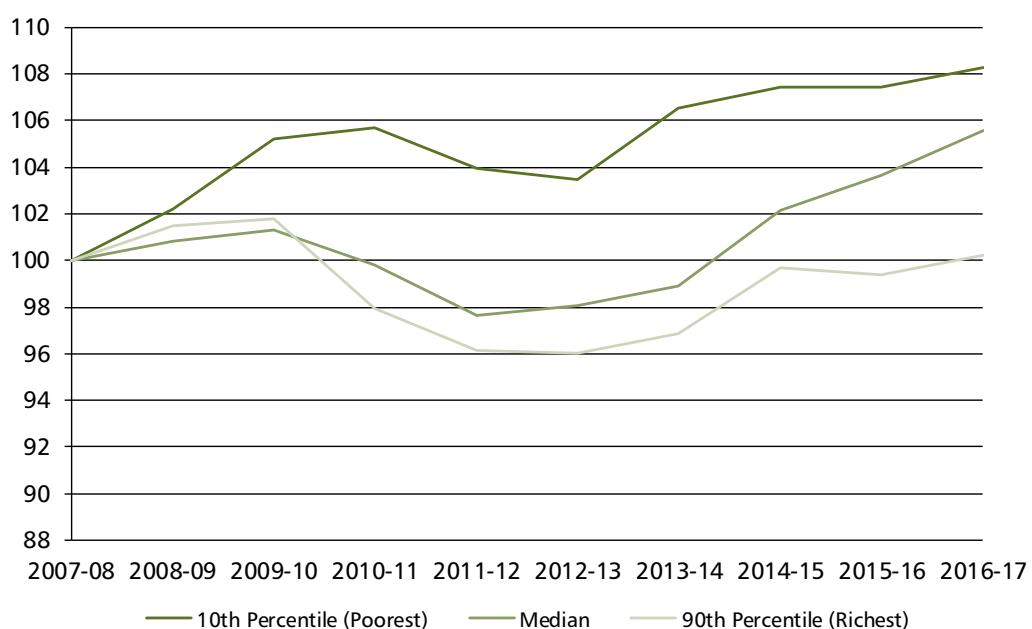
government decisions on low income households should be considered in the context of these methodological choices.

Many of the charts included in this document are presented by household equivalised net income decile. This means that a household's net income (income after taxes and benefits) is adjusted to take account of the size and composition of the household. Households are then ranked from lowest to highest equivalised net income, and divided into 10 equally sized groups.

To help understand where different households sit in the income distribution, Chapter 3 includes the median gross income for each decile, as well as a more detailed explanation of the data sources, methodology, and the equivalisation process.

- 1.3 As shown in Chart 1.A, since the financial crisis, households across most of the income distribution have seen real growth in their disposable incomes, on average. Since the financial crisis, incomes have grown more strongly for those on lower and middle incomes than for those on the highest incomes.

**Chart 1.A: Change in equivalised real disposable household income, before housing costs, at different points of the net household income distribution, 2007-08 to 2016-17 (2007-08=100)**



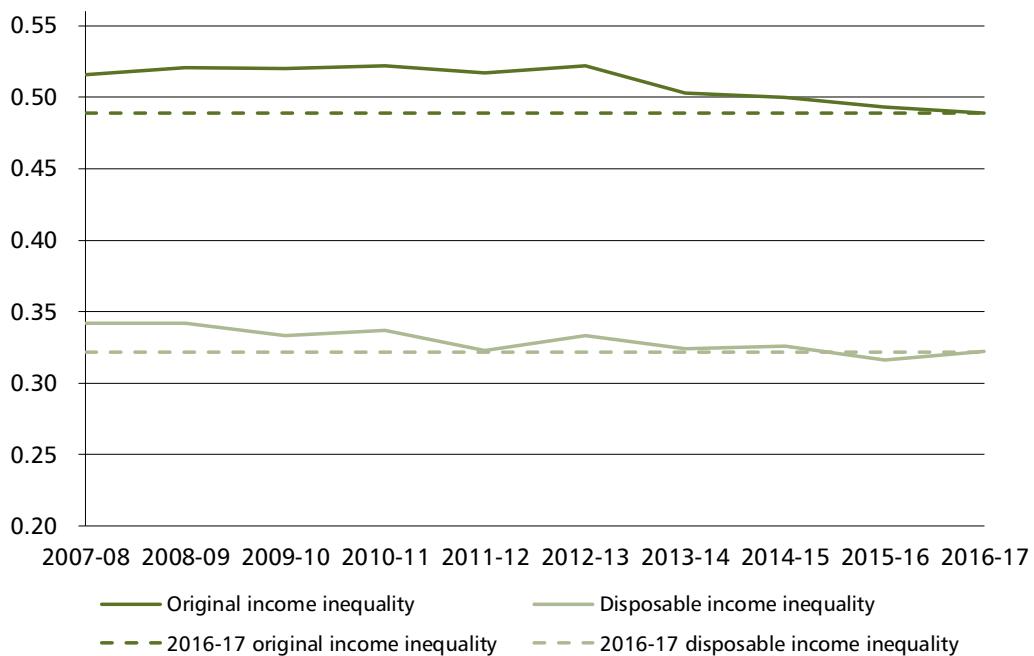
Source: *Households Below Average Income*, DWP

- 1.4 This trend in income growth across the distribution has lowered income inequality. Chart 1.B shows the long run trend in the Gini coefficient<sup>2</sup> since 2007-08. It shows two measures of inequality: original income inequality (i.e. inequality of labour income and income from private pensions and investments, before redistribution through tax and welfare), and disposable

<sup>2</sup> The Gini coefficient is a widely used measure of inequality, where 0 indicates that total income is shared entirely equally, and 1 indicates all of the country's income is earned by a single household.

income inequality (after redistribution through tax and welfare). In 2016-17, both measures show inequality at lower levels than before the financial crisis.

**Chart 1.B: Gini measures of income inequality, 2007-08 to 2016-17**



Source: *Household Disposable Income and Inequality*, ONS

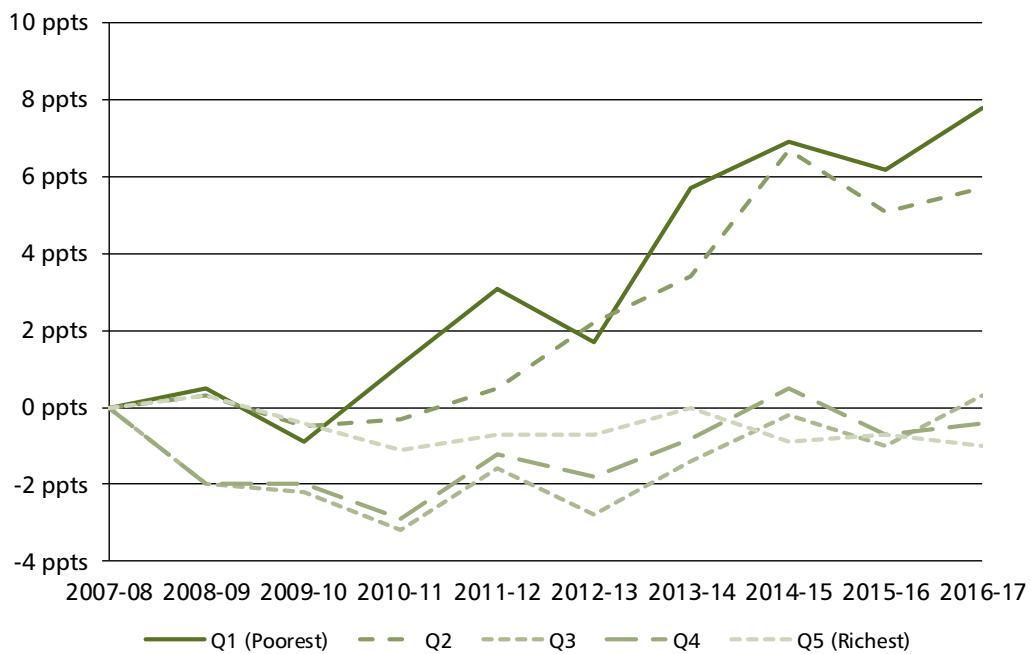
## Employment and earnings

- 1.5 One of the main drivers of living standards in the UK is the performance of the labour market, including the ability of working age individuals to move into employment and increase their earnings. Children living in workless households are around 5 times more likely to be in relative low income (after housing costs) than those where all adults work.<sup>3</sup>
- 1.6 Looking at aggregate data, the UK has experienced significant employment growth:<sup>4</sup>
  - since 2007, employment has risen by 3 million and stands near its record high, with the employment rate at 75.5%
  - there are 536,000 fewer workless households now than in 2007
  - the unemployment rate stands at 4%, the joint lowest since 1975
  - the inactivity rate stands at 21.2%, down from 23.2% in 2007
- 1.7 Since the recession, the UK employment rate has recovered strongly, and is now 75.5%, a near record high. As shown in Chart 1.C, this growth in employment rates has overwhelmingly benefitted those in the lower half of the household income distribution, and particularly the poorest 20% of households, whose employment rate is now more than 7 percentage points higher than in 2007-08.

<sup>3</sup> Based on Households Below Average Income 2016-17, published by DWP

<sup>4</sup> All figures are taken from the ONS and use latest available data. Figure on workless households compares Q2 2018 to Q2 2007

**Chart 1.C: Cumulative change in employment rates (% points) by net household income quintile, 2007-08 to 2016-17<sup>5</sup>**

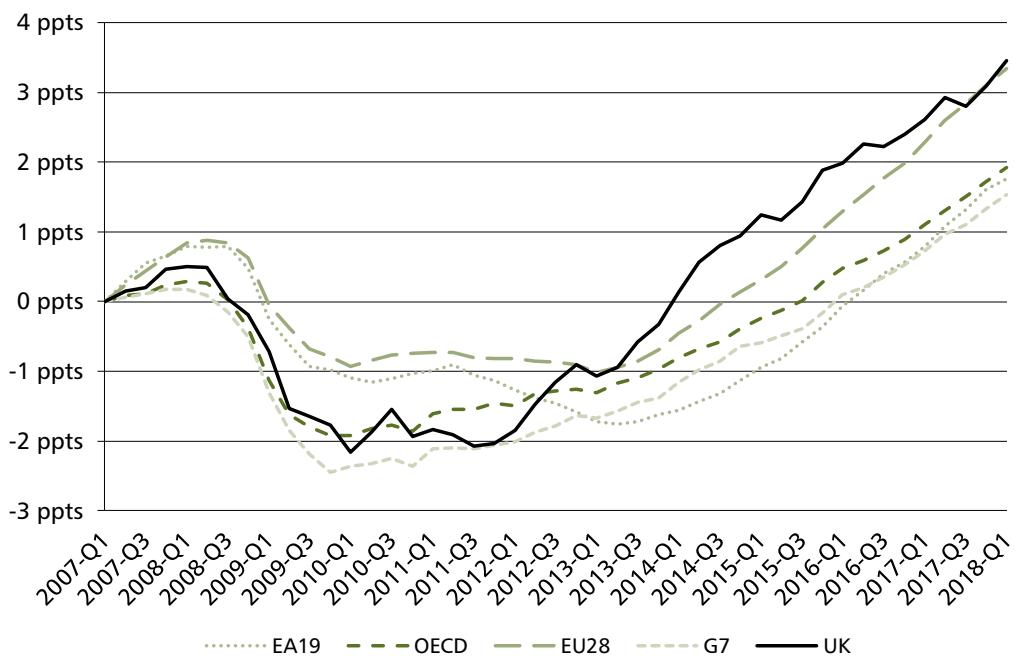


Source: *Households Below Average Income, DWP calculations*

- 1.8 Employment gains in the UK have been stronger than the average in the OECD, EU, euro area (EA19) and G7. While the UK saw significant falls in the employment rate following the financial crisis, its recovery over recent years has been particularly strong relative to comparable groups of advanced economies, as Chart 1.D shows.

<sup>5</sup> The analysis is based on 16-64 year old adults, as defined by DWP's Households Below Average Income statistics (see page 40 of "Households Below Average Income (HBAI) Quality and Methodology Information Report 2016/17" for more information on the definition of adults in the HBAI). Households are ranked based on income quintiles for the whole population.

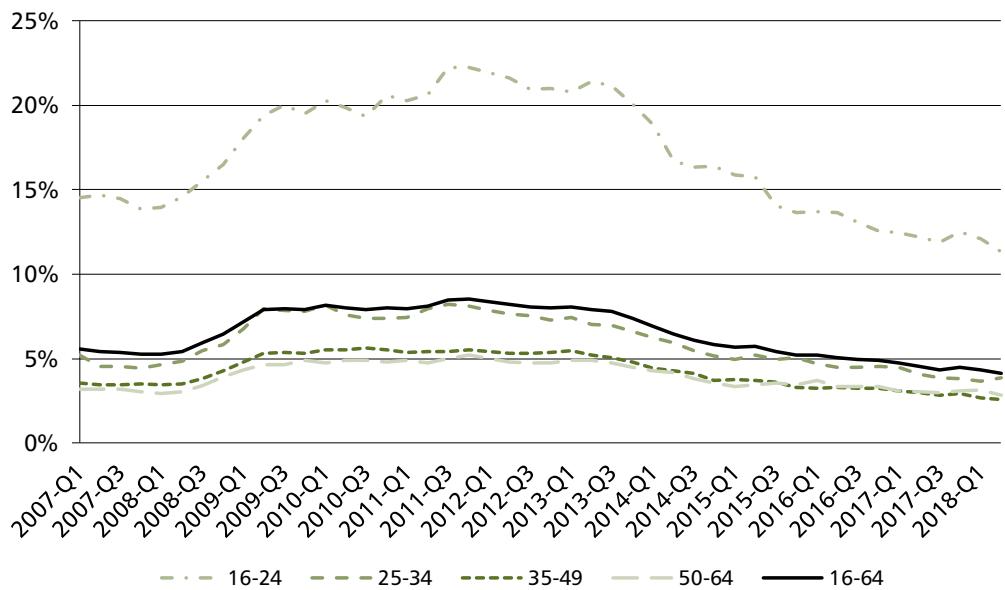
**Chart 1.D: Cumulative change in employment rates (% points) in the UK and different groups of countries, 2007-2018**



Source: OECD

- 1.9 Improvements in the UK labour market have been broad-based across the working age population. After some deterioration following the financial crisis, unemployment rates for all age groups have fallen over recent years, and are now lower than before the downturn.

**Chart 1.E: UK unemployment rates by age group, 2007 to latest available data**

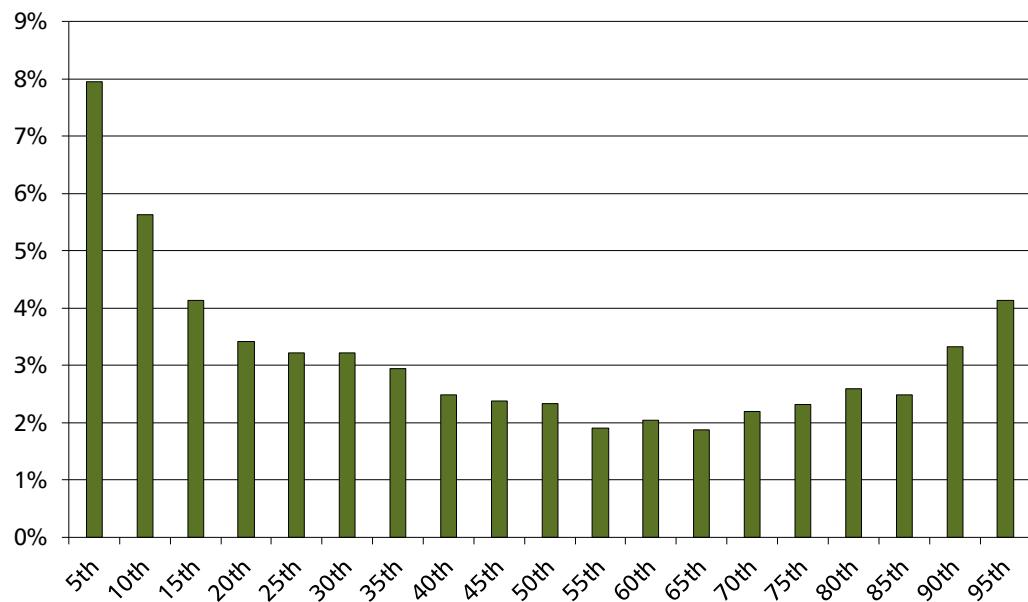


Source: Labour Force Survey, ONS

- 1.10 In recent years, earnings growth has disproportionately benefitted lower earners. Chart 1.F shows that full-time workers at the fifth earnings percentile saw their real wages grow strongly, by almost 8%, in the last three

years. This is higher than at any other point across the earnings distribution, supported by the introduction of the NLW in April 2016.

**Chart 1.F: Percentage change in individual full-time employee gross weekly real earnings across the UK, 2015 to 2018, at example percentile points**



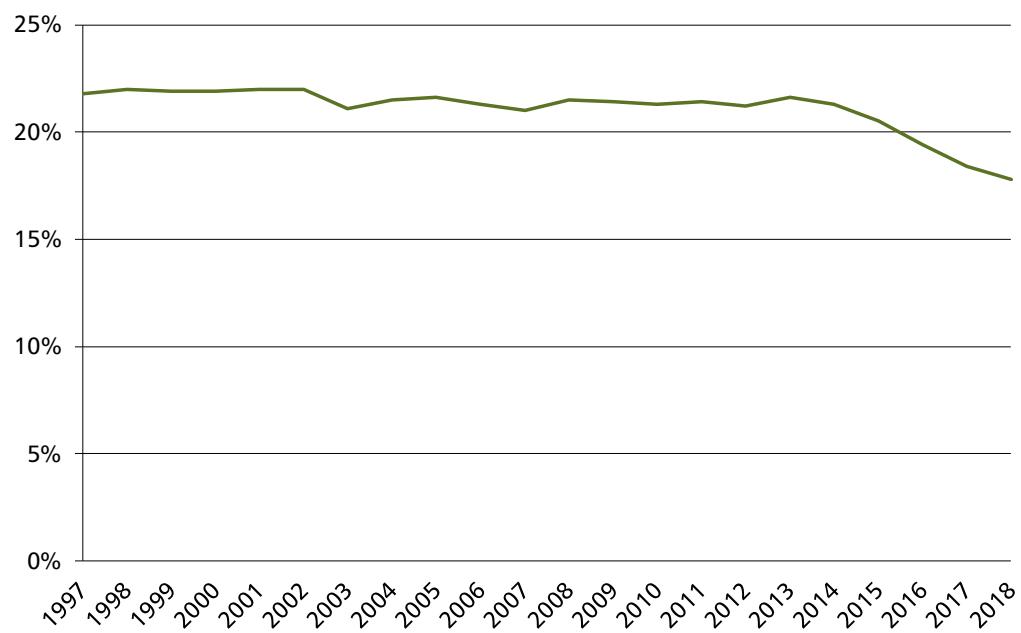
Source: HMT analysis of the Annual Survey of Hours and Earnings: 2015 results and 2018 provisional results, ONS

- 1.11 Looking over a longer time period, Chart 1.G shows the impact of recent earnings growth on the proportion of jobs that are low-paid, as defined by the OECD.<sup>6</sup> The proportion of jobs that are low-paid stands at 17.8%, the lowest level in at least 20 years.

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<sup>6</sup> The OECD define low pay as paying less than two-thirds of hourly median pay.

Chart 1.G: Percentage of jobs that are low-paid, 1997 to 2018<sup>7</sup>



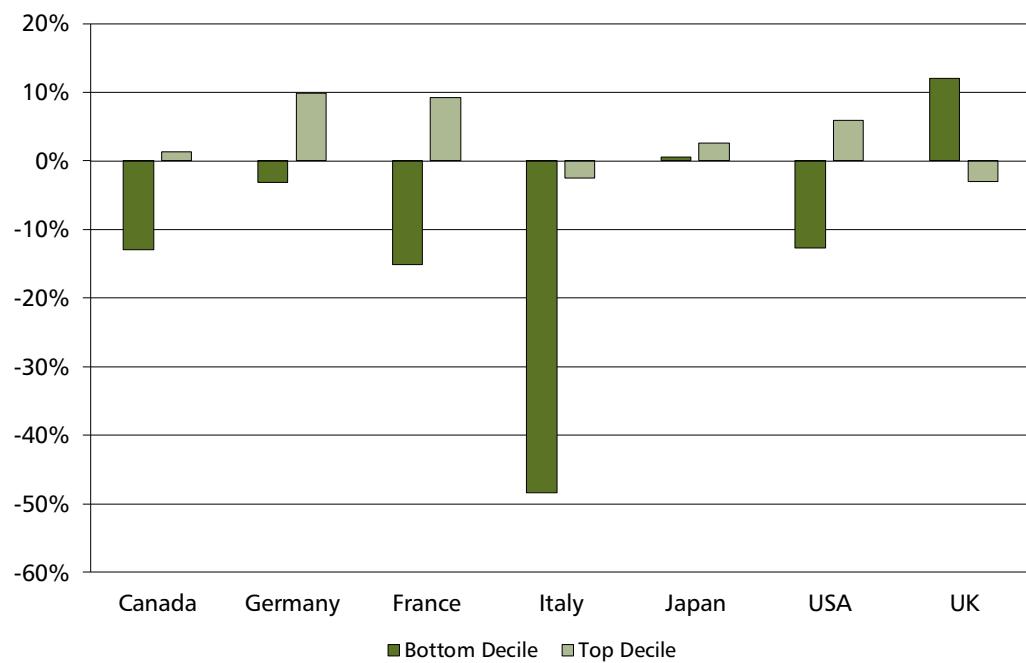
Source: Annual Survey of Hours and Earnings: 2018 provisional results, ONS

- 1.12 Taken together, these combined impacts of employment and earnings mean that income from work has increased for lower income households in the UK, a trend that is not evident across comparable advanced economies. Chart 1.H shows trends in gross household labour earnings<sup>8</sup> since 2008, for the bottom and top decile of total disposable household income. Internationally, the UK stands out in terms of the growth in income from work for the lowest income households.

<sup>7</sup> Data source begins in 1997. This measure includes both full-time and part-time employees.

<sup>8</sup> Gross household labour earnings measure a household's total gross earnings from employment and self-employment. They are impacted both by changes in individual earnings and changes in employment, such as more individuals within a household moving into work or working more hours.

Chart 1.H: Real terms change in gross household labour earnings as a percentage of 2008 gross labour earnings, by household disposable income decile, across the G7, 2008 to 2015<sup>9</sup>



Source: *OECD Income Distribution Database, OECD calculations*

- 1.13 Overall, for working-age households, strong employment growth has meant the incomes of lower income households have held up and grown over recent years. As a result, income inequality is now lower than before the financial crisis. Furthermore, the recent growth in earnings has continued to disproportionately benefit lower earners, supported by the NLW.

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<sup>9</sup> Data for France and Japan is available from 2009. 2015 data for Japan is provisional. Households are ranked by total disposable household income.

## Chapter 2

# Distributional analysis of tax, welfare and public service spending decisions since Autumn Statement 2016

2.1 This chapter looks at the tax, welfare and public service spending changes announced from Autumn Statement 2016 onwards that carry a direct, quantifiable impact on households, as well as the overall level of tax and public spending in 2019-20. The impact of these policy changes is analysed on different household net income deciles. This analysis is on a static basis, and shows the effect of tax and spending policy in isolation. For this reason, it only presents some of the factors which will drive households' living standards over the next few years, and importantly does not take into account the labour market performance and wider economic impacts of government policy as highlighted in Chapter 1.

2.2 Budget 2018 measures included in Charts 2.A to 2.C are:

- National Health Service: five-year settlement agreed in June 2018
- Social Care: 2019-20 funding
- Children's Social Care: improvement pilots
- Personal Allowance and Higher Rate Threshold: increase to £12,500 and £50,000 in 2019-20
- Fuel Duty: freeze for 2019-20
- Alcohol Duties: freeze spirits, beer and cider in 2019
- Universal Credit: £1,000 increase to work allowance
- Universal Credit: additional protections for claimants receiving the severe disability premium
- Stamp Duty Land Tax: extend First Time Buyers relief for shared ownership properties
- Capital Gains Tax: extend Entrepreneurs' Relief minimum qualifying period
- Capital Gains Tax: tackling misuse in Entrepreneurs' Relief
- Tobacco Duty: RPI plus 2ppt on all duties and additional 1ppt for hand rolling tobacco

- Tuition Fees: freeze fees in September 2019
- NICS: maintain Class 2 NICs
- Childcare Vouchers: extension to the closure for new entrants
- Index Linked Savings Certificates: re-index at next maturity date from May 2019

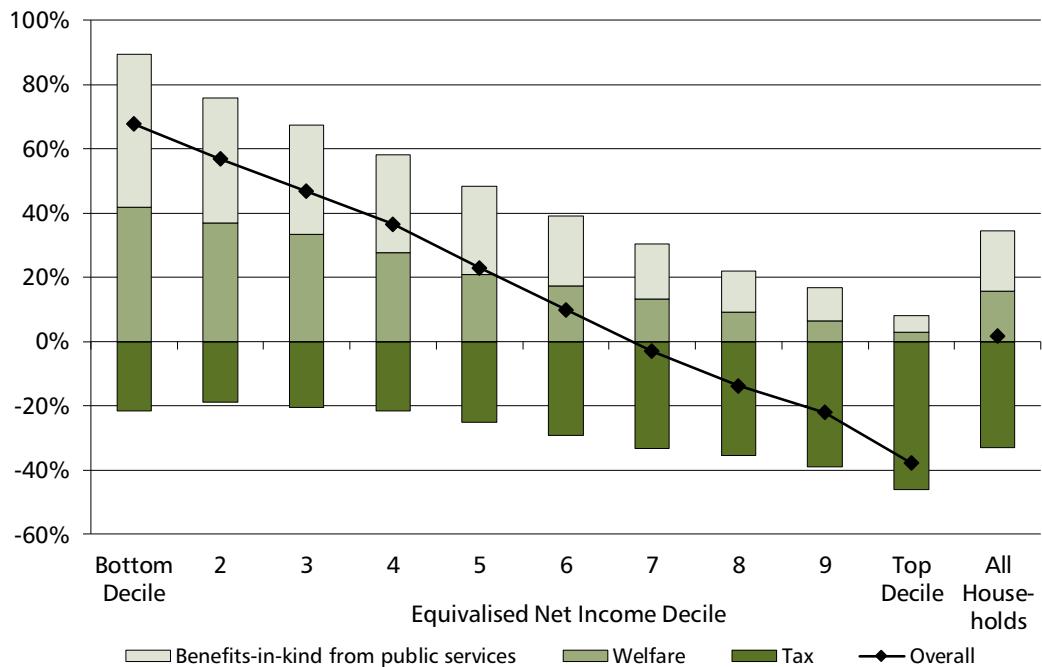
**2.3** This analysis is all presented in the fiscal year 2019-20. This is because, for most departments, day-to-day spending – known as Resource Departmental Expenditure Limits (RDEL) – has only been allocated to 2019-20, and therefore it is not possible to estimate the distributional impacts of public spending beyond 2019-20.

## Overall level of tax, welfare and public service spending

**2.4** Government policy continues to be highly redistributive. Chart 2.A shows the overall level of public spending received, and tax paid, by households (the black diamonds indicate the net position). It shows that:

- on average, households in the lowest income decile receive over £4 in public spending for every £1 they pay in tax
- on average, households in the highest income decile contribute over £5 in tax for every £1 they receive in public spending
- the poorest 60% of households receive more in public spending than they contribute in tax

**Chart 2.A: Overall level of public spending received, and tax paid, as a percentage of net income (including households' benefits-in-kind from public services), by income decile, in 2019-20**

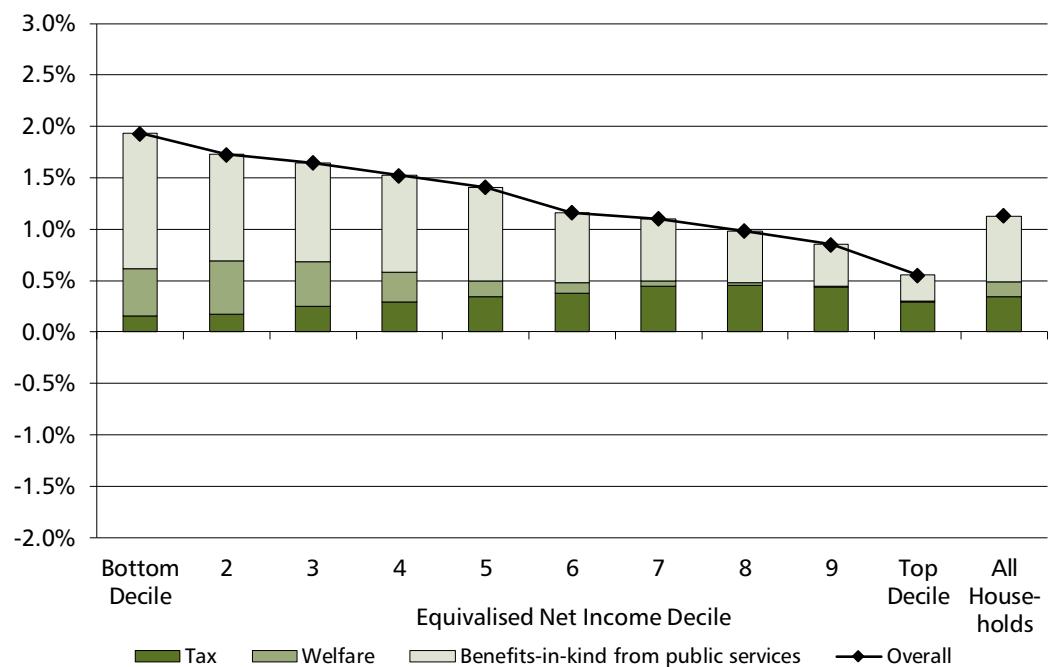


Source: HMT distributional analysis model, DWP and HMRC modelling

## Analysis of decisions announced at Autumn Statement 2016 and subsequently

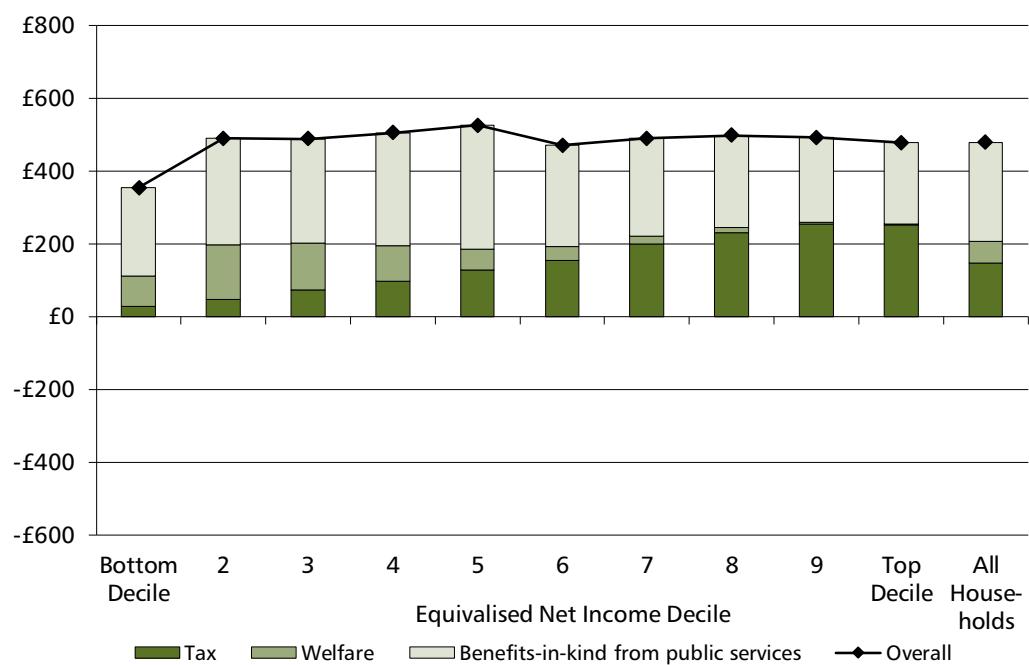
- 2.5 Charts 2.B and 2.C set out the impact of decisions announced from Autumn Statement 2016 onward, across the income distribution. Chart 2.B shows these impacts as a percentage of net household income (including benefits-in-kind from public services), while Chart 2.C is expressed in annual cash terms. The charts show the impacts on households in 2019-20 compared to a hypothetical world in which modelled government policies announced at and since Autumn Statement 2016 were not introduced. This analysis shows that, on average, households in each income decile are better off as a result of decisions taken under this government, with the poorest income deciles gaining the most as a percentage of net income.
- 2.6 As set out in more detail in Chapter 3, Charts 2.B and 2.C only show measures with a direct impact in 2019-20 on benefit incomes, taxes paid, or the benefits-in-kind received through public services by UK residents. The charts exclude the impact of changes to regulation, such as the NLW, the impact of government borrowing, or the impact of measures in years other than 2019-20.

**Chart 2.B: Impact of decisions announced at Autumn Statement 2016 and subsequently 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 and HMRC modelling

**Chart 2.C: Impact of decisions announced at Autumn Statement 2016 and subsequently on households in 2019-20, in cash terms (£ per year), by income decile**



Source: HMT distributional analysis model, DWP and HMRC modelling

# Chapter 3

## Data sources and methodology

Table 3.A: Data sources for charts

Chart	Source
1.A	DWP, Households Below Average Income 2016-17
1.B	ONS, Household Disposable Income and Inequality, January 2018
1.C	DWP, Households Below Average Income 2016-17, DWP calculations.
1.D	OECD Data, Employment Rate, 2018
1.E	ONS, Labour Force Survey, October 2018
1.F	Analysis of ONS, Annual Survey of Hours and Earnings, 2015 results and 2018 provisional results
1.G	ONS, Annual Survey of Hours and Earnings, 2018 provisional results
1.H	OECD Income Distribution Database, latest available data October 2018
2.A-2.C, A.1-A.2	Internal HM Treasury modelling. See 3.2 to 3.8

Table 3.B: Data sources for statistics

Paragraph	Statistic	Source
Executive Summary	Income inequality	ONS, Household Disposable Income and Inequality, January 2018
Box 1.A	Income movements	DWP, Income Dynamics: Movements between quintiles: 2010-2016, March 2018
Box 1.A	Expenditure distribution	Internal HM Treasury modelling
1.2, 1.5	Child low income in working and workless households	DWP, Households Below Average Income 2016-17, DWP calculations
1.2, 1.6, 1.7	Employment rates	ONS, UK Labour Market, October 2018
1.2, 1.6	Number of people in work	ONS, UK Labour Market, October 2018
1.6	Number of workless households	ONS, Working and Workless Households in the UK, August 2018
1.6	Unemployment rates	ONS, UK Labour Market, October 2018
1.6	Inactivity rates	ONS, UK Labour Market, October 2018

# Constructing Charts 2.A to 2.C, A.1 and A.2

## Methodology

- 3.1 Chart 2.A shows the overall level of public spending received, and tax paid, by households. Charts 2.B, 2.C, A.1 and A.2 compare the effect of changes in tax, welfare and public service spending policy against a counterfactual of no policy changes. Measures are only included if they have a clear first order impact on the benefit incomes, taxes paid, or the benefits-in-kind received through public services by UK residents.
- 3.2 The following policy impacts are out of the scope for this analysis:
- the impact of changes to regulation (e.g. the NLW), which are not direct changes to the distribution of tax or public spending
  - 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. Anti-avoidance measures are captured where they result in a change in tax liabilities in the year being analysed
  - impacts of decisions made by devolved administrations
  - impacts of taxes where the incidence of the tax does not fall directly on households, for example, the apprenticeship levy, corporation tax and inheritance tax. We exclude such taxes from this analysis as we are unable to determine the distributional consequences of how these taxes can be passed through to households
  - the impact of measures without a direct impact in 2019-20
- 3.3 A number of Budget 2018 measures are excluded from this analysis, either because they are out of scope or because there is insufficient data to robustly model the distributional impact of the measure. Measures excluded can nevertheless have a tangible impact on households' living standards. The one Budget 2018 measure which carries a direct impact on households, and that is not captured in Charts 2.A to 2.C, and A.1 and A.2 due to data limitations is:
- Alcohol Duty: rate for high strength cider
- 3.4 Throughout the analysis, individual employees are assumed to be paid at least the appropriate level of the National Minimum Wage (NMW) or National Living Wage (NLW). In this analysis, it is assumed that in 2019-20 employees are paid the NMW/NLW rates recommended by the Low Pay Commission, and announced at this Budget.
- 3.5 Charts 2.A to 2.C, A.1 and A.2 show the impact of measures in 2019-20, as most Resource Departmental Expenditure Limits (RDEL) are allocated in the years to 2019-20 and not beyond that.

- 3.6 Charts published at consecutive fiscal events are not directly comparable, as they are based on the latest available OBR forecast which is updated at every fiscal event.
- 3.7 HM Treasury continues to update the microsimulation modelling which underpins this analysis. The methodological changes that have been made since Autumn Budget 2017 include:
- updated modelling of Universal Credit in DWP's Policy Simulation Model (PSM)
  - updates in line with the OBR's latest forecast

## Defining income and ranking households

- 3.8 This distributional analysis uses equivalised net household income, before housing costs, as the main indicator by which to rank households from lowest income to highest income. This indicator is comprised of several components:
- equivalised: equivalence is a process that adjusts a household's net income to take into account the fact that larger households will require a higher net income to achieve the same standard of living as a household with fewer members. The equivalence factors used in the analysis are the modified OECD factors (as used in 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. Comparing household rather than individual incomes reduces the subjectivity of this analysis, ensuring that no assumptions are made about how incomes or expenditure are shared between separate individuals within the household
  - before housing costs: housing costs such as rent or the cost of servicing a mortgage are not deducted from household incomes
- 3.9 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.
- 3.10 Table 3.C below shows median gross incomes (pre-tax private income including earnings, private pensions, savings and investments, plus benefit income) within each decile. This gives a less precise estimate of a household's position in the income distribution than net income, but it is easier to understand because many people think about their incomes or salaries in gross rather than net terms.
- 3.11 Table 3.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 £21,700 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 3.C: Median gross income for each decile (£ 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	67,300	94,500	94,200	124,500	161,600
Ninth decile	42,300	59,700	63,200	80,900	99,900
Eighth decile	33,500	49,400	49,400	65,800	81,200
Seventh decile	27,800	39,900	41,300	54,900	65,300
Sixth decile	23,500	33,100	35,100	45,800	56,700
Fifth decile	20,100	25,900	29,900	39,200	46,800
Fourth decile	16,800	22,000	25,400	33,400	40,400
Third decile	14,400	19,100	21,700	28,200	34,200
Second decile	12,100	15,400	18,100	23,400	26,700
Bottom decile	8,700	11,800	13,700	16,800	19,500

*Source: HMT distributional analysis model*

## Analysis of tax and welfare measures

- 3.12 Where possible, tax and welfare policy changes are analysed using HM Treasury's Intra-Governmental Tax and Benefit Microsimulation model (IGOTM), which is underpinned by data from the ONS's Living Costs and Food (LCF) survey. The sample size of the LCF means that in order to produce robust analysis, three years of data have been pooled together, specifically 2012-13 to 2014-15. This data is then projected forward to reflect the financial year being modelled, using historical Annual Survey of Hours and Earnings data on earnings growth at different points across the income distribution as well as the latest OBR average earnings and inflation forecasts. The model makes no changes to the underlying demographics, employment levels or expenditure patterns in the base data.
- 3.13 For Charts 2.B and 2.C, the counterfactual for tax and welfare decisions is a hypothetical scenario in which policy changes announced at or after Autumn Statement 2016 were not implemented.
- 3.14 Not all households take up all 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. A policy which will lead to an increase in take-up will therefore be modelled as an increase in household income. This methodology provides a more accurate estimate of the impact on households.

- 3.15 Modelling of tax and welfare measures in IGOTM now takes into account the devolution of decisions in some areas from the UK government to devolved administrations. UK government decisions are now modelled as applying only to households directly affected by the measure. Decisions taken by devolved administrations are not included as policy impacts.
- 3.16 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.
- 3.17 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 Payment, Tax-Free Childcare and Housing Benefit. The welfare elements of Charts 2.B and 2.C also include those changes to non-welfare Annually Managed Expenditure (AME) which are specifically linked to changes in NS&I savings products.
- 3.18 Not all measures can be reliably modelled using IGOTM due to data and/or modelling constraints. Tax and welfare changes that cannot be modelled using microsimulation modelling are, where possible, apportioned to household equivalised income deciles. This is done according to the Exchequer impacts or savings from the measures, based on assumptions about where the impacts are likely to fall. The impact of Universal Credit compared to the legacy welfare system is calculated using DWP's Policy Simulation Model, while the impact of Universal Credit measures announced at this Budget is estimated using IGOTM.
- 3.19 The impact of transitional protection and Universal Credit's greater sensitivity to changes in earnings is apportioned across equivalised income deciles, but additional fraud and error savings are excluded.

## Analysis of public service spending

- 3.20 The analysis of public service spending only includes spending on frontline public services with a direct benefit to households. This covers the services delivered by the Department of Health and Social Care, the Department for Education, the Department for Work and Pensions, the Ministry of Housing, Communities and Local Government, the Department for Business, Energy and Industrial Strategy, the Department for Transport, the Ministry of Justice, and the Department for Culture, Media and Sport.
- 3.21 The analysis excludes:
- administrative spending

- capital spending (with the exception of student loans), and the depreciation of capital assets
  - spending funded through the reserve
  - changes to public sector pay and public service pensions policy
  - spending on public goods because it is not possible to identify the direct benefits from these areas of spending for specific households
- 3.22 To align with the definition of income used in DWP's Households Below Average Income publication, the analysis of spending on public services also includes financial transactions through 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.
- 3.23 For Charts 2.B and 2.C, the analysis of RDEL spending compares forecast spending in 2019-20, to a world where the new RDEL spending measures scored since Autumn Statement 2016 (inclusive) had not taken place. Therefore, the RDEL measures presented in Charts 2.B and 2.C are only those RDEL measures scored at fiscal events since Autumn Statement 2016 (inclusive), and do not reflect any reallocations within existing RDEL budgets.
- 3.24 Charts are on a United Kingdom basis, but only include RDEL spending in England. Some 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 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.
- 3.25 The analysis of the benefits-in-kind provided by public service spending is, like with taxes and welfare measures, derived from HM Treasury's IGOTM model. However, the modelling approach taken for public services is slightly different. Where the use of a public service is reported in the LCF, no additional data is required and the approach is similar to that used for most tax and welfare modelling. The spending on a particular public service is allocated between all those households who are expected to use this public service, in proportion to each household's expected use of the service.
- 3.26 Where the LCF does not contain information about the use of a service, additional data sources are required. This additional data is used to identify characteristics associated with the use of the service and then used to derive probabilities of service use conditional on these characteristics. The cash value spent on public services is converted into an identical cash gain to households and distributed to households based on the probability that any given household uses the service.
- 3.27 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 a 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.

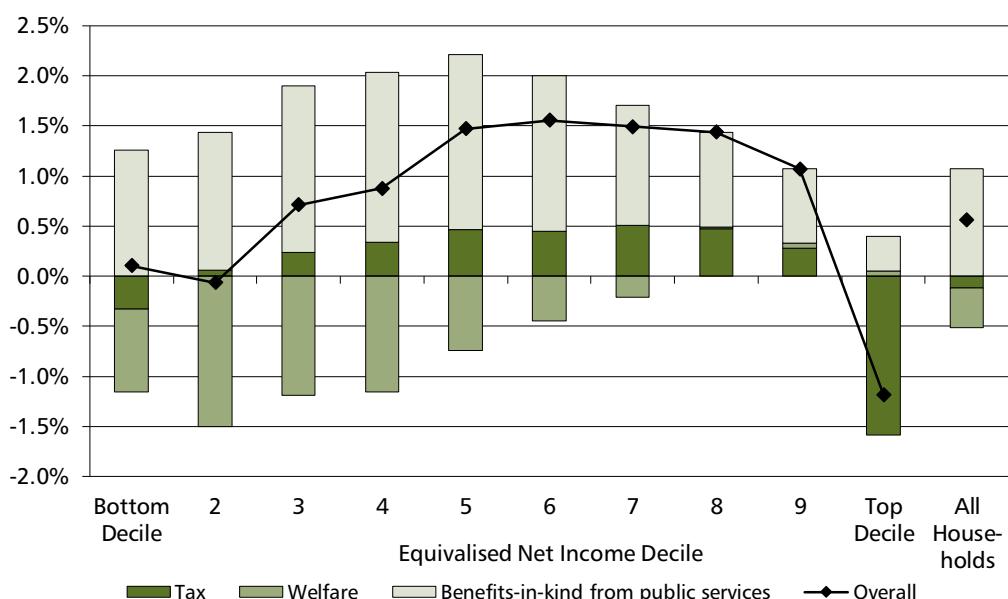
- 3.28 Spending (both actual and for the baseline) is then allocated according to each household's relative likelihood of using the service, where the relative likelihood of use acts as a weight to allocate total spending to individual households. Therefore, the spending will be skewed to those individuals 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. The cash value spent on public services is converted into an identical cash gain to households. Impacts of changes in RDEL spending are calculated alongside tax and welfare and presented across the income distribution.

## Annex A

# Analysis of measures implemented since 2015-16

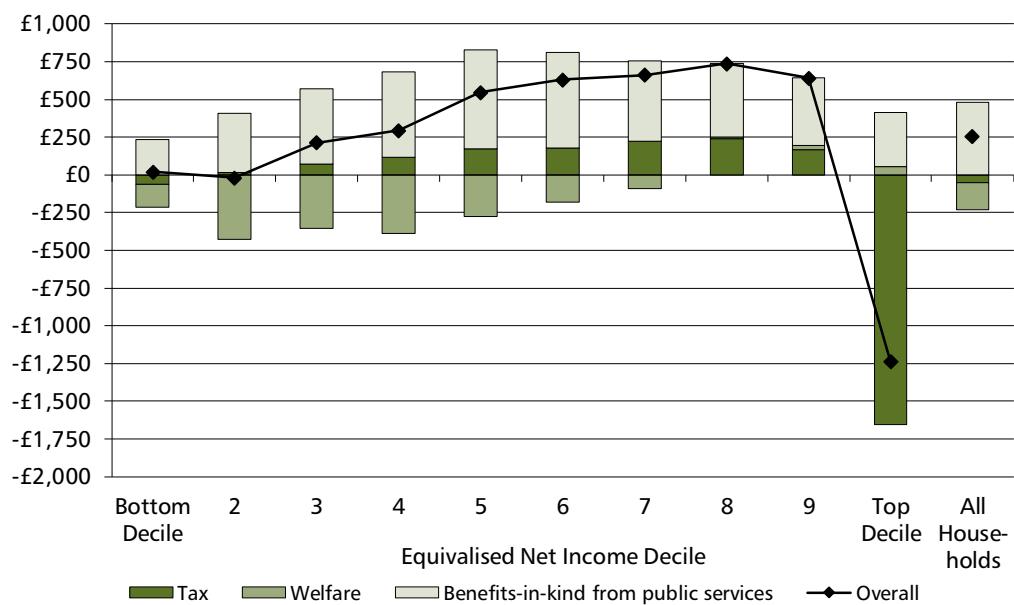
- A.1 To maintain consistency with HM Treasury's previous distributional analysis publications, the following charts show the cumulative impact of measures which have been implemented, or are planned to be implemented, from 2015-16 to 2019-20. These charts are presented at this Budget for information only, separately from the core distributional analysis in Chapter 2.
- A.2 Charts A.1 and A.2 include changes that were announced before May 2015 but have been implemented (or will be implemented) from 2015-16 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. The analysis of RDEL spending in these charts compares forecast spending in 2019-20 to actual spending in 2015-16, projected to 2019-20 in line with the GDP deflator. Chart A.1 shows the impact as a percentage of net household income, while Chart A.2 shows the impact in cash terms. The black diamonds indicate the net position.

Chart A.1 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 and HMRC modelling

**Chart A.2 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 and HMRC modelling





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