HM Treasury

Impact on households:
distributional analysis to accompany Autumn Budget 2017

November 2017

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OGL

Contents

Executive summary

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 or regulations placed on businesses, influences these factors. In addition, policy decisions, for example about whether to raise or cut particular taxes, 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:

- since 2010, households across all income deciles have seen growth in their disposable incomes, on average

- 50% of those in the bottom income quintile in 2010-11 were in a higher income quintile in 2014-15

- in 2015-16, income inequality fell to its lowest level since the mid-1980s

- strong employment growth has particularly benefitted the bottom half of the income distribution, where working-age adults are 4.6 percentage points more likely to be in work than in 2010-11

- the proportion of full-time jobs that are low-paid is at its lowest level in at least 20 years

- since 2010, growth in income from work for the lowest income households in the UK has been higher than in any other major advanced economy

- government policy continues to be highly redistributive. In 2019-20, the lowest income households will receive over £4 in public spending for every £1 they pay in tax, on average

- since (and including) Autumn Statement 2016, government tax and spending decisions have increased the tax contribution from the top income decile, while lower income deciles have gained overall

Chapter 1

Trends in the distribution of household incomes

1.1   This chapter describes recent trends in living standards, inequality, earnings, and employment. 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 2010, households across all income deciles have seen growth in their disposable incomes, on average

- in 2015-16, income inequality fell to its lowest level since the mid-1980s

- since 2010, growth in income from work for the lowest income households in the UK has been higher than in any other major advanced economy

- since the mid-2000s, the UK is one of two major advanced economies that has seen an increase in redistribution

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. Analysis by the Department for Work and Pensions has shown that, of those surveyed in 2014-15, 50% of those in the bottom quintile in 2010-11 were in a higher income quintile in 2014-15.

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 expenditure distribution. Due to limitations in the data, an expenditure-based approach is not used here. But the impacts of 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 2010-11, households across the income distribution have seen real growth in their disposable incomes, on average. Households in the top income decile have experienced lower growth than other households.

Chart 1.A: Cumulative percentage change in equivalised median real disposable household income, 2010-11 to 2015-16
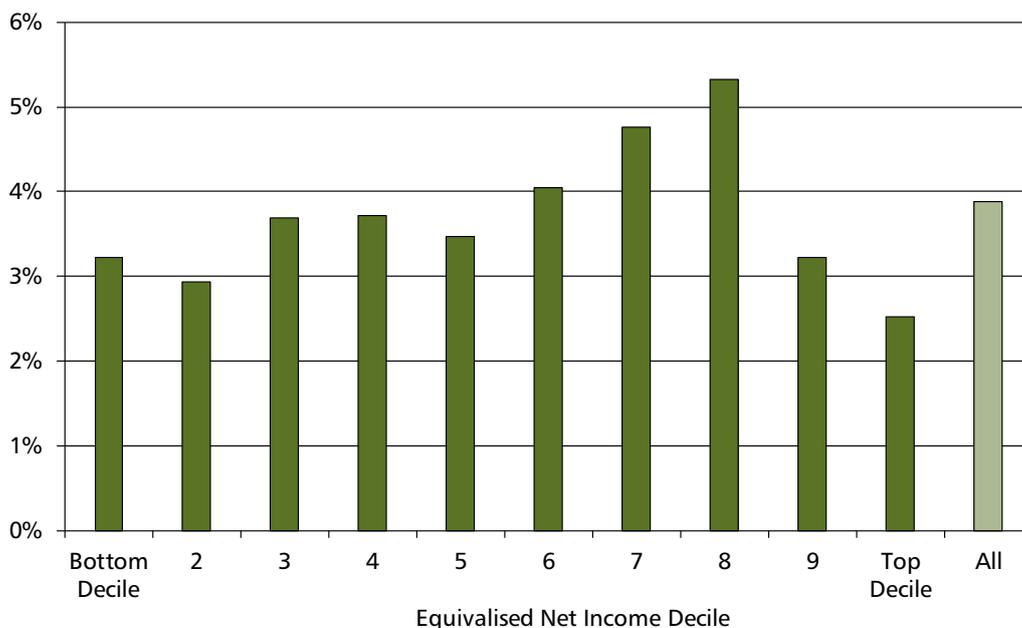
Source: Households Below Average Income, DWP [1]

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[2] since 1977. 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 income inequality (after redistribution through tax and welfare). In 2015-16, both measures show inequality at its lowest level since the mid-1980s.

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[1] ONS data on Real Household Disposable Income (RHDI) is not available by household income decile.

[2] The Gini coefficient is a widely used measure of inequality, where 0 indicates that everybody is equal, and 1 indicates all of the country's income is earned by a single household.

Chart 1.B: Gini measure of income inequality, 1977 to 2015-16

Original income
Disposable income
2015-16 original income
2015-16 disposable income
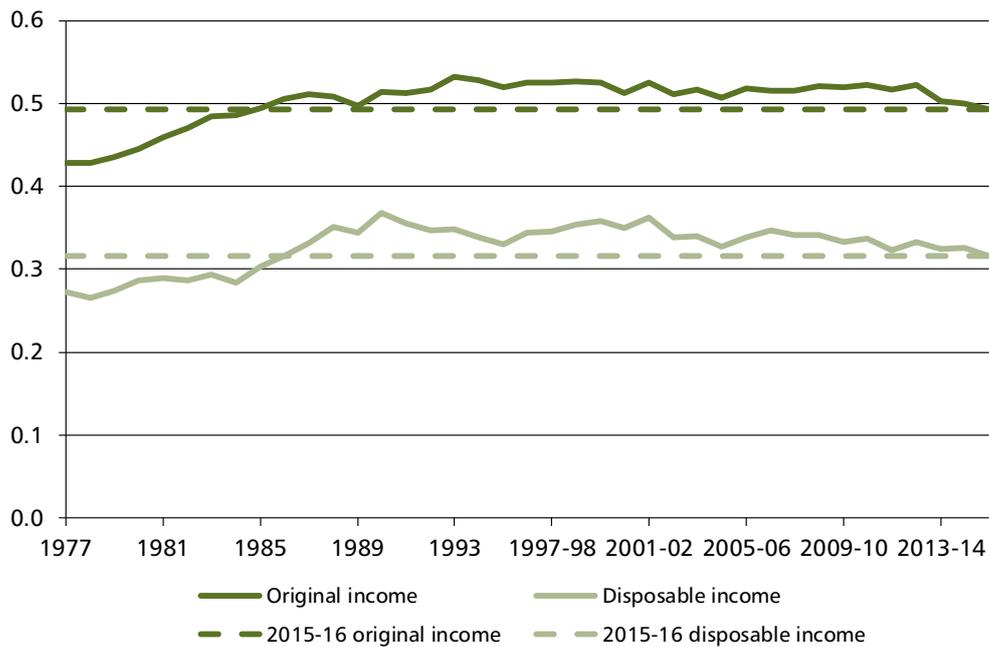
Source: Household Disposable Income and Inequality, ONS

1.5   The benefits of the UK's economic performance since 2010 have therefore been shared reasonably equally.

1.6   Chart 1.C focuses on trends in labour income[3] since 2010. Internationally, the UK stands out in terms of the growth in income from work for the lowest income households. Growth in labour income for the lowest income decile has been better in the UK than in any other major advanced economy and the OECD average.

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3 Labour income is defined as the total income from employment and self-employment.

Chart 1.C: Real terms change in household labour income as a percentage of 2010 labour income, by income decile, across the G7, 2010 to 2014
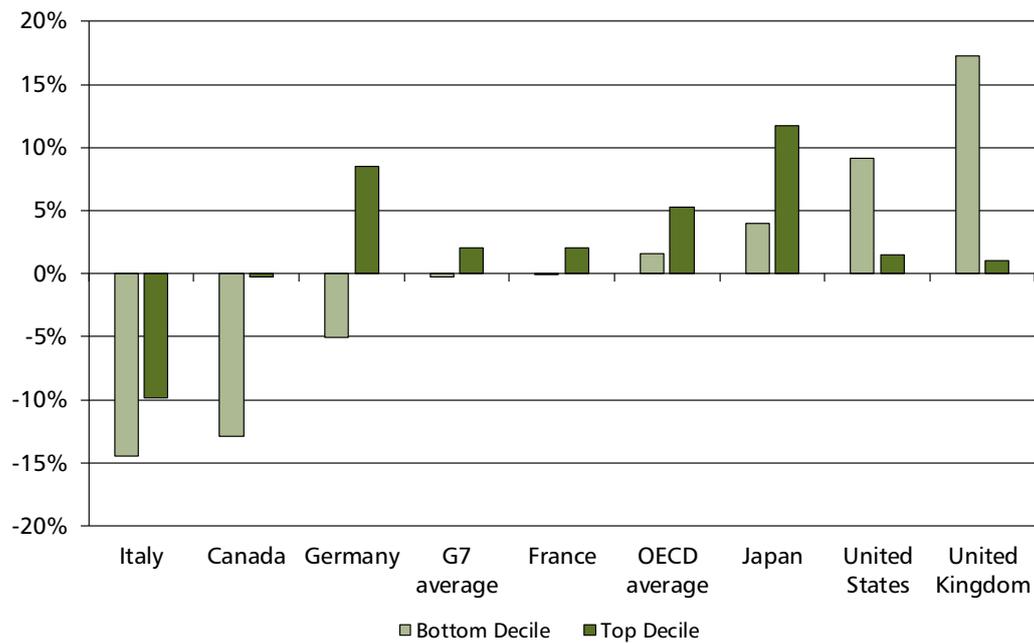
Source: OECD

1.7   In the majority of major advanced economies, the extent to which income is redistributed[4] by the state has also decreased over this period, but not in the UK. Chart 1.D shows the change in redistribution for countries in the G7 from the mid-2000s. Five out of the seven countries have become less redistributive over this period. The UK is one of two major advanced economies that has seen an increase in redistribution.

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[4] Redistribution is defined as the difference in the Gini coefficients of original income and disposable income, as a percentage of the original income Gini.

Chart 1.D: Percentage point change in redistribution, across the G7, mid-2000s to the latest available data
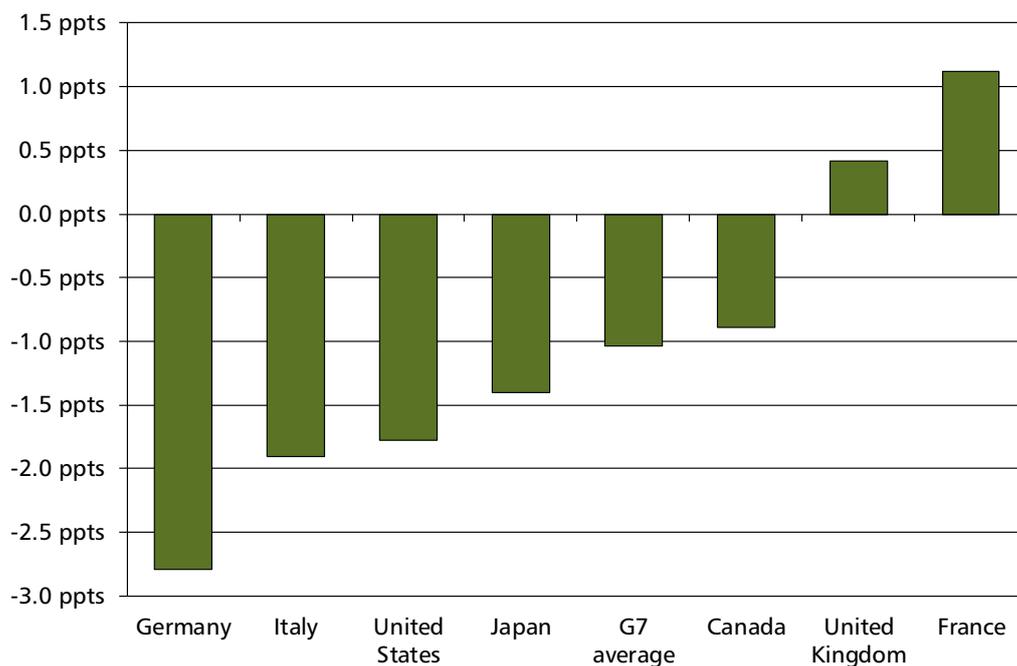
Source: OECD

1.8   The following two sections explore two important drivers of the change in original household incomes for working-age households: first, the role of employment and the labour market; and second, the change in earnings.

Employment

1.9   One of the main determinants of the incomes of working-age households is their ability to move into and remain in work. Reductions in unemployment and economic inactivity are important for raising household incomes sustainably, particularly for those at the lower end of the income distribution.

1.10   Looking at aggregate data, the UK has experienced significant employment growth:[5]

- since 2010, employment has risen by 3 million and at over 32 million stands near its record high, with the employment rate at 75.0%

- there are 954,000 fewer workless households now than in 2010

- the unemployment rate stands at 4.3%, the lowest since 1975

- the inactivity rate stands at 21.6%, down from 23.5% in 2010

1.11   This employment growth has particularly benefitted lower income households. Chart 1.E shows the change in the share of working-age adults in work in each income decile, since 2010-11. In the bottom half of the income distribution, working-age adults are 4.6 percentage points more likely to be in work than in 2010-11.

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[5] All figures are taken from the ONS and use latest available data. Figure on workless households compares Q2 2017 to Q2 2010.

Chart 1.E: Percentage point change in working-age adults in work in each income decile, 2010-11 to 2015-16
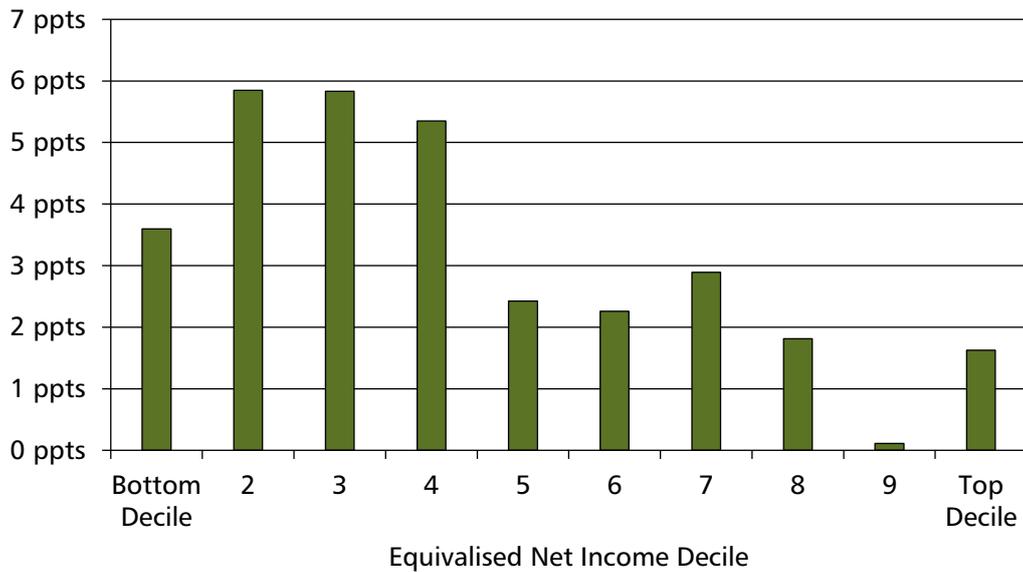
Source: Households Below Average Income and Family Resources Survey, DWP

Earnings

1.12   Another important driver of income is earnings growth, and improving productivity to drive higher wages in the future is a focus of this Budget. The analysis presented here shows that:

- increases in wages since 2015 have been greatest among the very lowest earners[6]

- the proportion of full-time jobs that are low-paid is at its lowest level in at least 20 years

1.13   Both total pay (including bonuses) and regular pay (excluding bonuses) rose 2.2% in the three months to September 2017, compared with the same period a year earlier.

1.14   In recent years, earnings growth has disproportionately benefitted lower earners and earnings inequality has declined. Chart 1.F shows that full-time workers at the fifth earnings percentile saw their real wages grow strongly, by almost 7% in the last two years. This is higher than at any other point across the earnings distribution, supported by the introduction of the National Living Wage.

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[6] Based on individual full-time employees at the fifth earnings percentile.

Chart 1.F: Percentage change in individual full-time employee gross weekly real earnings, 2015 to 2017, at example percentile points

Percentile points of the individual earnings distribution
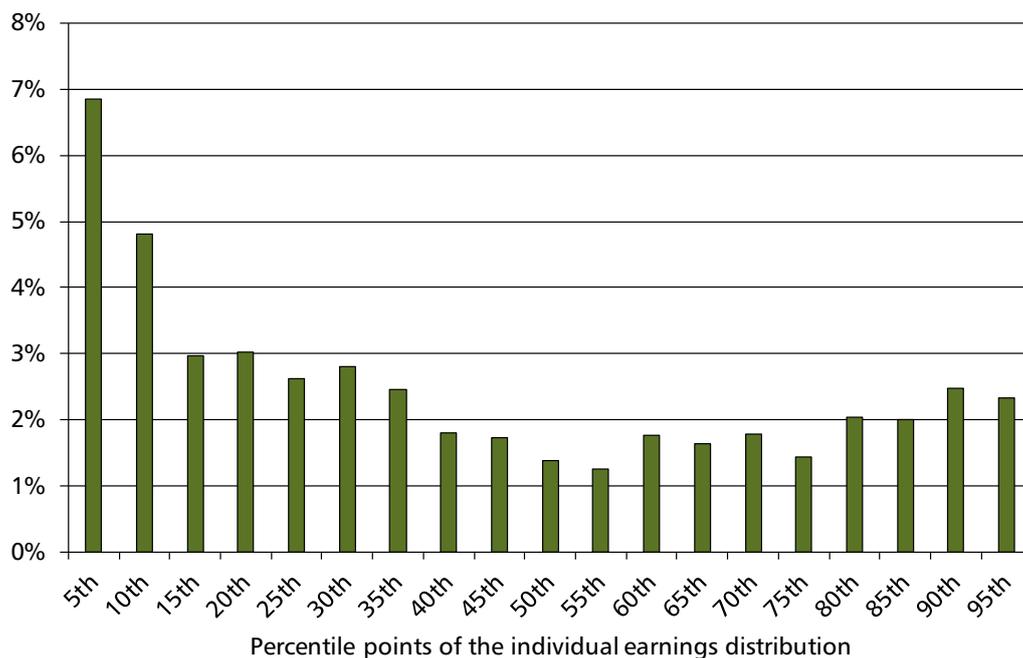
Source: HMT analysis of the Annual Survey of Hours and Earnings: 2015 results and 2017 provisional results, ONS

1.15   Looking over a longer time period, Chart 1.G shows the impact of recent earnings growth on the proportion of full-time jobs that are low-paid, as defined by the OECD.[7] The proportion of full-time jobs that are low-paid is at its lowest level in at least 20 years.

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[7] The OECD define low pay as paying less than two-thirds of hourly median pay.

Chart 1.G: Percentage of full-time jobs that are low-paid, 1997 to 2017[8]
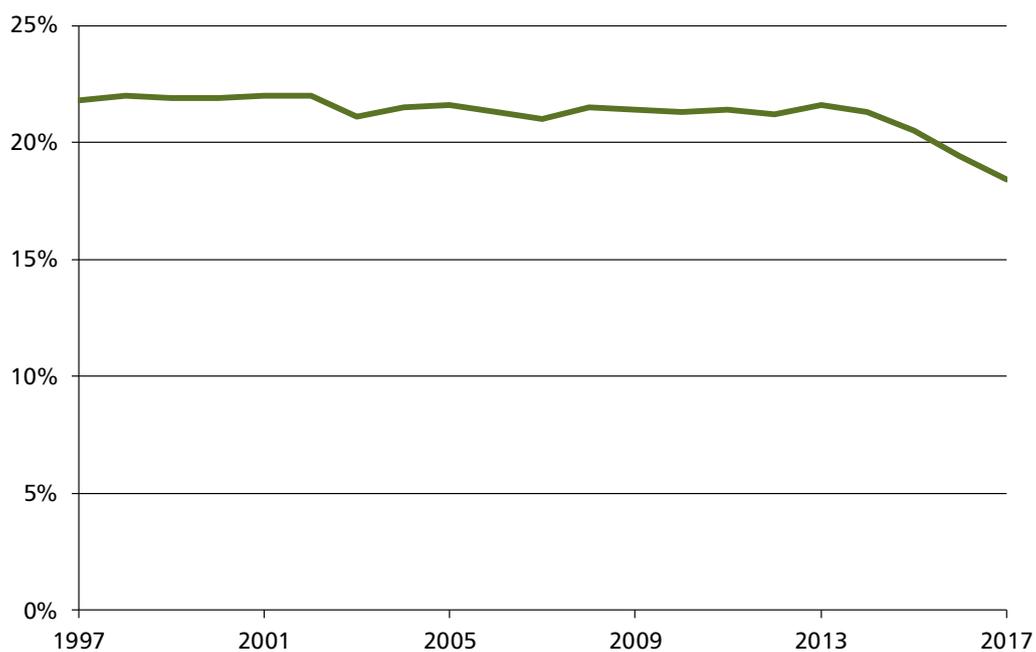
Source: Annual Survey of Hours and Earnings: 2017 provisional results, ONS

1.16   Overall, for working-age households, employment growth has been an important contributor to gains for lower income households. Furthermore, the recent growth in earnings has disproportionately benefitted lower earners. Trends in labour income growth in the UK stand out internationally. The gains from employment and earnings are not reflected in the static analysis presented in Chapter 2.

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8 Data source begins in 1997.

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 at Autumn Statement 2016 and subsequently 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 wider economic impacts of government policy as highlighted in Chapter 1.

2.2   Autumn Budget 2017 measures included in Charts 2.A to 2.C are:

- Stamp Duty Land Tax: abolish for First Time Buyers up to £300,000

- Fuel Duty: freeze for 2018-19

- Alcohol Duties: freeze in 2018

- Targeted Affordability Fund: increase

- Universal Credit: remove 7 day wait

- Universal Credit: run on payment for housing benefit recipients

- Patient Capital Review: reforms to tax reliefs to support productive investment

- Tobacco Duty: additional 1% on hand-rolling tobacco

- Air Quality: increase Company Car Tax diesel supplement by 1ppt from April 2018

- Air Quality: First Year Rate increased by one VED band for new diesel cars from April 2018

- NICs: maintain Class 4 NICs at 9%

- Social rented sector: maintain current rent policy without Local Housing Allowance cap

- NHS: additional resource

- Relationship Support: continue programme

- Skills: National Retraining Scheme initial investment

- Skills: investment in computer science teachers and maths

- Tuition Fees: raise threshold to £25,000 in April 2018

- Tuition Fees: freeze fees in September 2018

Overall level of tax, welfare and public service spending

2.3   Overall, 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
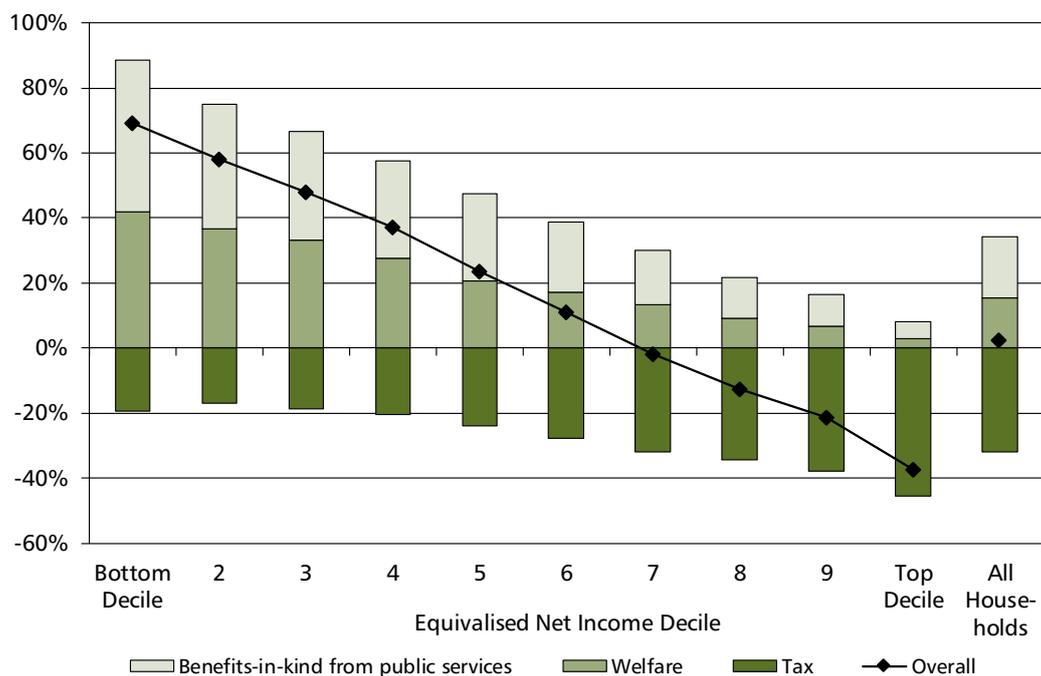
Source: HMT distributional analysis model, DWP and HMRC modelling

Analysis of decisions announced at Autumn Statement 2016 and subsequently

2.4 Charts 2.B and 2.C set out the impact of decisions announced at Autumn Statement 2016 and subsequently, across the income distribution, both as a percentage of net household income (including benefits-in-kind from public services) and in annual cash terms. This reflects decisions taken by this Chancellor and Prime Minister. 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 had not been introduced. Analysis in these charts shows:

- government tax and spending decisions have increased the tax contribution from the top income decile

- lower income deciles have gained as a result of government tax and spending policy

2.5 To maintain consistency with previous publications, analysis that shows the cumulative impact of measures which have been implemented, or are planned to be implemented, from 2015-16 to 2019-20 is shown in Annex A. Many of the measures in these charts were announced under a different Chancellor and Prime Minister.

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
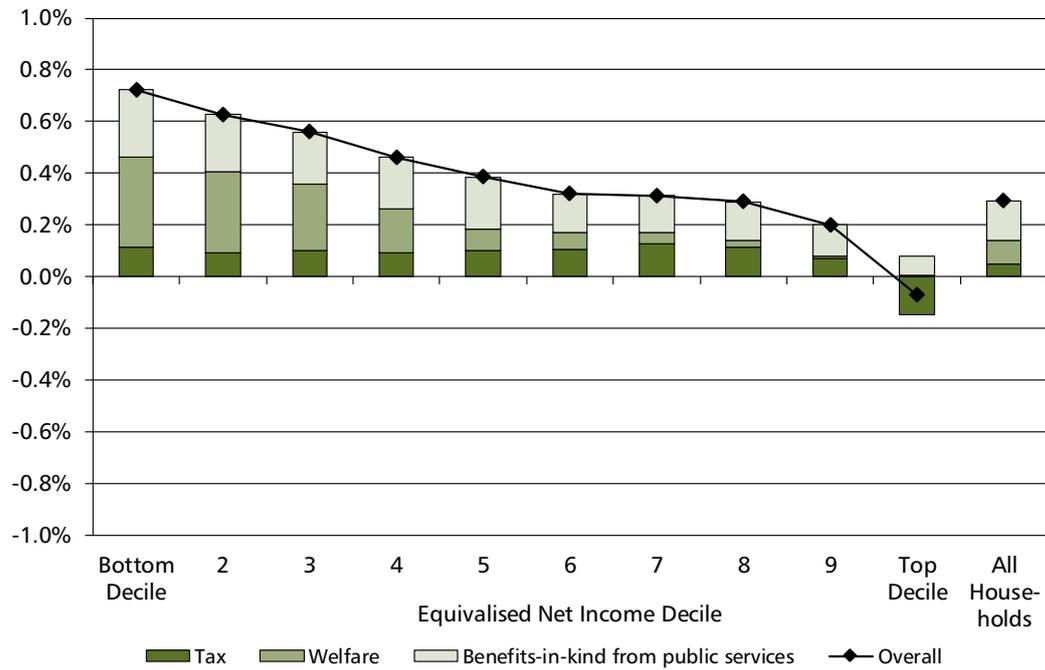
Source: HMT distributional analysis model, DWP and HMRC modelling

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
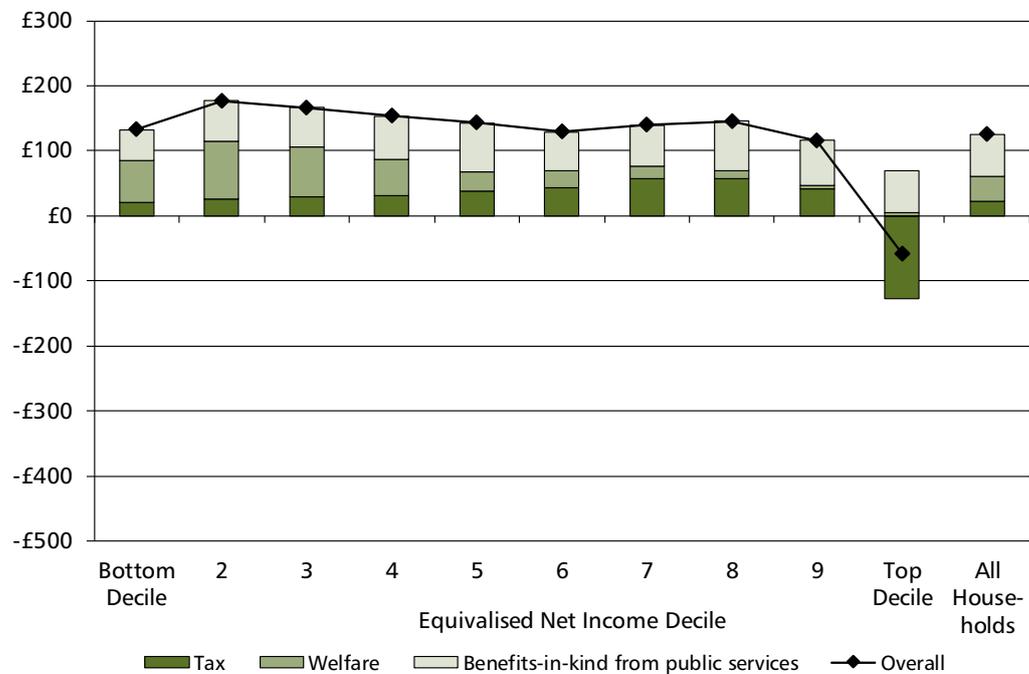
Source: HMT distributional analysis model, DWP and HMRC modelling

Chapter 3
Data sources and methodology

Table 3.A: Data sources for charts

Chart	Source
1.A	DWP, Households Below Average Income, 2010-11 to 2015-16
1.B	ONS, Household Disposable Income and Inequality, January 2017
1.C	OECD, Income Distribution Database. The latest available data is for 2014.
1.D	Causa, O. and M. Hermansen (forthcoming), "Income redistribution through taxes and transfers across OECD countries", OECD Economics Department Working paper. Data refer to 2004 to 2014 for Canada; 2005 to 2014 for France; 2004 to 2014 for Germany; 2004 to 2014 for Italy; 2003 to 2012 for Japan; 2004 to 2015 for the UK; and 2005 to 2015 for the USA. In all cases the latest available data and the available data closest to 2004 is used.
1.E	Analysis of DWP, Households Below Average Income statistics and Family Resources Survey, 2010-11 to 2015-16
1.F	Analysis of ONS, Annual Survey of Hours and Earnings, 2015 results and 2017 provisional results
1.G	ONS, Annual Survey of Hours and Earnings, 2017 provisional results
2.A-2.C	Internal HM Treasury modelling. See 3.2 to 3.8

Table 3.B: Data sources for statistics

Paragraph	Statistic	Source
Box 1.A	Income movements	DWP, Income Dynamics: Movements between quintiles: 2010-2015. This is based on Understanding Society data, collected in waves between January 2010 and December 2011; and January 2014 and December 2015.
Box 1.A	Expenditure distribution	Internal HM Treasury modelling
1.10	Employment rates	ONS, UK Labour Market, November 2017
1.10	Number of people in work	ONS, UK Labour Market, November 2017
1.10	Number of workless households	ONS, Working and Workless Households in the UK, August 2017
1.13	Pay growth	ONS, UK Labour Market, November 2017

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 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 National Living Wage), 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

3.3 A number of Autumn Budget 2017 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. Autumn Budget 2017 measures that are not captured in Charts 2.A to 2.C, A.1 and A.2 due to data limitations include:

- Air Passenger Duty: freeze for long-haul economy flights and raise business class multiplier

- Innovation: Ultra Low Emission Vehicles: plug in car grant

In addition, the measure "Universal Credit: remove 7 day wait" is not captured in Charts A.1 and A.2 because of limitations in capturing interactions with existing Universal Credit policy.

3.4 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.

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 Spring Budget 2017 include:

- Living Costs and Food Survey 2014-15 data update

- updated modelling of Universal Credit in DWP's Policy Simulation Model (PSM)

- updated estimates of RDEL spending on benefits-in-kind from public services

- updates in line with the OBR's latest forecast

- the method by which devolved policy is modelled

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: equivalisation 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 equivalisation 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 £21,600 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	67,400	94,100	94,200	123,900	161,100
Ninth decile	42,100	59,300	63,100	80,600	99,600
Eighth decile	33,300	49,300	49,200	65,500	80,600
Seventh decile	27,600	39,800	41,300	54,900	65,100
Sixth decile	23,500	32,900	34,900	45,800	56,500
Fifth decile	20,000	25,800	29,700	39,100	46,500
Fourth decile	16,800	21,900	25,300	33,400	40,200
Third decile	14,300	19,100	21,600	28,200	34,300
Second decile	12,000	15,400	18,100	23,400	26,700
Bottom decile	8,700	11,700	13,700	16,800	19,400

Source: HMT distributional analysis model

Analysis of tax and welfare measures

3.12 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 (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 had not been 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. By doing so, this analysis 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.

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 costs 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. Additionally, the impact of transitional protection and Universal Credit's greater sensitivity to changes in earnings is apportioned, but additional fraud and error savings are excluded, across equivalised income deciles. These figures are based on latest available modelling as at 01 November 2017.

Analysis of public service spending

3.19 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, the Department for Education, the Department for Work and Pensions, the Department for 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.

3.20   The analysis excludes:

- administrative spending

- capital spending (with the exception of student loans), and the depreciation of capital assets

- spending funded through the reserve

- 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

3.21   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.

3.22   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 Budget 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 Budget 2016 (inclusive), and do not reflect any reallocations within existing RDEL budgets.

3.23   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.

3.24   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.

3.25   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.

3.26   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.

3.27   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. Many of the measures in these charts were announced under a different Chancellor and Prime Minister. 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
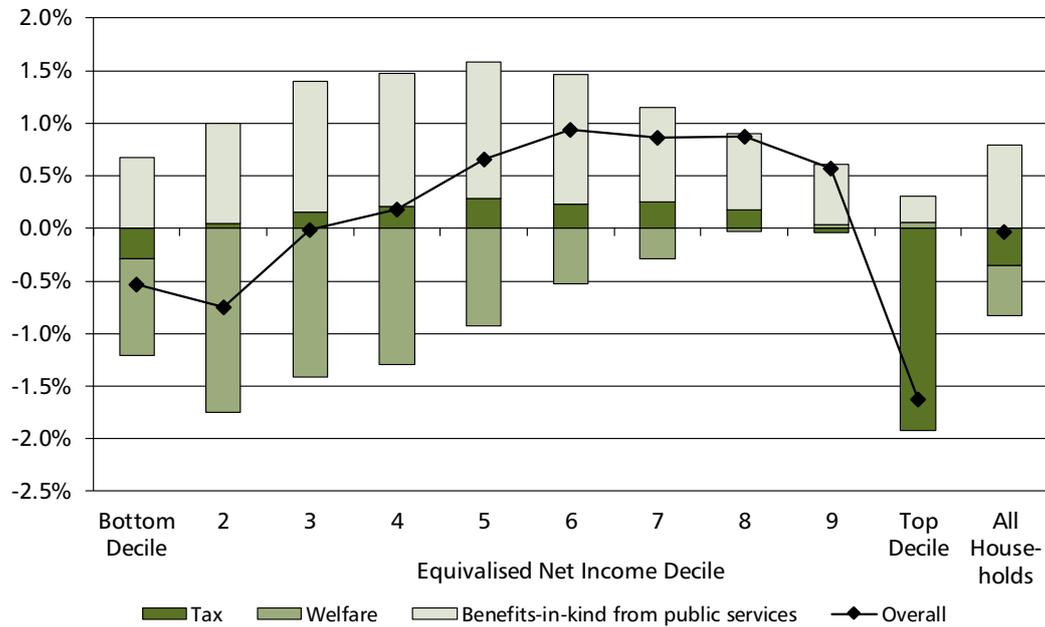
Source: HMT distributional analysis model, DWP and HMRC modelling

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