

Resolution Foundation

BRIEFING

The going rate

Moving from CPI to CPIH and the inflation experiences of UK households

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Summary

Inflation is about to return to the top of the economic agenda. After hovering around 0 per cent for 15 months, inflation as measured by the consumer prices index (CPI) started to rise from mid-2016 as a result of both increases in the price of oil and a significant depreciation of Sterling associated with the outcome of the EU referendum. It currently stands at 1.8 per cent, and is likely to rise well above the Bank of England's target of 2 per cent in the near future. As it does, it will eat into income growth and ensure that the prices we pay – not just the wages we earn – will be key to the living standards story of 2017.

Given the importance of inflation to the living standards equation, it is vital that we understand just what inflation indices are measuring. Unfortunately the world of consumer prices has been in turmoil in recent years. In this note we reflect on this turmoil and highlight forthcoming changes in measuring inflation. We also reflect on the adequacy or otherwise of the existing suite of inflation measures in capturing changes in living standards.

In early 2013, the retail prices index (RPI) – which had served as the main measure of inflation in the UK until 2003 – lost its National Statistic status due to concerns about the formula used to calculate it. Unlike the CPI – which was introduced in 1996 to serve as the UK's version of the EU-standard Harmonised Index of Consumer Prices (HICP) – RPI includes a measure of owner occupiers' housing costs. It's downgrading therefore left a gap in the inflation measures for an index that incorporated such costs.

With this in mind, two new alternatives were introduced in 2013: CPIH (calculated in the same way as CPI, but including a measure of owner occupiers' housing costs) and RPIJ (covering the same population and range of goods as RPI, but calculated using a different formula). Both were designated as National Statistics, but CPIH subsequently lost this status because of concerns about the data on private rentals that it used.

The result was that users were left with a potentially confusing list of different indices to choose from: a seemingly-discredited RPI; a CPI that failed to capture housing costs; and the newly-established, often-contested and relatively little-used CPIH and RPIJ (with only the latter having National Statistic status).

Accordingly, the ONS commissioned Paul Johnson to undertake a review of consumer prices statistics. Concluding in January 2015, this review recommended that CPIH should replace CPI as the main measure of inflation. Johnson acknowledged that CPI would remain in place for legal reasons and that RPI would need to be maintained for legacy purposes, but the review recommended that RPIJ be discontinued in order to avoid confusion with CPIH. Reflecting on the Johnson Review, the national statistician, John Pullinger, subsequently agreed that once the methodological problems of CPIH were resolved it would become the main measure.

While it hasn't yet had its National Statistic status restored, CPIH will indeed replace CPI as the UK's main inflation measure from 21 March 2017. Alongside its inclusion of owner occupied housing costs, CPIH will also start to capture Council Tax. This reflects the correct assessment that such payments are important costs for many households.

While the process of dealing with the loss of faith in RPI and the inadequacy of CPI has taken several years and involved numerous consultations and public events, the switch to CPIH remains controversial in some areas. The fact that CPIH hasn't had its National Statistics status restored ahead of the switch is clearly problematic, though the ONS expects confirmation to follow. Critics also

express dissatisfaction with its use of imputed rents (rather than mortgage interest payments) to measure owner occupier's housing costs.

Despite the controversy, the switch looks likely to have only a small impact on the reported level of inflation in the near-term. Since 1989 the difference between CPI and CPIH has averaged zero percentage points, although in the last two years annual inflation has been 0.3 percentage points higher under CPIH.

Importantly, over time even modest annual differences quickly add up. Deflating median net disposable household income using CPIH results in real-terms growth of 26 per cent in the period from 1999 to 2015, as opposed to an increase of 23 per cent using CPI. The figure is different again under RPIJ (17) per cent and lowest of all using RPI (10 per cent).

The establishment of a new headline measure that includes housing costs is a welcome step forward from the confusion of recent years. What's clear however, is that different users will continue to disagree – for legitimate reasons – as to the appropriateness of different approaches.

This goes to the heart of the problem with any headline or main measure of inflation, namely that it will inevitably mask differences across people and households. The actual inflation experienced by a household depends on their particular spending profile and how the prices of the things appearing in their individual basket change. It is also affected by the extent to which the household responds to price changes, substituting goods or forgoing altogether something they would otherwise want.

Yet these difficulties don't mean that we should abandon a headline measure, merely that we should dig deeper to understand how inflation is experienced by different groups and recognise that the headline measure of CPIH may not always be the most appropriate deflator to use

For example, the inflation experienced by single-person households has been higher than the level suggested by the headline rate for at least the last 40 years. As a result, the average working age single-person household without children would have around £1,000 more annual spending power today if they had experienced the inflation rate recorded by couple households with children over the period from 1976 to 2015.

Similarly, we see that higher income households experienced higher inflation than lower income households in the 1980s and 1990s but that the situation has reversed since the millennium. Taking the period from 2001, we find that households in the bottom 20 per cent of the income distribution would have an additional £150 of annual spending power today had they experienced the inflation rate of households between 60 per cent and 80 per cent of the way up the distribution.

Applying group-specific inflation rates to the earnings and incomes of different parts of society is a first-best option in measuring living standards, but one that is not always possible. In many instances, an aggregate headline measure will be the best we can do. But one other important consideration that can make a difference to our assessment of living standards relates to matching what is on either side of the equation: if something is included (excluded) within a measure of household income then it should ideally be included (excluded) in the inflation index used to deflate that series.

For example, in relation to the DWP's Households Below Average Income dataset, two different bespoke deflators are used depending on whether the income being measured is captured 'before housing costs' (CPI – BHC deflator) or 'after housing costs' (CPI – AHC). Using CPIH would result in potential double counting or under-counting of certain housing costs and is therefore inappropriate in this instance.

With the concept of living standards reflecting more than an accounting process of money in and money out, it is also important to consider approaches to both incomes and deflators that best match how households themselves think of income and expenditure. For example mortgage interest payments are excluded from CPI-based measures, reflecting the fact that the Bank of England's target

inflation rate shouldn't include interest rate costs. But this is a regular and largely unavoidable (in the short-term) cost for households living in their own home, making it hard to explain to households why a sharp increase (or decrease) in their living costs as a result of interest rate movements should be absent from any real-terms assessment of their changing income.

It is with issues such as this in mind that the ONS is developing a new 'household inflation index'. This measure – experimental at first and still subject to user feedback – will aim to better capture how households experience inflation. As with CPIH, it should lend itself to further exploration with the creation of group-specific household inflation indices. Its proponents hope that it might ultimately serve as an alternative means of establishing appropriate upratings for things such as benefit levels and regulated price increases.

Inflation promises to be one of the key living standards issues in the next couple of years

Despite the economic damage wrought by the financial crisis including the unprecedented pay squeeze, households have enjoyed something of a 'mini-boom' in the last couple of years. This has owed much to large rises in employment but also ultra-low inflation, which averaged 0.4 per cent for 2015 and the first half of 2016.

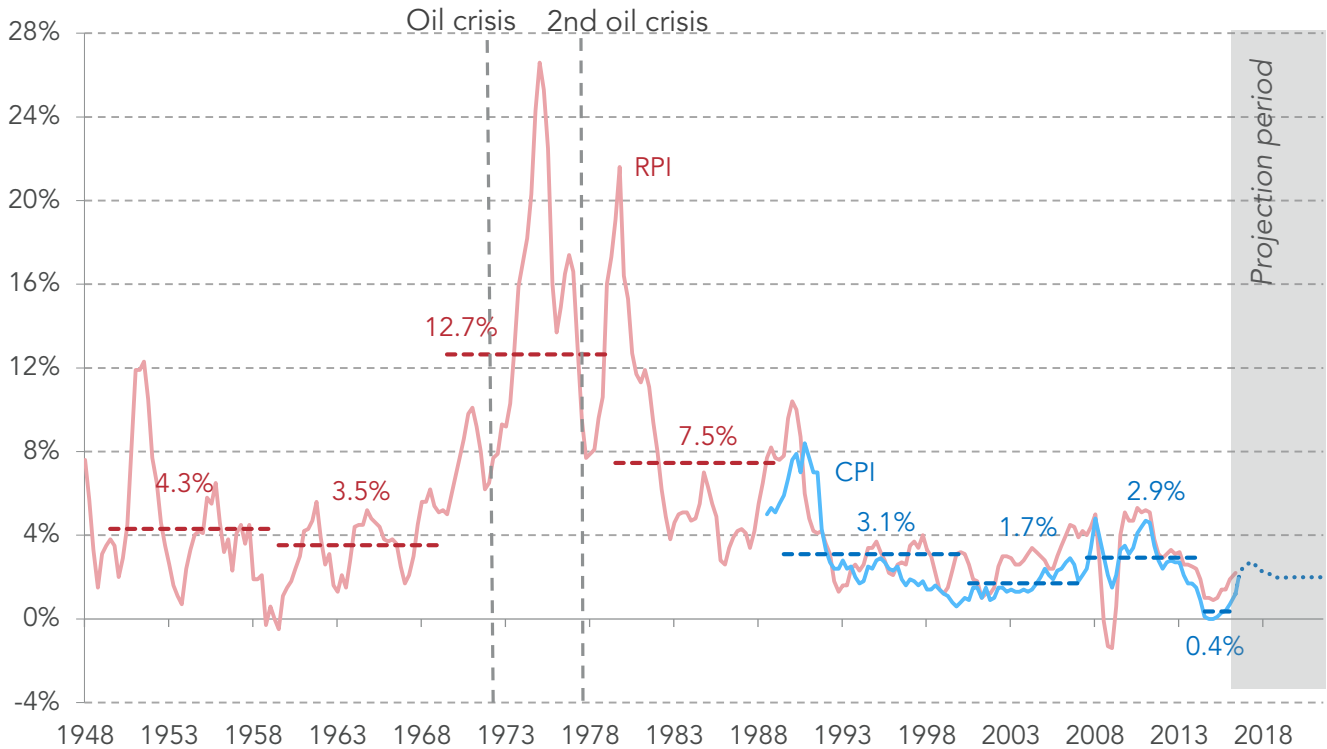
Low inflation meant that people's pay packets have gone further and the value of benefits for people of working age – which rose by 1 per cent between 2013 and 2016 but are currently fixed in nominal terms – have been eroded to a lesser extent than they might have been.^[1]

Figure 1 sets out inflation since 1948, and highlights how unusual this recent period has been. It shows both the consumer prices index (CPI) – which has been the UK's headline measure of inflation since 2003 – and the longer-established retail prices index (RPI). Having averaged 12.7 per cent in the 1970s, RPI inflation fell to an average of 7.5 per cent in the 1980s and 3.6 per cent in the 1990s. Measured using CPI, inflation hovered between 1 per cent and 3 per cent between the 1990s and the financial crisis – the "Great Moderation". It subsequently spiked following the start of the financial crisis, rising to 5.3 per cent in early 2011, but fell steadily thereafter. CPI was barely above zero throughout 2015 and the first half of 2016.

[1] [A Corlett & S Clarke, Living Standards 2017: the past, present and possible future of UK incomes, Resolution Foundation, February 2017](#)

Figure 1: Inflation is currently at an almost historical low, but has risen sharply

CPI and RPI inflation and projection (year-on-year change)



Notes: Dashed line shows OBR's projection for CPI (need to redo after budget)

Source: ONS, Consumer prices Inflation time series dataset

Viewed in this longer context, the pick-up in inflation in recent months appears modest, and the current rate of 1.8 per cent remains below the Bank of England's 2 per cent target. Nevertheless, the pace of change stands out from the relative stability of the Great Moderation period. The recent increase has been driven in part by the rising price of oil – up around 10 per cent since November – but also because of the significant depreciation of Sterling – down by around 18 per cent since the EU referendum.

It is difficult to disentangle the effects of Sterling from the rising oil price because oil is priced in dollars so the fall in Sterling magnifies the effect. But work by the Bank of England suggests that around 60 per cent of any change in sterling-denominated foreign export prices is passed through to UK import prices, with the pass-through mostly completely within a year. Given this we can get some idea of the extent to which the fall in Sterling has magnified the rise in oil prices as well as contributing to rises in other imported goods.

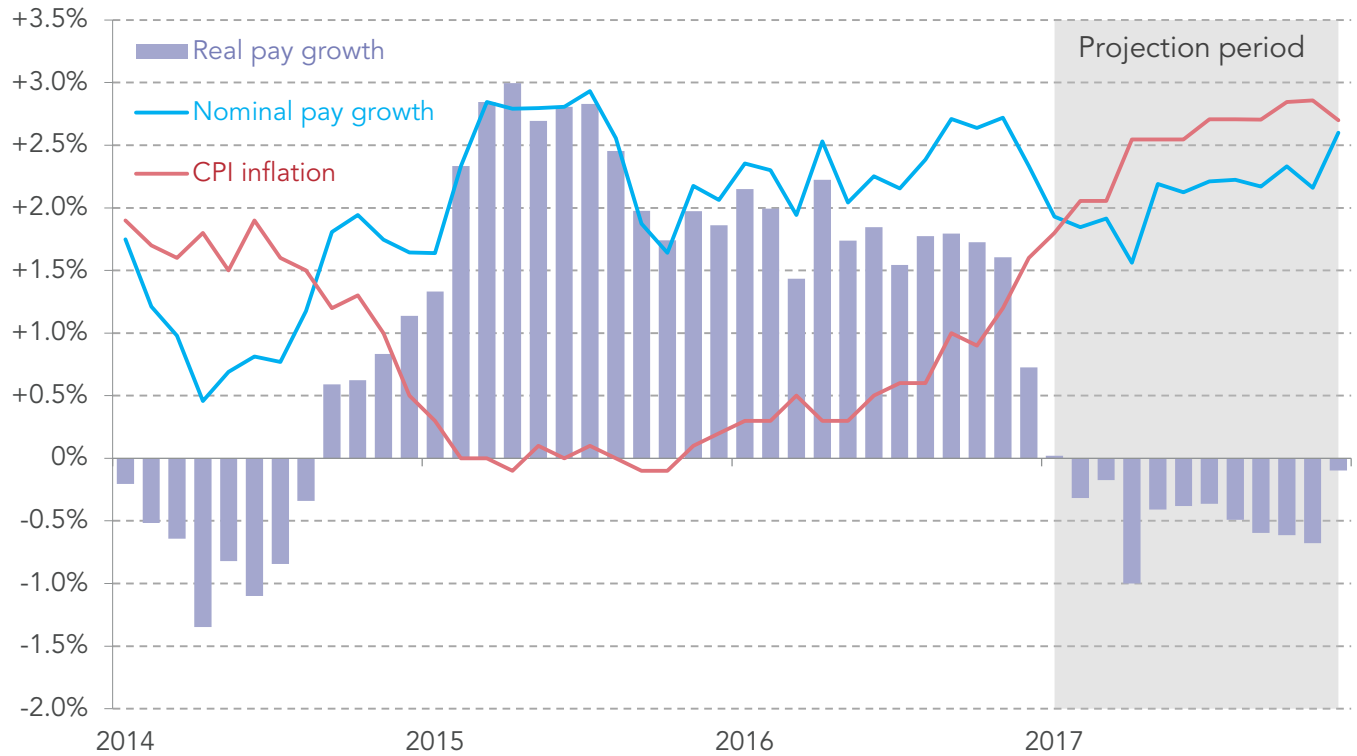
Figure 1 shows that CPI is currently running at 1.8 per cent. The Office of Budget Responsibility (OBR) expects it to rise further in the next couple of years reaching a peak of 2.7 per cent at the end of 2017 and then falling back to 2 per cent by 2020. This projection is of course uncertain with scope for changes that are smaller or greater in magnitude. The summary of independent forecasts compiled by the Treasury puts CPI at between 1.6 per cent and 3.5 per cent in 2018 and between 2.9 per cent and 1.5 per cent in 2020.

Whatever the scale of the change, the clear consensus is that inflation is likely to rise further in the near future. Without a significant uptick in wages this is likely to mean that real pay growth

will be lower than it has been in the past few years, and real pay might even fall for a period. On a year-to-year basis nominal wages rose by an average of 2.3 per cent over the past two years, as a result inflation doesn't need to rise by much to cause real pay to fall. Figure 2 shows that real pay may already be falling and could fall further in the coming months.

Figure 2: If inflation continues to rise then real pay could start to fall early in 2017

Annual growth in average weekly earnings and CPI inflation

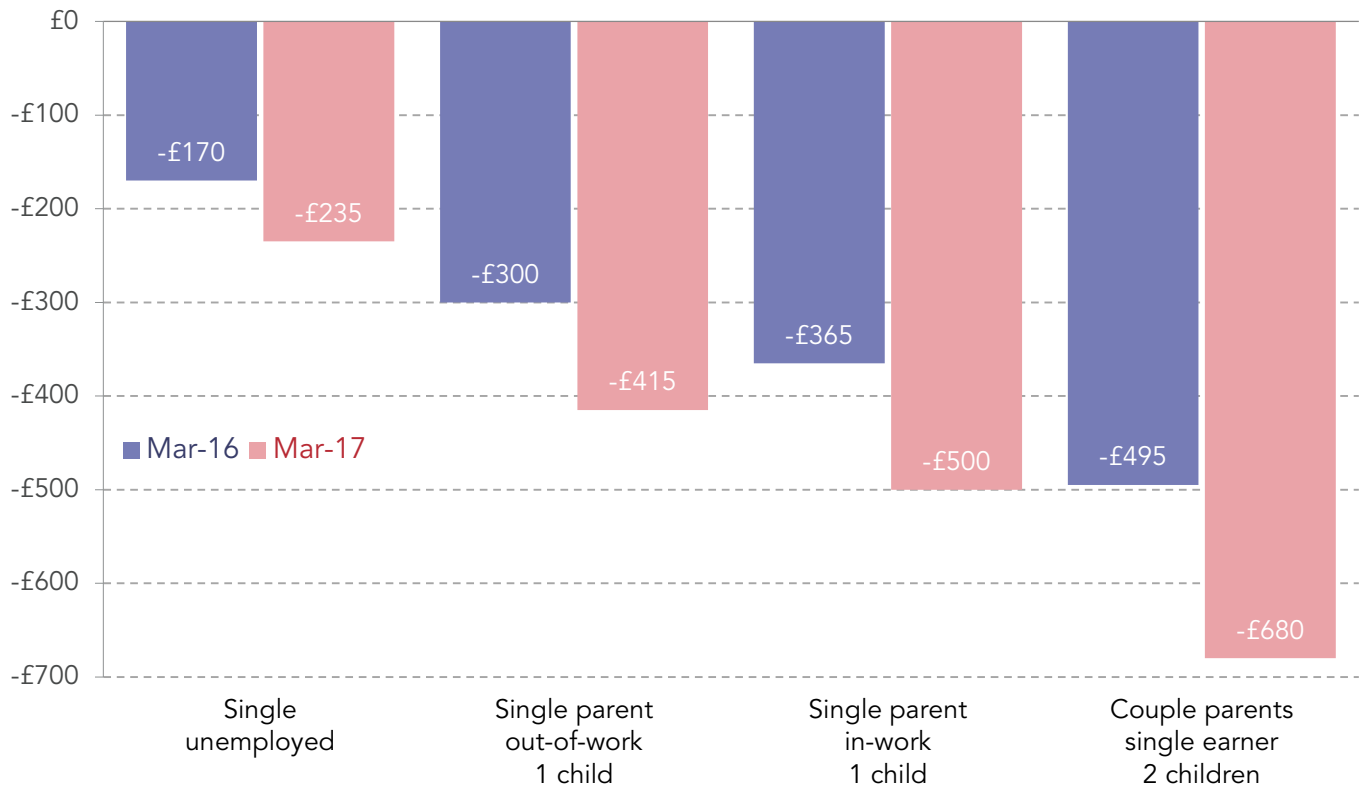


Source: RF analysis of ONS, Average Weekly Earnings and OBR, Economic and Fiscal Outlook

Rising inflation will have an even more pronounced effect on the value of people's welfare receipts. As discussed above, working age benefits have been frozen in nominal terms since April 2016 and will remain so until 2020. As a result, any rise in inflation reduces the real value of these benefits by an equivalent amount. Figure 3 compares the expected impact of the freeze at Budget 2016 with the one prevailing following recent changes in expectations about future inflation. With inflation expected to be higher in the coming years than was previously thought, the squeeze associated with the cash freeze is set to intensify. Whereas a single-earner couple with two children could previously expect to lose £495 as a result of the freeze by 2020, the loss may now rise to £680 due to higher inflation.

Figure 3: Change in income due to benefit freeze by 2020

Real-terms annual change in income (CPI-adjusted)



Source: RF analysis using OBR, *Economic and Fiscal Outlook*

With this in mind, the imminent change in the headline measure of inflation takes on new importance

The precise numbers involved in the projections above are inevitably uncertain, but it is clear that inflation will be of central importance to living standards in the next couple of years. How we measure it is therefore important. As such, the fact that the main measure of inflation is shifting from March 2017 is of great significance.

Inflation takes many forms of course. indicators, such as the GDP deflator (a measure of the level of prices of all new, domestically produced, final goods and services in an economy), the Producer Price Index (which measures the inflation of goods bought and sold by manufacturers) and the Services Producer Price Index (which measures the price changes of services provided by UK businesses to other firms and the government) offer specific insights into changes in price levels in different parts of the UK economy.

Consumer price indices – the subject of this note – capture the speed at which the prices of goods and services bought by households rise or fall. In theory this should be easy to capture, but there are a number of important methodological choices which must be made when constructing such indices which reasonable people can legitimately disagree about. In recent years, the level of disagreement – and subsequent confusion – has been particularly marked.

Since 2003, CPI has served as the UK’s headline measure of inflation. While offering an internationally comparable measurement of inflation (it was introduced in 1996 in response to the Maastricht Treaty’s stipulation that all EU member states develop a standardised Harmonised

Index of Consumer Prices (HICP)), it is marked by its failure to include any element of owner occupiers' housing costs. Users who wanted to capture such costs instead made use of the RPI, a long-standing measure which served as the main inflation level in the UK between the 1950s and 2003. However, the RPI lost its National Statistic status (see Box 1) in 2013, due to concerns about the formula used to calculate it.

i Box 1: Types of official statistics

'Official statistics' are statistical outputs produced by the ONS, central government departments and agencies, by the devolved administrations and by other Crown bodies.

Some 'official statistics' are deemed 'National Statistics'. There are three types of National Statistics, 'legacy statistics', which were designated as such before 2008 but have not yet been re-assessed. 'Re-assessed National

Statistics' are those that have retained their status, such as CPI and RPIJ. Finally ministers can propose 'new National Statistics' which are those that have received accreditation by the Statistics Authority. RPI is not a National Statistic but is still produced because of its use in contracts particularly index-linked gilts sold by the Bank of England. CPIH lost its National Statistic status in 2014.

In order to fill the potential void, two new alternatives were introduced: CPIH (calculated in the same way as CPI, but including a measure of owner occupier's housing costs) and RPIJ (covering the same population and range of goods as RPI, but calculated using a different formula). Both were designated as National Statistics – offering a choice for those who wanted to use a measure of inflation that included owner occupiers' housing costs – but CPIH subsequently lost this status because of concerns about the data on private rentals that it used.

Given the potentially confusing list of different indices on offer, the ONS established a review of consumer price statistics led by Paul Johnson (see Box 2). The review concluded that, subject to its problems being rectified, CPIH should replace CPI as the main measure of inflation. It was recommended that both CPI and RPI be retained (to meet legal and legacy obligations respectively), but that calculation of the RPIJ should be ceased in order to avoid confusion with CPIH. Reflecting on the Johnson Review, the national statistician John Pullinger agreed that once the methodological problems of CPIH were resolved it would become the main measure. This switch will occur on 21 March.

i Box 2: Recommendations of the Johnson Review

The Johnson Review reported in January 2015 with 24 recommendations.^[1] Key among these were:

- » CPIH should become the headline inflation measure.
- » The ONS should develop household inflation indices that capture the experiences of different groups and also explain what income measures different indices should be used with.
- » The Statistics Authority should state that RPI is flawed and should not be used for new purposes, should be kept just for contractual purposes and phased out as soon as is practicable.
- » The ONS should develop a superlative inflation index that better captures how consumers change what goods they buy in response to price changes.
- » The ONS should continue to develop and improve how it collects price data including taking advantage of new technologies, such as sale scanner data, where appropriate.
- » The ONS should look to improve the Living Costs and Food Survey (LCFS) and other sources so as to collect the most accurate weights data.
- » The ONS should continue to assess how it can better reflect improvements in the quality of goods in its inflation measures.
- » CPIH should use the rental equivalence approach to measuring owner occupiers' housing costs.

[1] P Johnson, [UK Consumer Price Statistics: A Review](#), January 2015

The inclusion of housing costs and Council Tax in the new headline measure is a step forward

CPI and CPIH differ in that the latter includes a measure of owner occupiers' housing costs and, from March, Council Tax. The inclusion of both is welcome, with such costs representing important considerations for the assessment of household living standards. But the way in which owner occupiers' housing costs are captured is not without controversy.

There are four theoretical approaches, including:

- » *Net acquisitions*: This approach measures costs at the point a house is acquired, treating a house as a purchase of a good that is part asset, part consumable. Only properties that are bought from outside the household sector are included (hence 'net'), with sales to other sectors netted off. The distinction between asset and consumable is represented by considering the building itself (and spending on the property, such as maintenance) as the good being consumed, and the land it stands on as the asset.
- » *Payments approach*: This focuses on what households pay out as owner occupiers excluding capital payments. It therefore covers mortgage interest payments, transaction costs (such as estate agency fees) and running costs (such as maintenance).
- » *Narrow user cost approach*: The aim of this approach is to measure the cost of *using* housing. In effect, housing is viewed as a capital good that the homeowner consumes. It measures the cost of owning the house (such as maintenance) and the cost of financing the purchase of the property (including mortgage interest payments and the interest foregone on the capital used).
- » *Rental equivalence*: As with the narrow user cost approach, rental equivalence treats housing as a capital good. The value of the service consumed by homeowners is taken to be equivalent to the rent they could achieve if they chose to let their capital out rather than living in it. The rent charged by landlords on equivalent properties is assumed to cover not just property but other costs such as maintenance, meaning such costs are not calculated separately in this approach.

There is no universally accepted 'correct' approach, with all involving some theoretical and practical limitations. The ONS view – in line with the recommendations of the Consumer Prices Advisory Committee and the Johnson Review – is that CPIH is a measure of the cost of consumption, and that its owner occupiers' housing cost element should therefore be based on the most accurate form of capturing consumption costs – which it considers to be the rental equivalence approach.^[2] Not all users agree with this conclusion, but it is the product of lengthy debate in recent years.^[3]

Over time, the switch is likely to have a non-trivial impact of our understanding of living standards

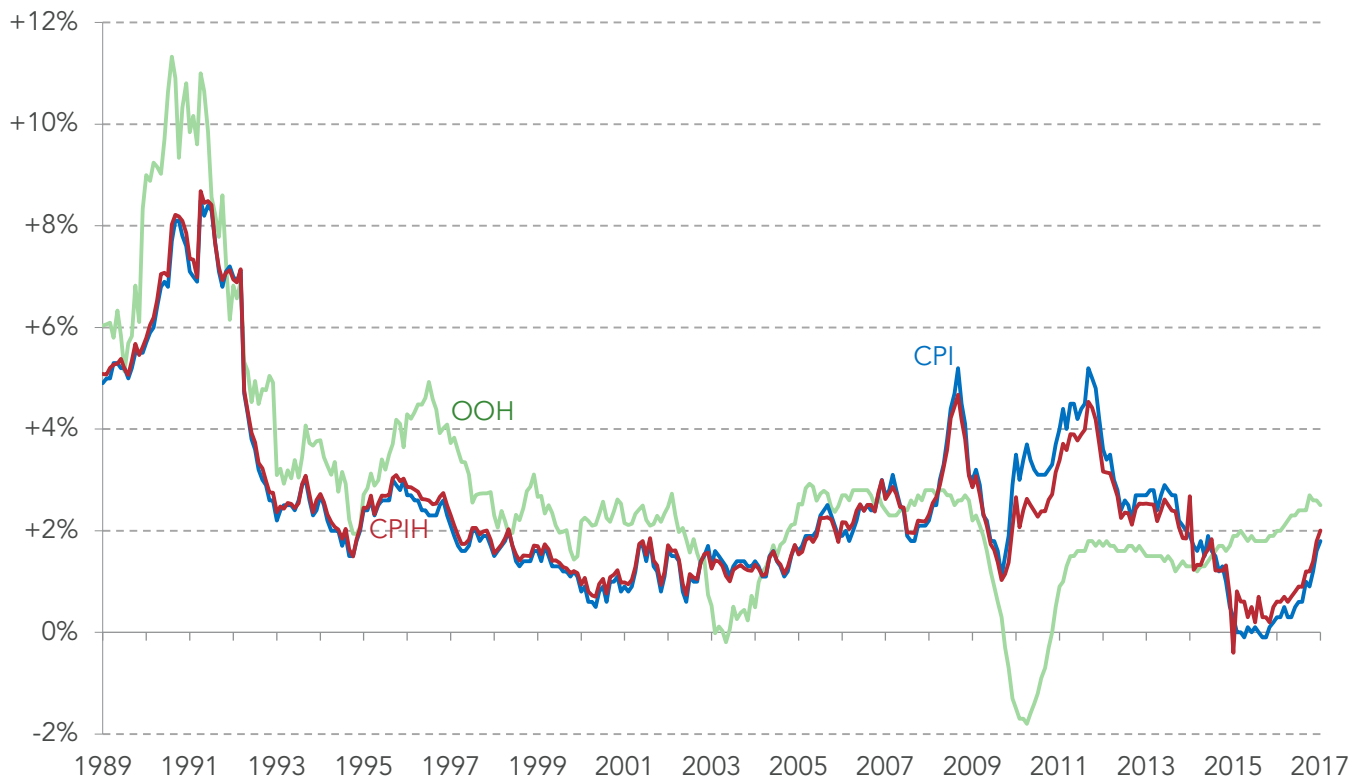
Figure 4 shows that CPI and CPIH have tended to track each other closely over time. Since 1989 the average difference in annual inflation between the two series has been 0 percentage points. Since 2009 there has been more of a difference between the two, with CPI 0.3 percentage points higher between 2008 and 2015 and CPIH 0.3 percentage points higher in the past two years. At present CPIH is running at 2 per cent while CPI is at 1.8 per cent.

[2] See both C Payne, *CPIH Compendium*, 28 October 2016 and J Athow, [Including owner occupier housing costs in measures of inflation](#), National Statistical, January 2017

[3] A comparison of the rental equivalence measurement of owner occupiers' housing costs with the other approaches considered will be published by the ONS on a regular basis. See T Flower, [Understanding the different approaches of measuring owner occupiers' housing costs \(OOH\)](#), ONS

Figure 4: Over the long-run CPI and CPIH track each other very closely differences are the result of change in OOH

CPIH, CPI and OOH (year-on-year change)



Source: ONS, Consumer prices Inflation time series dataset

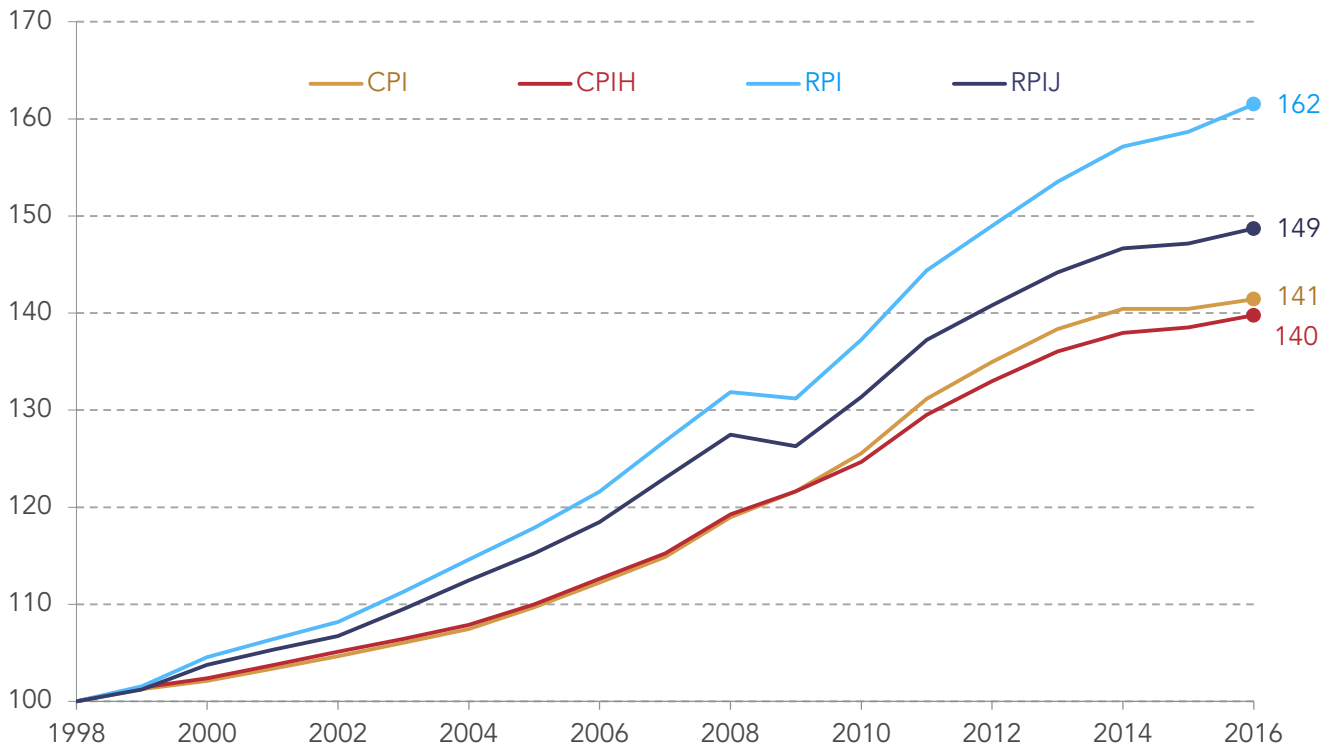
Given these relatively modest differences, the change in the headline inflation rate may seem a technocratic and unimportant thing. After all nothing in the real world changes – prices continue to change as they always have, we just measure these changes a little differently. But different inflation indices give different impressions of how prices have changed over time. They matter too when trying to determine how future income (from wages or benefits for example) should be adjusted to compensate for changes in the price level. Crucially, modest in-year differences can compound over time.

Looking at the four main consumer inflation measures in place over recent years, Figure 5 shows alternative versions of inflation in the period since 1999. In cumulative terms, the RPI is shown to be 62 per cent higher in 2016 than it was in 1998, whereas CPI was only 41 per cent higher. These differences partly reflect what each index measures and partly reflect the way they are constructed (see Box 3 for more details). It is estimated that the different aggregation approaches used by RPI and CPI mean that RPI is about 0.6 per cent higher than CPI on an annual basis, and so this accounts for about half the difference between the two indices over the 1998-2016 period.^[4]

[4] ONS, [Consumer prices Index: Technical Manual](#), 2014

Figure 5: Differences in inflation matter

Inflation under various different indices (1998=100)

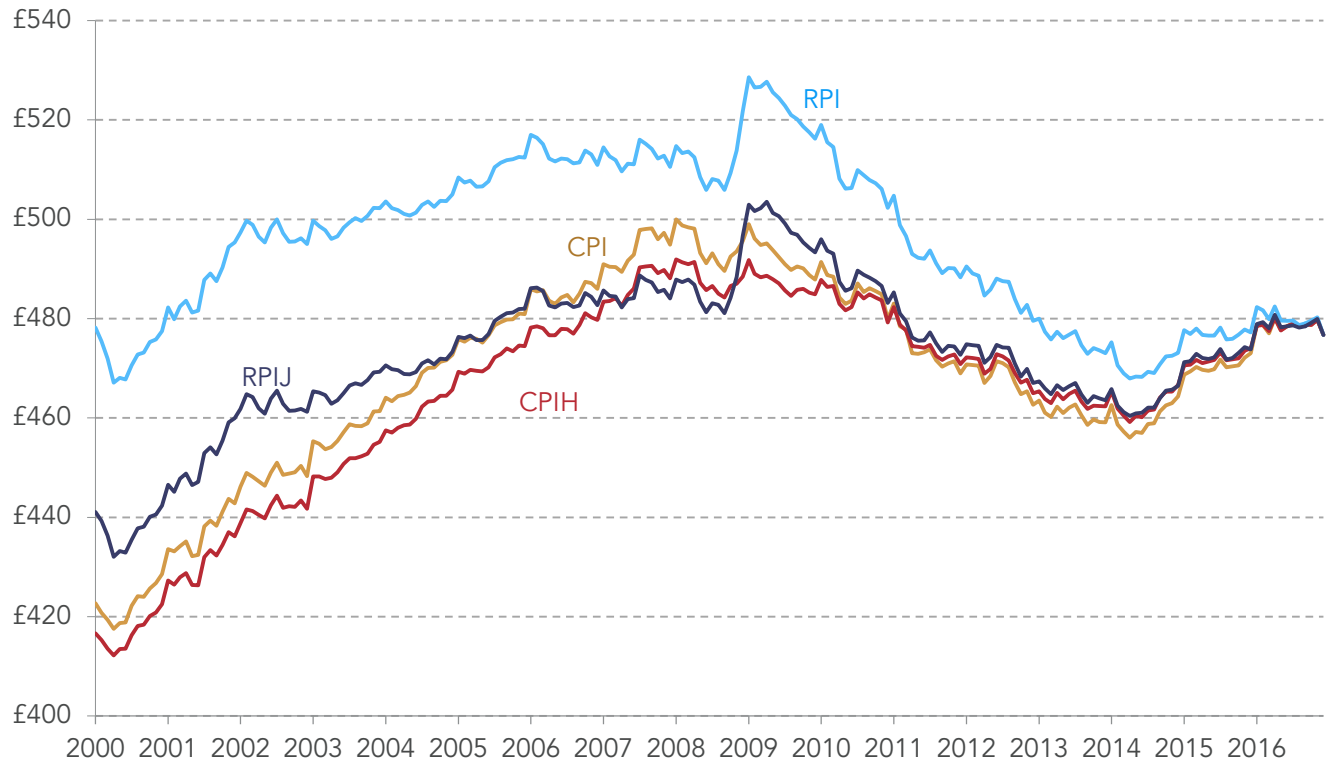


Source: ONS, Consumer prices Inflation

Figure 6 considers what these differences mean for real-terms wages. It compares average weekly earnings using each of the four indices. Peaks and troughs fall in different places and there are differences in both the pace of wage growth recorded in the pre-crisis years and the depth of the wage squeeze thereafter. For example, when deflated by CPI average weekly earnings rose to a peak of £500 compared to £492 for CPIH. However, the subsequent fall was also greater under CPI, hitting a low of £456 compared to £459. This is likely to reflect the fact that owner occupiers' housing costs were rising at a relatively slow rate during this period which produces a smaller fall under CPIH.

Figure 6: Real weekly earnings rose higher, but fell further, when deflated by CPI rather than CPIH

Real-terms average weekly earnings using different deflators



Source: ONS, Consumer prices Inflation & ONS, Average Weekly Earnings

Box 3: Different inflation measures: what they contain and how they are constructed

Inflation measures differ both in terms of coverage and in method of construction. In this box we consider differences in approach across four consumer indices that have been in operation in recent years (see ONS, *Consumer Prices Index: Technical Manual* for a fuller description), and two further versions of CPI used when deflating income measures captured in the DWP's *Family Resources Survey (FRS)*.

CPI

Coverage: Goods and services by households that are included in the household component of the national accounts. Does not include housing costs; council tax, mortgage interest payments, house depreciation, buildings insurance, ground rent, estate agents fees and conveyance fees. The entire UK, but not the offshore islands (such as Isle of Man) are covered.

Households: The CPI measures spending by all private households in the UK including foreign visitors and residents of communal establishments such as student halls and retirement homes. Spending abroad by UK households is excluded.

Spending: Spending for consumption only is included, and so investment spending, savings and gambling are excluded. Also excluded are goods and services that are paid for out of taxation such as those provided by the NHS.

Aggregation: Prices are arranged into elementary aggregates which are then aggregated into elementary aggregate indices using a geometric mean. Aggregate indices are weighted and aggregated to produce the overall index.

CPIH

Coverage: Same as the CPI but CPIH includes owner occupiers' housing costs and from March 2017 it will include Council Tax. Owner occupiers' costs are the costs associated with owning, maintaining and living in one's home. The approach used to calculate these costs is the 'rental equivalence' approach where the rent paid for an equivalent property in the private sector is used as a proxy for the costs faced by homeowners.

Households, spending, aggregation: All identical to CPI.

RPI

Coverage: The goods and services included in the *Living Costs and Food Survey (LCFS)*. Unlike CPI this includes

Council Tax, mortgage interest payments, depreciation costs and estate agents' fees. RPI excludes university accommodation fees and university fees paid by foreign students.

Households: All private households in the UK, excluding those in student accommodation and retirement homes. Also excluded are pensioners that receive three-quarters or more of their income from benefits and households whose income places them in the top 4 per cent of the income distribution.

Spending: As with the CPI, spending on investment, savings and gambling is excluded.

Aggregation: Unlike the CPI the arithmetic mean is used to aggregate elementary aggregates into aggregate indices. These are then weighted and aggregated to create the overall index.

RPIJ

Coverage, households and spending: All identical to RPI

Aggregation: RPIJ uses the geometric mean to aggregate elementary aggregates into aggregate indices in the same way that the CPI does.

CPI (BHC)

CPI (BHC) is a modified version of CPI produced by the ONS specifically to be used to deflate the 'before housing costs' (BHC) income data produced as part of the DWP's *Family Resources Survey (FRS)*. It includes mortgage interest payments, ground rent and dwelling insurance. The specific inclusion of such items means that it is different from CPIH which uses owner occupiers' housing costs as an encompassing measure of housing costs. It is constructed in a different way to CPI as a result.

CPI (AHC)

CPI (AHC) is a further modified version of CPI also produced to be used with the FRS. It excludes rents, maintenance repairs and water charges on the basis that such payments are removed from household incomes in the survey's 'after housing costs' (AHC) measure of income. In this way it removes housing costs completely (unlike CPI which just doesn't include owner occupiers' housing costs) and so should only be used to deflate household income which is net of housing costs (see Figure 8).

But we need to acknowledge that the new headline measure will not always be the most appropriate deflator to use

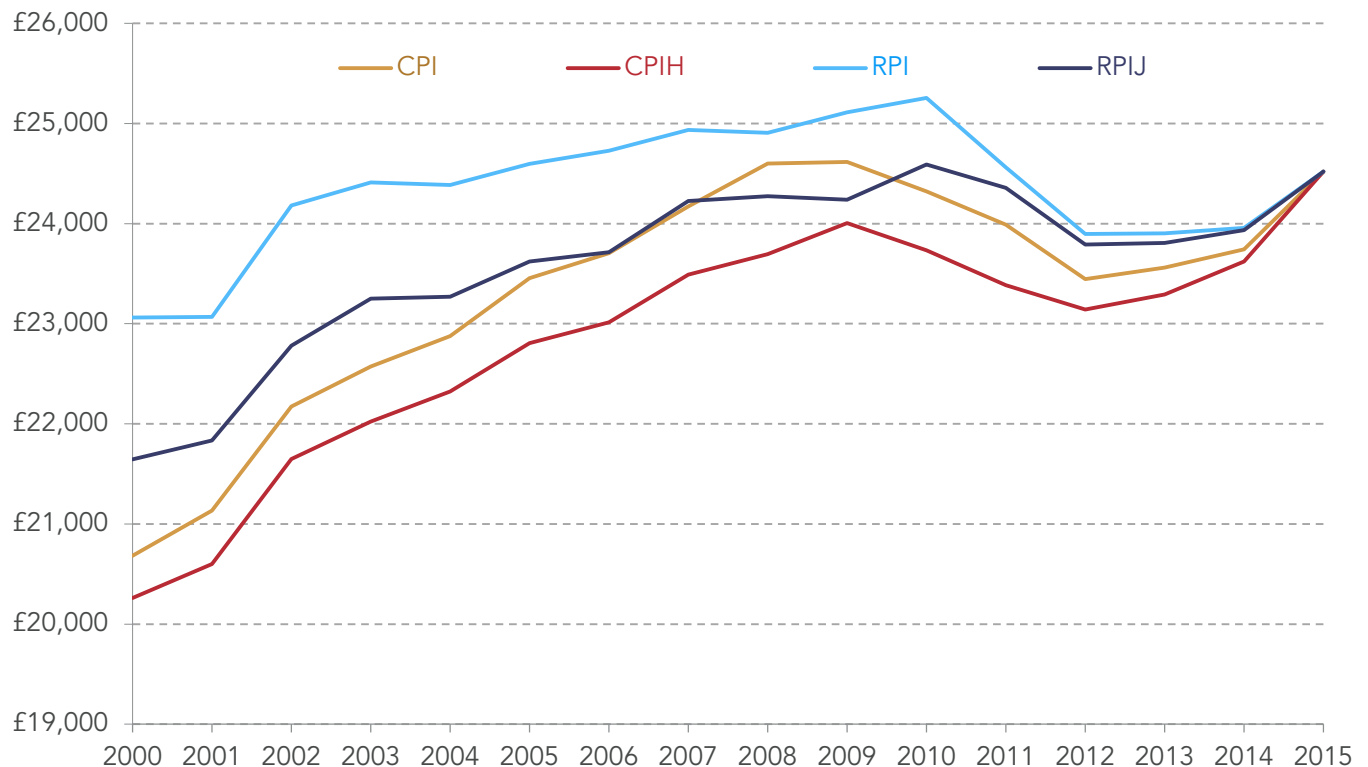
The differing trends produced when adopting different deflators raises the risk of ‘inflation shopping’ with users selecting the deflator that best suits the story they wish to tell. With this in mind, greater clarity on the use of consumer indices is welcome.

It would be wrong, however, to conclude that CPIH should be the preferred measure of inflation in all circumstances. Different measures serve different purposes, and there are legitimate reasons why an alternative deflator might be better in some situations. For example, when converting survey-based measures of income into real-terms, CPIH may not be the best option due to it including or excluding cost elements which are included or excluded from the definition of ‘income’ used in the survey.

Figure 7 presents trajectories for median disposable household as captured in the DWP’s *Family Resources Survey* and deflated using the same suite of deflators considered above. As with wages, we see that incomes appear to have grown most slowly when using RPI and most rapidly when using CPI. And – again as before – the depth of the post-crisis squeeze on incomes varies depending on the deflator used.

Figure 7: Income has grown slowest when deflated using RPI

Real-terms median disposable household income (equivalised and BHC) using different deflators



Source: RF analysis of ONS, Consumer prices Inflation & Family Resources Survey

Yet none of the four deflators quite matches what is on the income side of the equation. The survey data used in Figure 7 includes all sources of income and makes no adjustment for housing costs (it

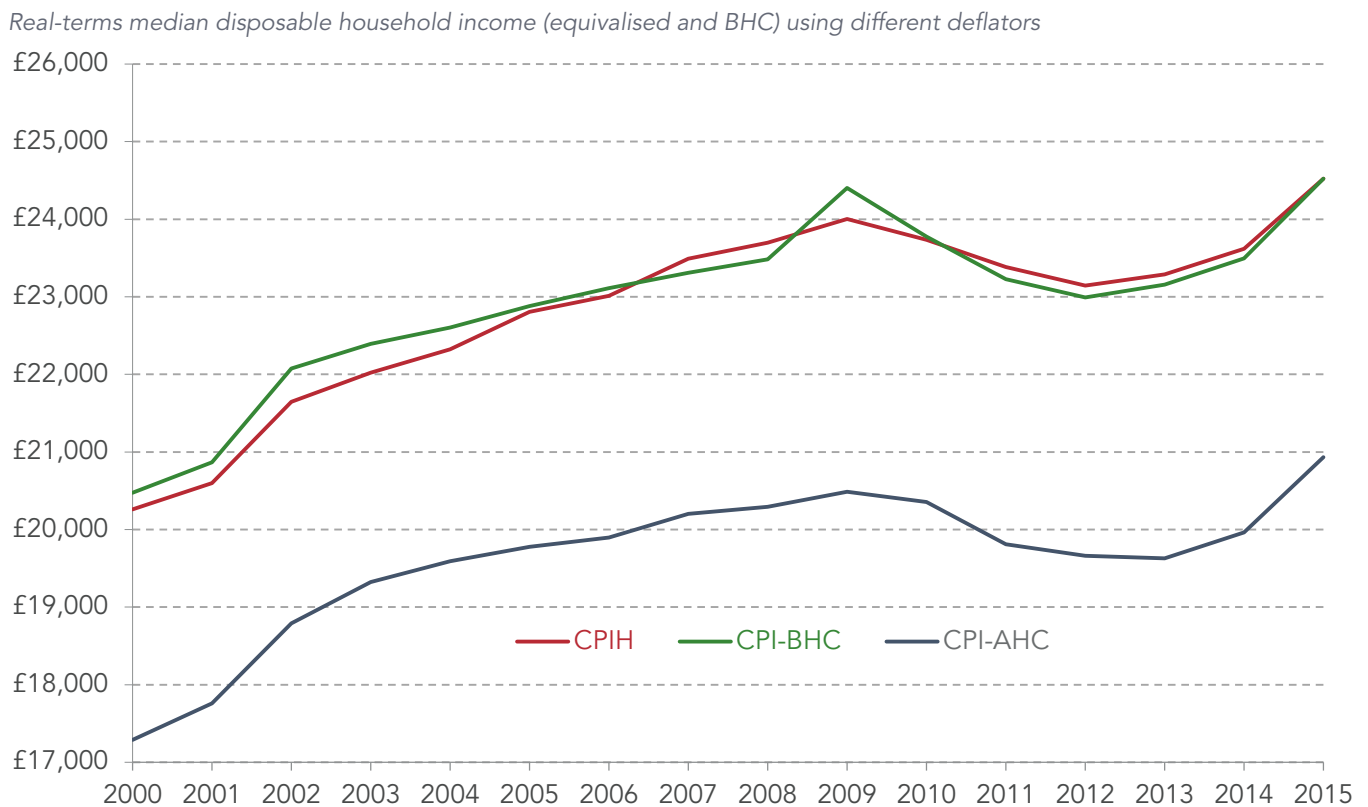
is ‘before housing costs’ (BHC) income). Our deflator therefor needs to be a broad one, with some element of housing costs included. CPI is therefore inappropriate. Yet the precise nature of the housing costs included in the other deflators means that they too are not quite right. For example CPIH includes owner occupiers’ housing costs but does not include mortgage interest payments which are considered a housing cost in the survey.

An alternative approach – and one adopted by the DWP when presenting this income data – is to use a bespoke deflator which better matches what is included in income. The CPI-BHC deflator does just this (as discussed in Box 3).

A still more accurate way of controlling for housing costs is to account for them at the individual level. That is, we can measure household income ‘after housing costs’ (AHC) directly in the survey in order to avoid having to apply an economy-wide housing cost deflator that will overstate costs for some households and understate for others. In this instance, our deflator must exclude housing costs. CPI is an option, but it contains some housing costs and therefore would double count. Better – and again the approach followed by the DWP – is to create a bespoke deflator that removes precisely the housing cost removed from the AHC income measure (the CPI-AHC deflator).

Figure 8 compares BHC income deflated using both CPIH and the bespoke CPI-BHC deflator and AHC income deflated using CPI-AHC. It shows that the choice of deflator makes a relatively small – but important – difference to the real-terms version of BHC income. Switching to AHC income has a larger effect, better capturing the actual housing costs faced by different households in the population.

Figure 8: Our preferred measure of after housing costs income removes actual rentals and mortgage interest from disposable income



Source: RF analysis of ONS, Consumer prices Inflation & Family Resources Survey

All headline inflation measures mask differences in individual experiences

While differences in method, coverage and population can affect the appropriateness of different measures of inflation in different circumstances, all of the measures discussed above face potential communication problems. That is, households are unlikely to recognise the technical measurement of inflation as accurately reflecting the changing cost of living that they face.

The development of alternative measures that better reflect the price changes understood by households – in relation to mortgage payments or insurance premiums for example – provides one potential way forward. This is the principle underpinning the approach advocated by Astin and Leyland^[5] and now being pursued by the ONS (see Box 4).

i Box 4: Index of Household Payments

In making the case for a new household inflation index, Astin and Leyland establish a number of key points of principle:

Weighting each household equally: At present the CPI is weighted based on the share of expenditure that a household accounts for and so it apportions more weight to the experiences of higher spending households.

Including gross interest costs: For example, a new index should reflect the cost of interest on loans without adjusting for interest paid on deposits because households recognise the former as a cost change when interest rates move.

Reflecting price changes at the time at which a good or service is purchased not when it is acquired: In most cases purchase and acquisition occur simultaneously, but on occasion households purchase something upfront and consume it later (university tuition fees) or vice versa ('buy now pay later').

Utilisation of a payments approach to owner occupiers' housing costs, rather than rental equivalence: This

approach would reflect the fact that households observe price changes most readily in terms of their mortgage payments.

Based on the Astin and Leyland work, the ONS is considering the creation of an 'Index of Household Payments'. The ONS has set out proposals and received feedback, and it currently plans to release the first experimental publication on changes to household income and costs by the end of 2017.^[1]

Ahead of this, it intends to release a series of analytical articles covering many of the – as yet – undecided points of principle underpinning the new measure. These include issues around weighting, population coverage, the treatment of interest payments and the potential for matching a new index with compatible measures of income. It is also unclear at this stage whether the index will be presented as an aggregate measure or as a series of group-specific indices.

[1] ONS [Developing an Index of Household Payments](#) August 2016 and ONS, [Developing an Index of Household Payments, summary of responses: Dec 2016](#) December 2016

Such an index could provide an important step forward. But even in this approach it remains the case that the precise inflation rate experienced by an individual or a household will depend on what, and how much, they consume – and that this will differ from the average rate of inflation recorded by the headline measure. For example, some households will spend more on restaurants and hotels than others (as a share of their total spending) and so will be more affected by rising prices in those sectors, but the headline inflation rate will average across the experience of all households. In some instances (in relation to private tuition fees for example) a majority of households will be entirely unaffected by price changes, yet will still find movements incorporated within their average inflation rate.

[5] J Astin & J Leyland, [Towards a household inflation index](#), 2015

In this sense each individual and each household experiences their own inflation rate. While it would be impractical to publish inflation indices for each household it is possible to create bespoke indices that better reflect the experiences of different groups in society. Such an approach was recommended as part of the Johnson Review and (as noted in Box 4) is being considered alongside the development of an index of household payments. We produce our own version below.

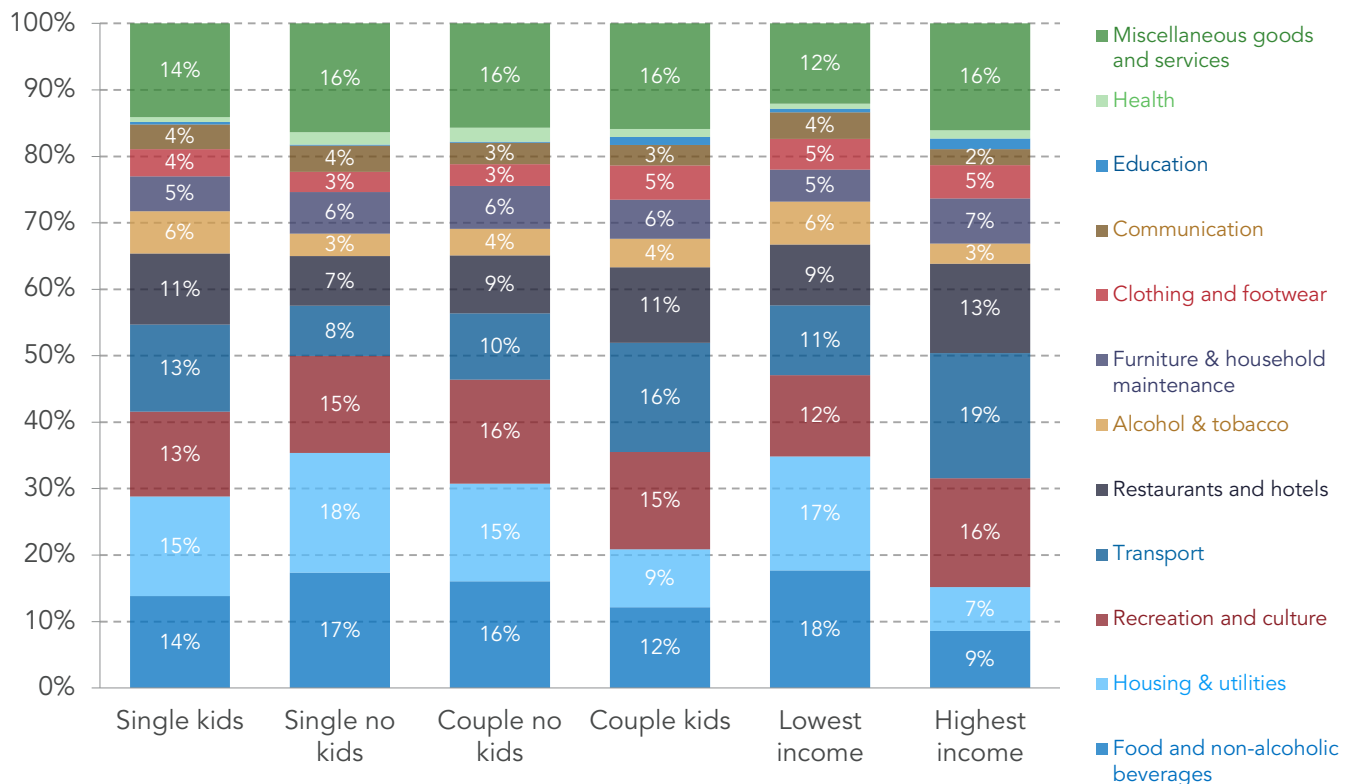
Inflation tends to be higher for single person households, lower income households, pensioners, and those renting privately

One way to produce inflation rates that more closely match the experiences of particular households is to take into account how different types of households allocate their spending.

Figure 9 shows that where a household is in the income distribution affects how much it spends on different items each week. Households in the bottom fifth of the income distribution allocate 18 per cent of their weekly spend on food and non-alcoholic drinks, whereas such items account for just 9 per cent of spending in the top fifth. The situation is reversed for transport with richer households spending proportionally more.

Figure 9: Spending differs by household: 2014

Share of weekly spend accounted for by different categories (% of total expenditure)



Notes: Household income is equivalised, before housing costs, for working-age households. Housing and utilities does not include mortgage principal or interest payments paid by owner occupiers and so the above does not include full owner occupier's housing costs that CPIH does. Housing and utilities is also net of housing benefit.

Source: RF analysis of ONS, LCFS

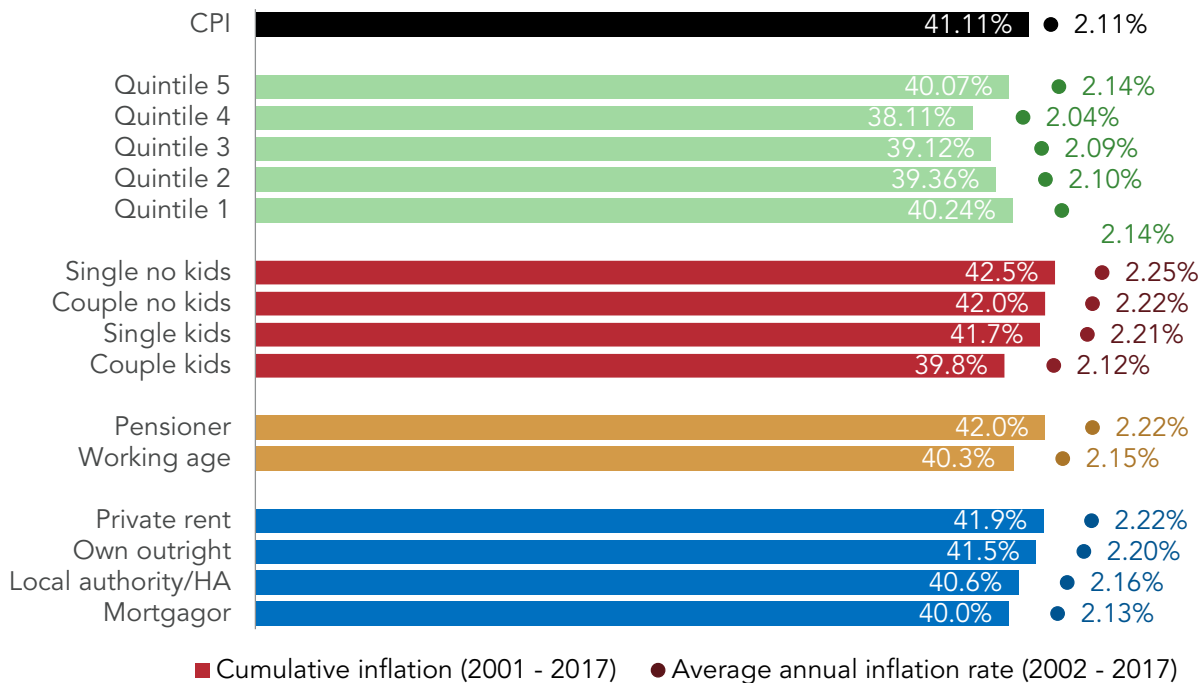
There are similarly differences in spending between single and couple households and between those with children and without. Figure 9 shows that couples with children spend proportionally less on housing and utilities but more on transport than single households with no children.

Given these different group-specific ‘baskets’, the inflation experience of different households will be affected by the degree to which prices change at different rates for different items. For example, if prices rise at a more rapid rate for food and drink than for transport then poorer households will experience higher inflation than better-off ones.

Figure 10 considers these differences by showing the cumulative (CPI-based) inflation faced by different sub-population groups in the period between 2001 and 2017. It shows that households without children experienced higher inflation than those with children, with single person households without children experiencing the highest inflation rate of all.

Figure 10: Single people, those without children, pensioners and those in the private rented sector all experienced greater inflation: 2001 – 2017

Cumulative and average annual inflation rate for different households



Notes: See Figure 11. Household income is equivalised, working age and before housing costs. All family types are working age. CPI is higher than the inflation rates for the income quintiles because it was higher for retired households over the period and the income quintiles refer to only working age households.

Source: RF analysis of ONS, LCFS and ONS, Consumer prices Indices

In understanding these differences, we need to reflect on what’s happened to prices of different parts of the CPI basket. For example, housing costs have jumped by 89 per cent since 2001,^[6] helping to explain why single person households – which spend proportionally more on housing and utilities than other household types – have experienced higher inflation overall. Food and drink and transport divisions have both increased by around 50 per cent over the period, with implications for those households spending disproportionately more on such items. At the other end of things, clothing and footwear prices have fallen by 34 per cent since 2001, helping to pull back on inflation for households with children which spend proportionally more on such items.

[6] The second-highest increase of any division. The highest was education which is mainly the result of rising university tuition fees.

The results set out in Figure 10 chimes with previous work by the Institute for Fiscal Studies which showed that working age single adult households also experienced the highest inflation rate between 1976 and 2000 (7.3 per cent compared to 6.9 per cent for couples with children and 6.9 per cent for all households).^[7] Both pieces of research therefore suggest that single adult households have experienced consistently higher inflation for over 40 years.

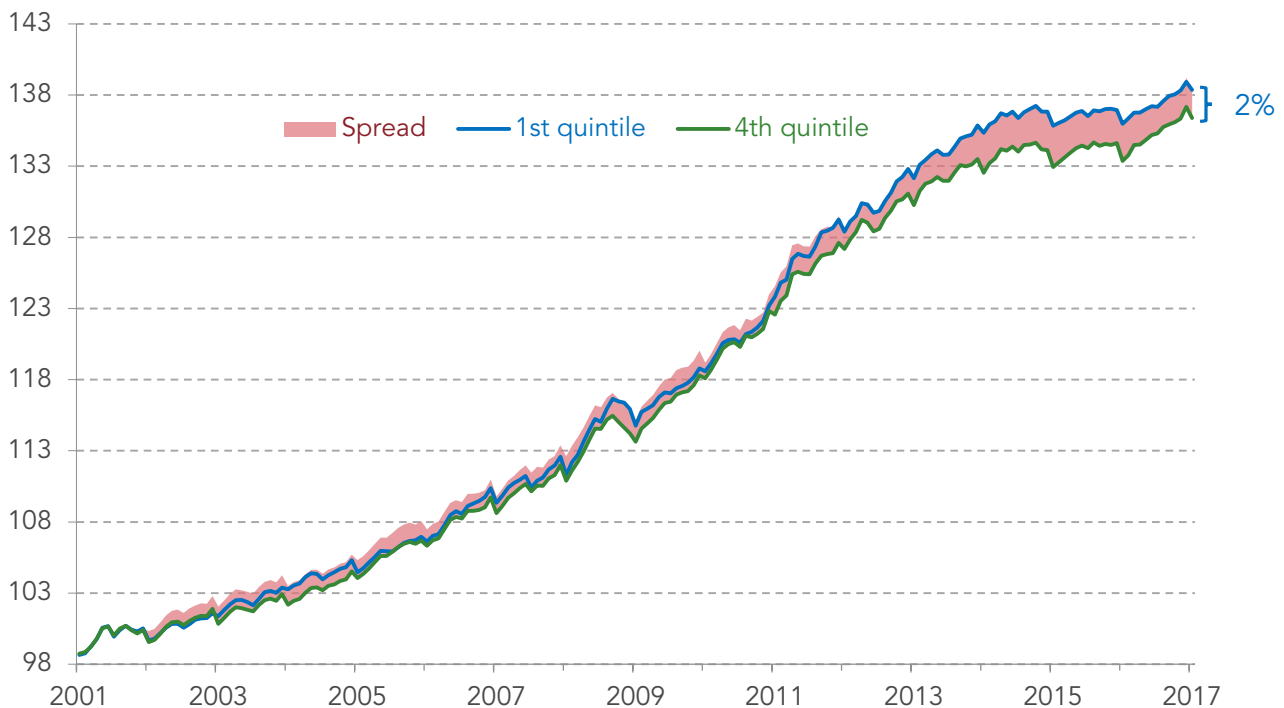
Another interesting result from Figure 10 is that inflation falls with household income until we reach the top quintile of the income distribution (with the top 20 per cent experiencing higher inflation over the period than all other quintiles bar the bottom quintile). This is almost completely due to the fact that this group spends more on education goods and services than the other quintiles, with the price level of these goods and services rising by 346 per cent over the period, far more than any other category.

Given these different profiles for sub-population inflation experiences, we can consider what this means in money terms by undertaking a simple thought experiment: namely, what would one group’s spending power look like if they had faced the group-specific inflation rate experienced by another group over a sustained period?

In Figure 11 we consider the cumulative difference in inflation experienced between the first (poorest) and fourth quintile of the income distribution in the period since 2001. Although the differences are typically small in any given year, over time they add up to a non-trivial 2 per cent difference in inflation. Given the incomes of households in the bottom quintile, this difference in inflation is equivalent to around £150 of spending power.

Figure 11: Lower income households tend to experience greater inflation than higher income households

Cumulative inflation by income quintiles



Notes: Expenditure weights for the twelve divisions for different income quintiles are calculated from ONS, LCFS and corrected to better match with national accounts using weights provided by ONS, *Variation in the inflation experience of UK households: 2003 – 2014*. The inflation rate is the weighted sum of each of the 12 divisions. Household income is equivalised, working age and before housing costs.

Source: RF analysis of ONS, LCFS and ONS, *Consumer prices Indices*

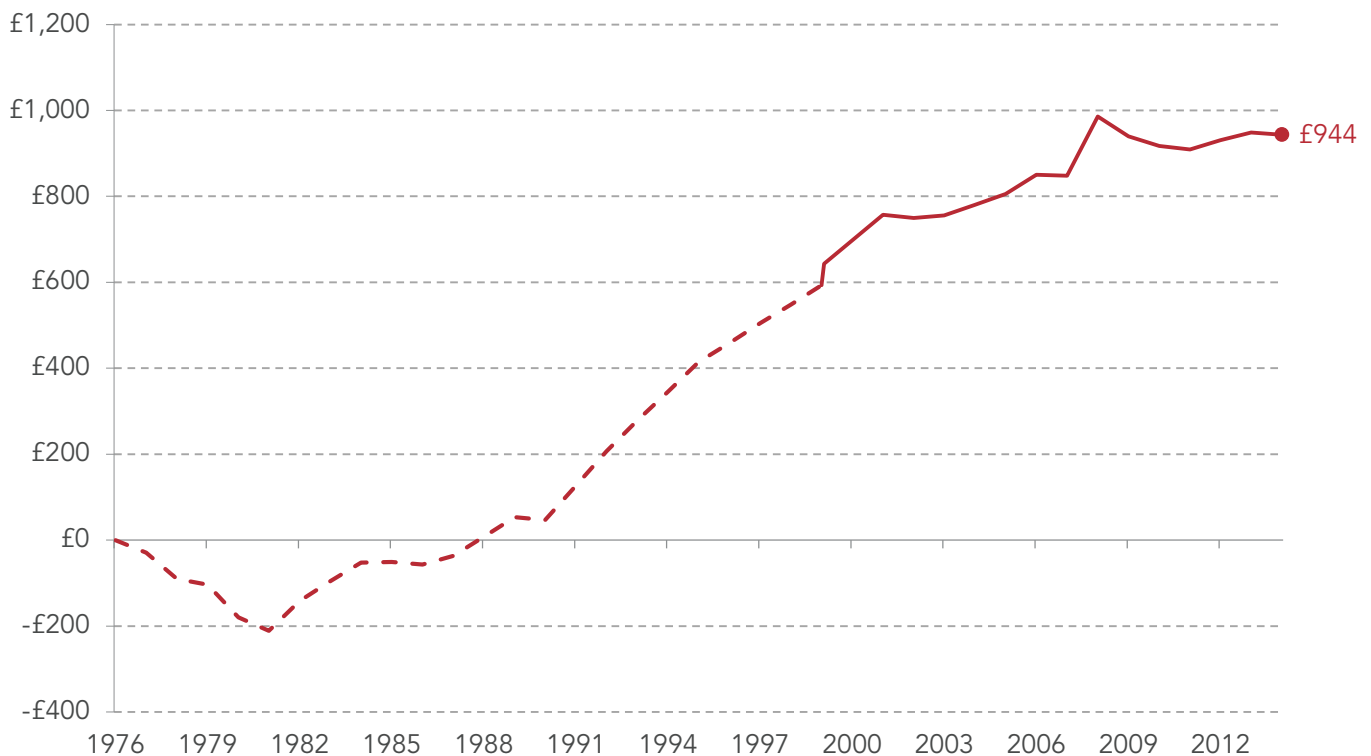
[7] I Crawford & Z Smith, *Distributional Aspects of Inflation*, Institute for Fiscal Studies, 2002

Another way to appreciate the impact of differences in inflation is to consider how much the headline measure of inflation under- or over-states the actual level of inflation (and therefore spending power) they have faced over a given time.

Taking single person households without children – which we believe have experienced higher-than-average inflation for the last 40 years – Figure 12 implies that members of the group would have £944 more spending power in 2014 had they experienced the actual reported headline rate of inflation in the period since 1976. By way of context, note that £944 represents about 7 per cent of the average disposable household income for a single person household in 2014; a non-trivial amount of money.

Figure 12: Single households with no children would have been around £1,000 better off should they have experienced the inflation rate faced by a couple household with children

The cumulative effect (£) upon annual spending power of the difference between the inflation experienced by single person households with no children and the rate for all households



Notes: This was calculated by deflating the mean disposable equivalised household income of a single person household with no children by the inflation rate that group experienced over the period and by the headline inflation rate RPI in the period before 2000 and CPI thereafter. The cumulative impact of inflation was then calculated for both series and the difference taken. The dashed line indicates where inflation data was taken from Crawford & Smith, *Distributional Aspects of Inflation*, Institute for Fiscal Studies, and so was computed in a different way to how inflation indices for different groups have been calculated in this paper. Nevertheless, given that it is the difference in inflation experiences rather than the absolute magnitude of the inflation experienced that is important, this does not affect the calculation.

Source: RF analysis of ONS, *FES*, ONS, *FRS/HBAL*, and ONS, *Consumer prices Indices*. Data on inflation between 1976 and 2000 provided by Crawford & Smith, *Distributional Aspects of Inflation*, Institute for Fiscal Studies, 2002.

Even with our more detailed look at sub-population inflation rates we aren't capturing the individual experience of inflation – we're still aggregating, just at a much lower level than the headline. Sub-population indices can be improved further by switching from 'plutocratic' weighting (where the relative contribution that each household makes to the index is based on their expenditure) to 'democratic' weighted (where each household contributes equally). See Box 5 for further discussion.

i Box 5: Plutocratic versus democratic inflation indices

So far, all the inflation indices we have been discussing are plutocratic indices. Weights are derived from household spending and each household's contribution is based on how much it spends. A democratic inflation index would weight the inflation experience of each household equally.

Whether or not democratic and plutocratic indices differ that much will depend on how much the composition of spending varies across households. When households tend to spend very different amounts on different things then the difference will be greater.

Previous work looking at inflation between 1975 and 2000 found that plutocratic and democratic indices were

significantly different in 18 of the 25 years examined.^[1] More recent work by the ONS found that the average difference between CPI and a democratically calculated inflation index for all households was 0.3 percentage points and that there were bigger differences in the plutocratic and democratic indices for retired households and for households without children.^[2]

[1] I Crawford & Z Smith, [Distributional Aspects of Inflation](#), Institute for Fiscal Studies, 2002

[2] T Flower & P Wales, [Variation in the inflation experience of UK households: 2003 – 2014](#), ONS, December 2014

Democratic indices may better reflect the experience of the typical household but plutocratic indices are a better measure of the inflationary pressure in the economy given that they take into account the fact some households tend to spend more than others. Again, it is clear that there is not perfect measure of inflation but that we can make choices to better understand the inflation experiences of particular households or groups.

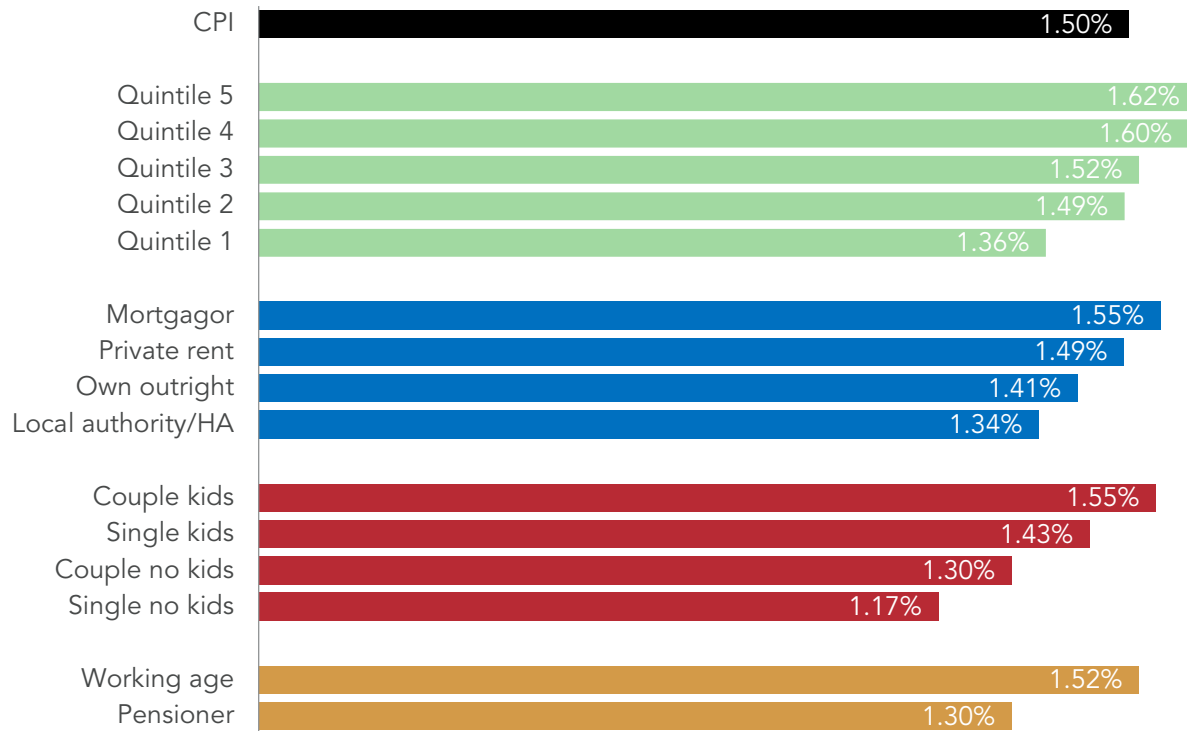
Recent rises in inflation have been more heavily felt by higher income households, but this could well change in 2017

As noted earlier, year-on-year inflation has picked up significantly over recent months: the CPI rate has doubled since October alone. It is expected to rise further still in the coming months, playing a leading role in the living standards story of 2017. With this in mind, it's worth considering variations in recent experience across different groups.

In contrast to the longer-term picture set out above, Figure 13 shows that higher income households, households with children and working age households have experienced marginally higher inflation than other groups in the period since May 2016. There has been a 1.6 percentage point increase in inflation for households in the top 20 per cent of the income distribution since May, whereas it is 1.4 per cent for households at the bottom of the distribution.

Figure 13: Households with higher levels of income and mortgagors have experienced higher inflation than other households since the EU Referendum: May 2016 – January 2017

Increase in annual inflation between May 2016 & January 2017



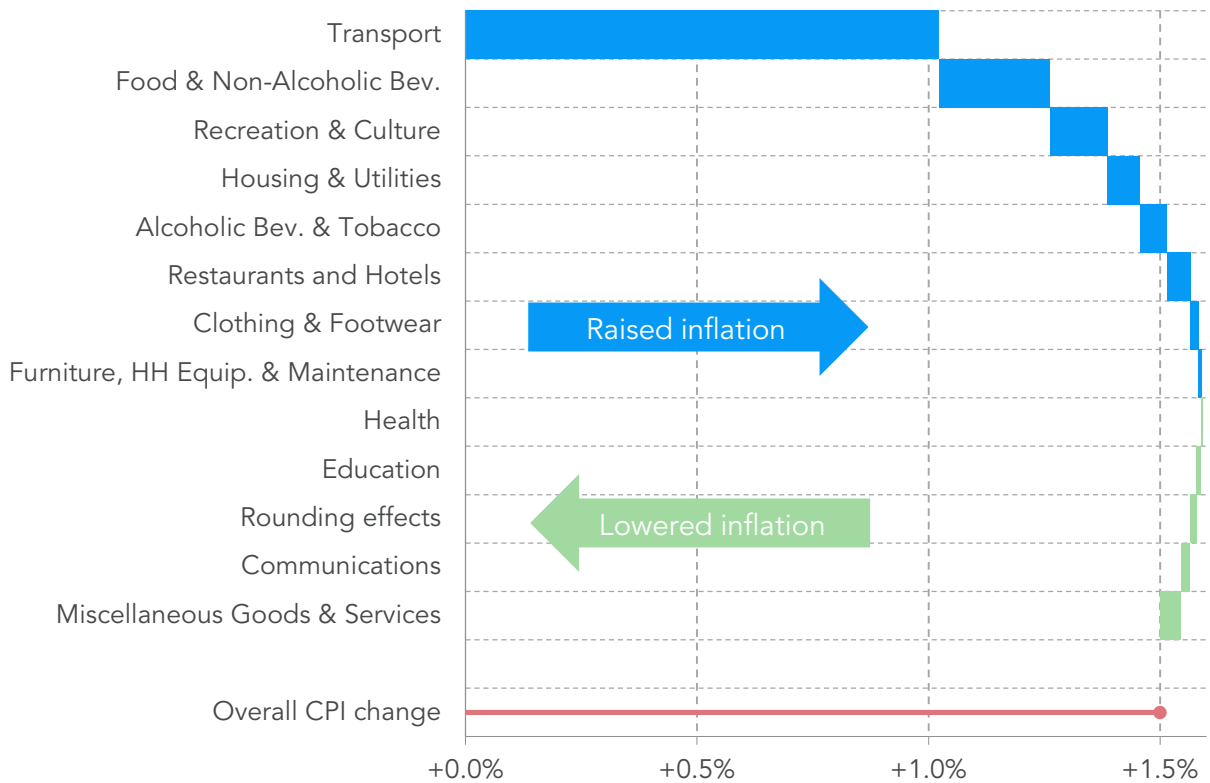
Notes: See Figure 11. Household income is equivalised, working age and before housing costs. All family types are working age.

Source: RF analysis of ONS, LCFS and ONS, *Consumer prices Indices*

As before, we can better understand why the recent pick-up in inflation has played out in this way across the population sub-groups by assessing which items have done most to drive inflation. As Figure 14 shows, transport has been a major factor. It has accounted for just over 1 percentage point of the 1.5 percentage point increase in annual CPI inflation experienced since May 2016. As such, we can conclude that the marginally higher level of inflation faced by higher income households in recent months is the product of their tendency to allocate more of their overall spending on transport.

Figure 14: Increases in transport inflation accounts for most of the rise in CPI since May

Contribution to 1.5 percentage point increase in annual CPI inflation between May 2016 & January 2017)



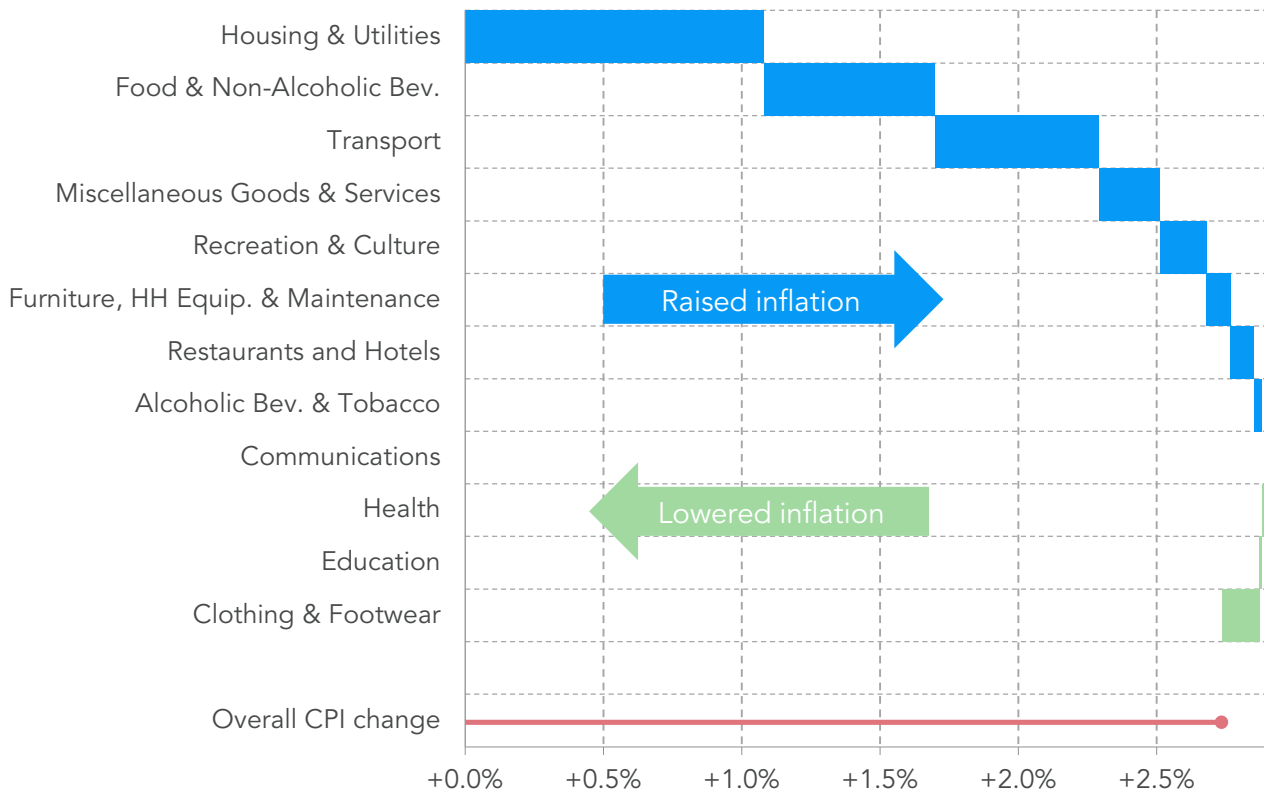
Source: RF analysis of ONS, Consumer prices Indices

Yet there is good reason for expecting the shape of inflation to change in the coming months as it heads higher. While the post-referendum depreciation in sterling is having some effect on inflation, much of the recent change has been driven by oil price rises. As the sterling effect builds in 2017, past experience suggests that we might expect to see food and drink and housing and utility costs making more of a contribution to overall inflation.

Of course we cannot predict exactly which goods are likely to rise in price over the coming months, but we can gain a useful insight by focusing on a previous period of rising inflation that was also triggered by a dramatic fall in the value of the pound. On a trade-weighted basis sterling fell 14 per cent between September 2007 and September 2008; over the same period there was a 2.6 percentage point increase in CPI. As shown by Figure 15, the rise in inflation in this instance was driven by housing, food and drink and transport. If something similar occurs this time around, then we would once more expect to see higher levels of group-specific inflation among lower income households.

Figure 15: Increases in housing, food & drink, and transport accounted for most of the rise in CPI during the last major period of rising inflation

Contribution to 2.57 percentage point increase in annual CPI inflation between September 2007 & September 2008



Source: RF analysis of ONS, Consumer prices Indices

Tracked over long enough horizons, variations in inflation across the income distribution have tended to balance out. However, the 21st century experience has so far clearly weighed against lower income households. The differences we have found in this and previous work (which looked at household income on an after housing costs basis) are – while not large – non-trivial. Should they continue in future, then lower income households will have less spending power than an analysis of the headline inflation measure would suggest. It will therefore be important to continue to monitor differences across groups and it is welcome that the ONS is planning on releasing further data on the different inflation experiences of households later this year.

Alongside the headline change there is an ongoing need for development of our inflation measures

It appears that some groups do experience different inflation rates, and that these differences may sometimes endure over time. However, we base this conclusion on the assumption that households do not change their consumption in response to price changes. This assumption is not likely to reflect how households actually act; instead they may substitute spending on a good whose price is rising faster for one whose price is rising at a slower rate.^[8] As a result it is likely that our group-specific inflation indices, like the other indices produced by the ONS, overstate inflation.

[8] See A Corlett & S Clarke, [Living Standards 2017 The past, present and possible future of UK incomes](#), Resolution Foundation, February 2017 for a longer discussion.

Work by the ONS has shown that the failure to account for this substitution effect may have overstated annual inflation by approximately 0.5 percentage points between 2007 and 2009.^[9] Taking this substitution effect into account is difficult and data intensive. However, changes in the formula used to calculate inflation indices or the development of a household inflation index (see Box 4) could approximate the substitution effect and the ONS is undertaking welcome research into both.

Other developments merit consideration too. So far we have calculated the different inflation experiences of groups based on their different consumption patterns. But groups may also experience different inflation rates because they face different prices for similar goods. The standard assumption that households face the same prices may not hold because households may pay different prices for similar goods because of where they are in the country (see Box 6) or because of the specific goods they buy (for instance if they tend to buy branded goods rather than supermarkets own products).

Unfortunately there is limited data with which to test this because the ONS only releases price data for broad items (such as “large loaf, white, unsliced, 800g”) and does not disaggregate geographically. Further research could examine the extent to which prices differ for different households and try to ascertain if as a result average, or even group-specific, inflation indices systematically under or overstate inflation for certain households.

[9] G. Clews, R Sanderson, J Ralph, [Calculating a Retrospective Superlative Consumer prices Index for the UK](#), February 2016

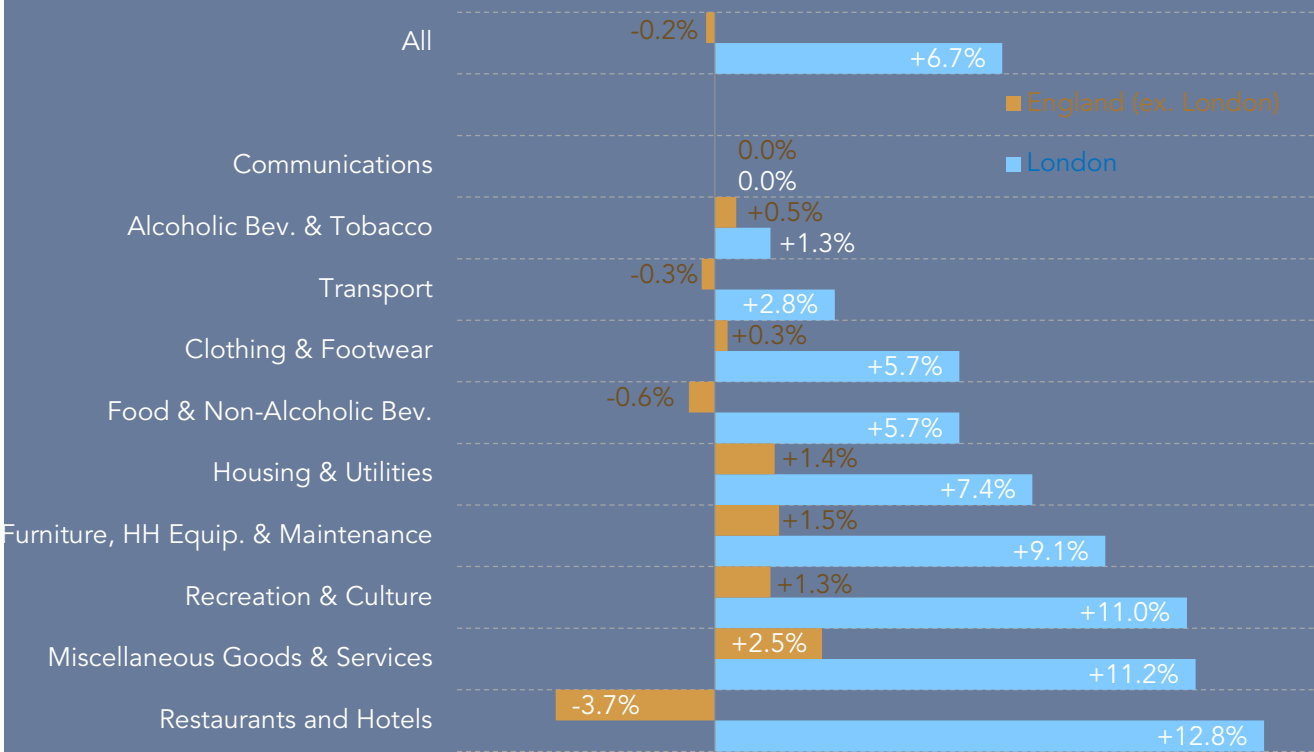
i Box 6: Differences in inflation across the country

Some other countries, such as the US, publish regional inflation indices that capture different price levels and inflation rates across the country. The UK does not publish such data on a consistent basis. The ONS has published data on the differences in the prices of broad categories of goods across the UK on three occasions (in 2003, 2004 and 2010), but the data cannot be used to estimate changes in the price level over time or regional rates of inflation.^[1]

Despite these drawbacks, the data provides a useful indication of how price levels differ across the country. It suggests that households in different parts of the country face different prices for similar goods, with prices in London 6.7 per cent higher than those elsewhere (see Figure 16). Prices of restaurants and hotels are 12.8 per cent higher, though there is no difference in the price of communications. And it may surprise punters in London pubs to know that there is a relatively small difference between the price of alcoholic drinks in the capital and in the rest of the UK, though this is most likely because prices differ little in the supermarkets.

Figure 16: Prices in London are higher than in the rest of the country

Price level relative to national price level (UK=0)



London however is somewhat of an outlier with the price difference between the other countries and regions and the United Kingdom price level averaging just 1.4 per cent. Other geographical differences, such as between urban and rural areas, may be important, although we do not have the data to investigate this. Without better regional data any analysis of the differences in inflation experienced by groups is incomplete, and in the case of households in London it is likely to have a big effect.

[1] ONS, [UK Relative Regional Consumer prices levels for Goods and Services for 2010](#)

Should further research reveal that the different inflation experiences of groups is more significant or enduring, then policy makers may want to mitigate the effects. For example, a case could be made for uprating benefits in line with group-specific inflation rates. Alternatively, policy makers could try to tackle the source of differential inflation – working to slow down the housing cost increases that have driven higher inflation for singletons for instance.

Given the importance of inflation – in terms of how it shapes our understanding of the past, its effect on household living standards in the present and its key role in determining the pace of real income growth in the coming months and years – this is a topic that we will continue to return to. For the moment though the change from CPI to CPIH does mean that we will be changing the inflation indices we use in our work. For full details see Box 7.

i Box 7: The key inflation indices RF uses

Earnings: When deflating earnings data RF will move from using RPIJ to CPIH. Our preference for RPIJ was driven by the fact that it provided a fuller measure than CPI (by including housing costs) and – unlike CPIH – was a National Statistics. The elevation of CPIH and the imminent end of RPIJ means that we must now switch.^[1]

Household income after housing costs: For deflating household incomes after housing costs we will continue to use a variant of CPI compiled by the ONS for the DWP that

excludes rents, maintenance repairs and water charges.

Household income before housing costs: For deflating household incomes before housing costs we will continue to use a variant of CPI compiled for the DWP that includes mortgage interest payments, ground rent and dwelling insurance.

Depending on the ONS' development of the household inflation index we are likely to be interested in using this measure in the future and will also make further use of group-specific inflation rates.

[1] J Pullinger, [Statement on future of consumer prices inflation statistics in the UK](#) November 2016

Annex

Datasets

The analysis in this report is based on the ONS, *Consumer prices inflation* and *Living Cost and Food Survey (LCFS)* releases. Estimates of spending on different divisions of goods and services are produced using the *LCFS* and information on the inflation rate of these divisions is provided by the *Consumer prices inflation* data. In addition to this the *LCFS* provides data on incomes and the ONS, *Consumer prices inflation time series dataset* provides the historical inflation data.

Calculating inflation rates for different groups

Our approach to calculating inflation rates for different groups is similar to that used by T Flower & P Wales in *Variation in the inflation experience of UK households: 2003 – 2014*. Slightly different is the fact that we calculate spending shares for groups at the divisional rather than the group level, similar to the approach we have used previously.^[10] Where we and Flower and Wales have calculated indices for the same group we find that our results are consistent, therefore we are confident that using divisions rather than groups is not problematic, nevertheless in future work we will explore the use of group data.

[10] A Corlett & S Clarke, [Living Standards 2017 The past, present and possible future of UK incomes](#), Resolution Foundation, February 2017

After calculating weights using the LCFS we then adjust these to make them comparable with the weights derived from national accounts using the difference between LCFS and CPI using ratios provided in *Variation in the inflation experience of UK households: 2003 – 2014*. Spending shares are produced for each year between 2001 and 2014 and are used to weight the price data. We extend our analysis to January 2017 using expenditure data from 2014 because this is the latest available data. We feel that this is justified due to the fact that expenditure shares do not change much over time.

In calculating the differences in inflation experienced by single-person households without children compared to the headline inflation measure we draw upon data produced by I Crawford & Z Smith, *Distributional Aspects of Inflation*, Institute for Fiscal Studies. Crawford and Smith create versions of the retail prices index for different groups and calculate that between 1976 and 2000 single person households (of working age) experienced average annual inflation of 7.3 per cent compared to 6.9 per cent for all households. We use this information, in conjunction with our own calculations for the period after 2000, to produce inflation indices for single person households and all households from 1976 to 2014.

We then deflate net disposable household income before housing costs, taken from the Family Expenditure Survey and from 1994 the FRS/HBAI, for single person households without children using their own deflator and that of all households. The cumulative impact of inflation was then calculated for both series and the difference taken.



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- » *developing practical and effective policy proposals; and*
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