

Household Cost Indices, UK: methodology for second preliminary estimates, 2005 to 2018

This article provides the methodological framework for the second preliminary estimates of the Household Cost Indices.

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Release date:
8 August 2019

Next release:
To be announced

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1 . Introduction

The Household Cost Indices (HCIs) are a set of experimental measures, [currently in development](#), that aim to more closely reflect UK household experience of changing prices and costs. More specifically, they will aim to measure how much the nominal disposable income of different household groups would need to change, in response to changes in costs, to enable households to purchase the same quantity of goods and services of the same quality. Put simply, the broad approach of the HCIs is to measure the change in the outgoings of households.

When considering the household experience of changing costs, it is informative to look at different groups within the population, as we would expect them to experience changes in prices and costs differently. Our analysis in [2014](#), [2017](#) and [2018](#) has demonstrated that different household groups (for example, retired households and low-income households) can experience different levels of inflation. Therefore the [second preliminary estimates of HCIs](#) focused on measuring the experience of a number of different population groups, although an all-households index has been produced for reference.

The Consumer Prices Index including owner occupiers' Housing costs (CPIH), our lead measure of inflation, measures changes in the prices of goods and services as consumed by households. While measuring changes in the price of consumption is extremely important for measuring economic activity in the UK, it does not always reflect the changes in prices and costs that are directly observed by UK households ¹.

For example, the CPIH measures owner occupiers' housing costs (OOH) using a rental equivalence approach. This approach estimates the cost of consuming housing services by calculating the price that would need to be paid to rent an equivalent property. The HCIs will look at using a measure of direct payments in place of [rental equivalence](#) (such as mortgage interest payments, dwelling insurance, ground rent and Stamp Duty Land Tax) to more closely reflect changes in costs as they are experienced by UK households.

A [methodological article](#) on the HCIs was released alongside the first publication. This article described the methodological differences between the CPIH and the [first preliminary estimates of the HCIs](#) and explored the impact of each of these differences. The present article builds on the former article, and provides the methodological framework for the [second preliminary estimates of the HCIs](#), published in April 2019, which benefits from further development work, following discussion with the [Advisory Panel on Consumer Prices - Technical](#).

This article has three aims. First, it complements the previous article through additional methodological information. Secondly, the article presents a new component (student loan repayments) which was developed for the second HCIs preliminary release and replaces the measure of tuition fees used in the first preliminary estimates (and also in CPIH and CPI). It also presents specific results for the student loan repayment component. Further methodological changes that have impacted on the HCIs are also presented (for example changes in owner-occupiers household costs). Thirdly, the article compares the HCIs estimates in the previous and in the current releases. The comparison will show how methodological changes have improved estimates.

For completeness and ease of reading, this article retains much of the information from the former methodological article. It is noted that the former, being the first release, had a format which introduced the reader to the main differences of the HCIs from CPIH.

The present article follows a format which, while including the differences from CPIH, focuses on the through-time development of the HCIs. It starts with the theoretical background, and then presents the data used, methodology, impact analysis and future developments. The former article presented a section called "Cumulative impact of changes" where the HCIs were compared with CPIH and RPI, which is not now included.

Because the second preliminary HCIs series is the most up to date, this should be referenced for research purposes. Any future changes to the HCIs will be highlighted in future releases and, during the development phase, we will update the historical series accordingly.

It should be noted that the HCIs are experimental; therefore, we would caution against any use of the indices, other than for research and indicative purposes. We welcome feedback on the methodology presented in this article to cpi@ons.gov.uk.

Notes for: Introduction

1. Please refer to a description of the different measures and approaches to inflation in the UK ([Measuring changing prices and costs for consumers and households: March 2018](#)).

2 . Structure of this release

The preliminary estimates of the Household Costs Indices (HCIs) differ to measurement of the Consumer Prices Index including owner occupiers' housing costs (CPIH) in five different ways. These are:

- the use of democratic weighting
- the use of a payments approach for measuring owner occupiers' housing costs (OOH)
- the inclusion of a measure of interest costs on credit card debt
- the use of gross expenditure to calculate the weight for insurance premiums
- the inclusion of student loan repayments rather than the full cost of tuition fees

Section 3 outlines the proposal of the HCIs and the current development.

Section 4 provides information on the data used for the current development.

Section 5 describes the democratic weighting methodology that has been used to construct the HCIs and how it differs from the plutocratic method used by CPIH.

Section 6 has two subsections. Firstly, it details the results associated with the Education class of spending which underwent a change in treatment between the first and the current release of the HCIs. Secondly, Section 6 shows how the changes in the Education class of spending and other methodological changes have impacted on the second preliminary estimates of the HCIs.

Sections 7 and 8 discuss limitations and strengths of the HCIs.

3 . Background

Consumer price indices measure price changes across the economy. However, this may not necessarily reflect the households' month-on-month experience of changing prices and costs. Household Costs Indices (HCIs) are designed to fill this gap, that is, to measure price and cost changes as experienced by different household groups. The HCIs fulfil a different purpose compared with the Consumer Prices Index including owner occupiers' Housing costs (CPIH) which is the Office for National Statistics' (ONS) lead measure of inflation. Therefore, the focus of this publication is household subgroups.

The Consumer Prices Index (CPI) was the lead measure of inflation up until March 2017, when it was replaced by [CPIH](#). CPIH incorporates a measure of owner occupiers' housing (OOH) costs into the CPI framework. In line with CPI, CPIH has a largely acquisition-based approach with a few exceptions, depending on the goods and services in the basket.

With regard to OOH costs, CPIH adopts a “rental-equivalence” methodology (which is a use-based approach) similar to other international consumer price indices. The rental equivalence method consists of determining how much rent would be paid for an equivalent property in the private sector, as a proxy for housing services. In CPIH, OOH costs are thus imputed based on an estimate of equivalent costs for renting.

The HCIs build on CPIH with features which reflect their separate scope. Firstly, the HCIs aim to capture prices at payment, which leads to differences between CPIH and the HCIs for the classes of spending with a time lag between payment and use. This applies, for example, to university fees paid through a student loan, since the actual payment for a household is deferred. It follows that, while CPIH captures student loans through the full price of tuition fees in the year of enrolment, the HCIs adjust for student loans at the time of repayment.

CPIH and the HCIs also differ in their treatment of OOH costs ¹, which are a rental-equivalent approach and a payment approach respectively.

Another distinction between CPIH and the HCIs lies in the measurement of insurance premiums. In fact, CPIH expenditure weights are based on the service charge element of an insurance package, whereas the HCIs expenditure incorporates the full cost, including money used to reimburse households.

In addition, the measurement of changing prices and costs as experienced by households requires the inclusion of items that impact on a household budget but are not within scope of CPIH. This is the case with interest payments, which are not part of CPIH because interest on loans is neither a good nor a service consumed by households. They are however included in the HCIs, since they are part of the payments made by households to consume goods, and a change in interest rates impacts on household expenditure as much as a change in price of ordinary goods and services, as discussed in [Astin and Leyland, 2015 \(PDF, 546.12 KB\)](#).

The differential scope of the HCIs from CPIH similarly informs the weighting methodology for their estimation. While CPIH deploys a “plutocratic” weighting mechanism, the HCIs use a “democratic” method, as illustrated in Section 5.

3.1. Features of the HCIs

The preliminary estimates presented in the [first release of the HCIs](#) differed to CPIH in four ways:

- a democratic weighting method
- the use of a payments approach for measuring owner occupiers' housing costs (OOH)
- dwelling, transport and health insurance
- interest payments on credit card debt

In the [latest release](#), Education is a further class of spending which takes a different approach from CPIH. This stems from the HCIs' adjustment to replace tuition fees with student loan repayments, following discussion with the [Advisory Panel on Consumer Prices - Technical](#).

In the following paragraphs, the rationale for the addition of student loan repayments in the HCIs is discussed. This is presented alongside the treatment of OOH costs, insurance premiums and interest payments on credit card debt. Although these were also described in the [first methodological paper](#), the treatment of OOH costs has changed. In addition, the interest payment class has moved between the first HCIs preliminary estimates published in 2017, and the most recent (second preliminary) estimates, published in April 2019.

Data for the above items were either drawn from available data sources (for example Student Loans Company Data) or derived indirectly for the purpose of the HCIs, as will be illustrated in Section 4.

3.1.1. Student loan repayments

Students pay university tuition fees either up front or through a student loan which is repaid at a deferred date upon earning above a certain amount. Therefore, at any point in time, expenditure for university education consists of upfront payments, made by some households with current students, and of student loan repayments, made by households with ex-students.

Based on acquisition principles, CPIH accounts for total university tuition fees, whether paid up front or through a loan. For the HCIs, however, a distinction between the type of payment is necessary since only present expenditure affects a household budget. Therefore, the HCIs are designed to account for both upfront tuition fee payments and student loan repayments, which are weighted according to their share of expenditure. The latest HCIs series includes student loan repayments for the first time, with a view to including both types of payment in the next release.

It is noted that loan repayments may also cover former students' subsistence costs, which poses some limitations discussed later in this article.

3.1.2. Owner occupiers' housing (OOH) costs (payment approach)

Housing costs represent a large proportion of household expenditure. Households incur OOH costs as a result of owning, maintaining and living in their own home. Under the payment-based approach, OOH costs attempt to capture what households pay out as owner occupiers to consume housing services. At present, the costs refer to: mortgage interest payments, dwelling (building) insurance, ground rent, stamp duty, estate agent fees, home buyers survey, major repairs and maintenance, and house conveyancing.

In the [previously published HCIs results](#), Council Tax was included as a component of OOH costs, whereas for the [second results publication](#) it has been recorded in its own class of spending. Through the separate recording of Council Tax, which is paid both by tenants and owner occupiers, OOH costs now reflect more closely the payments faced by all households. The removal of Council Tax from OOH costs may cause some variation in the HCIs estimates between [the former](#) and [the latest release](#).

Compared to the former publication, there is a further change which warrants mentioning. In the first preliminary HCIs series, interest payments on credit card debt were included in OOH costs whereas in the second preliminary estimates they are recorded within the Financial Services class of spending (12.6).

The payment-based approach for OOH in the HCIs is the same as that published in [Measures of owner occupiers' housing costs, UK: October to December 2019](#).

3.1.3. Insurance premium (gross costs)

While life insurance is excluded from consumer price indices because it is regarded as a financial asset rather than a good or service consumed by households, insurances for the dwelling (house contents), transport and health are in scope and so are measured by both CPIH and the HCIs.

Households pay an insurance premium as a guarantee of compensation for loss (for example, through theft). The cost of an insurance premium results from the service charge paid to the company and from a payment into a “claims pool” from which claims are met. Based on their alternative purpose and acquisition or payment approach, CPIH and the HCIs capture insurance expenditure differently.

Under the acquisition approach, expenditure reflects the net impact on the household sector as a whole. In particular, insurance payments allocated to meeting claims are regarded as a transfer in the household sector, that is, payments from households claim-free are received by the households making a claim. Accordingly, the service charge is the only element captured by CPIH (net premium) for expenditure². Conversely, under the payment approach, expenditure is represented by the full cost of the package. Therefore, the HCIs adopt a “gross premium” approach for insurance.

3.1.4. Interest payments on credit card debt

Interest payments are the amount paid to borrow money, or for delaying the repayment of a debt, with costs increasing when interest rates rise. While interest payments are not part of CPIH, which measures the changing cost of consumption goods and services, they are measured by the HCIs which treat interest payments as a household outgoing.

Clearly, for owner occupier households, interest payments on a mortgage are the major outgoings within the category. Nevertheless, a household budget is also affected by other forms of debt, such as credit card debt, as well as loans and finance schemes for cars and other durable goods.

At this developmental stage, the HCIs comprise mortgage interest repayments (included in OOH costs), interest on student loans (captured in the student loan repayments component), and payments on credit card debt.

3.1.5 Capital mortgage repayments

The appropriateness of including mortgage capital in the HCIs has been discussed by the National Statistician’s [Advisory Panels for Consumer Prices \(APCPs\)](#) for a number of years, culminating in the recent [Economic Statistics Centre of Excellence workshop](#) on the conceptual foundations of the HCIs in April 2019. The capital element of housing is typically excluded from consumer price inflation measures because it represents the purchase of an asset. On the other hand, mortgage payments are a key expense for many households, and one from which they cannot easily escape.

From the discussions, however, it is clear that there is a need for a measure which incorporates the capital element of owner occupied housing.

In June 2019, the National Statistician published a [statement](#) on the future development of the Household Costs Indices. The statement sets out our plans to develop a main HCIs measure alongside a variant, called the HCIs-Capital (HCICs). This variant will additionally include a measure of capital mortgage repayments. The HCICs will be developed once the main HCIs measure has been put into regular quarterly production and has been badged as a National Statistic. Our development plans and timeline for the HCIs are presented in Annex B.

Notes for: Background

1. OOH costs refer to: mortgage interest payments, building insurance, ground rent, stamp duty, estate agent fees, home buyers survey, mayor repairs and maintenance, house conveyancing.
2. CPIH has a net premium approach for expenditure and a gross premium approach for prices (see Section 4.3).

4 . Data: prices and weights

Price indices are estimated from the quantity of products purchased and the prices of these products, where expenditure (or weight) is defined as price times quantity. The Household Costs Indices (HCIs) are estimated for class-level categories in accordance with the Classification of Individual Consumption According to Purpose (COICOP). Hereafter, class of spending and COICOP are used interchangeably.

For the estimation of the HCIs, the price data are for the most part taken from the Consumer Prices Index including owner occupiers' Housing costs (CPIH). Expenditure consists of both household-level (or micro-level) data and aggregate household spending data in the UK. The former is facilitated by the Living Costs and Food Survey (LCF) which gathers detailed expenditure variables from a sample of around 6000 representative households per year. For each interviewed household, the LCF provides spending information, sample weight and demographic variables. Through sample weight, household expenditure in the UK is estimated, whereas demographic information enables the computation of price indices by type of household, for example retired versus non-retired. The LCF data used for the latest HCIs release refer to households surveyed between Q1 (January to March) 2003 and Q4 (October to December) 2016.

CPIH and HCIs share the aggregate household spending data (or total expenditure) for those items that are identically derived by the two measures. The data are extracted, for every class of spending, from the System of National Accounts which compiles them from the LCF and other sources. As with the micro-level data, for the latest HCIs release, the time period for total expenditure spans from 2003 to 2016.

A downside of expenditure data from surveys is that household spending estimates might not align with the System of National Accounts, owing to typical surveys limitations, for example low response rate. To address this issue, the final household data informing the construction of CPIH and of the HCIs are obtained by reconciling micro-level data with national accounts aggregates.

For the additional items included in HCIs but not CPIH, price indices are separately computed. Corresponding household-level expenditure is extracted from the LCF, whereas total expenditure data are drawn from the most suitable available source, whether administrative sources or from the Retail Prices Index (RPI, which is based on LCF expenditure). Details on these additional data are provided in the next subsections.

4.1. Student loan repayments (Plan 1)

In December 2017, the [first preliminary estimates of the Household Cost Indices \(HCIs\)](#) were published. The accompanying methodological article announced forthcoming development with the view to including the costs associated with student loan repayments.

There are currently two repayment plans for graduates who have received student finance within the UK. Plan 1 relates to students from Scotland, Northern Ireland, England and Wales who started their undergraduate course before 1 September 2012. Plan 2 refers to English and Welsh students who started their undergraduate course after 1 September 2012, with mandatory repayments starting from April 2016 if gross income exceeds the annual threshold. A further repayment plan (Plan 3 for postgraduate studies) was introduced in the academic year 2016 to 2017, with repayments starting from April 2019.

The latest HCIs series (2005 to 2018) accounts for repayments under Plan 1 which is the main stream of repayments, with a view of including Plan 2 and Plan 3 in future years once repayment expenditure becomes more significant.

For the aim of including student loan repayments, administrative and survey data sources were investigated. Her Majesty's Treasury's public spending database ([OSCAR](#)) collects monthly student loan repayments. Because the variable also adjusts for new loans throughout the financial year, an OSCAR-based price index could not be derived separately for repayments.

The exploration of survey data pinpointed the availability of a repayment variable in the LCF, but small sample sizes led to a highly volatile index. This issue, coupled with survey data not being timely for the estimation of a price index, led to favouring a model-based rather than a data-based index. A “threshold” model was proposed for the estimation of the price index. The model consists of estimating monthly student loan repayments from graduate salaries and the repayment threshold, taking into account that individuals pay 9% of their income over a given threshold. The mean salary of full-time graduate employees is preferable over the median as the latter, being generally lower than the mean graduate income, underestimates repayments. The median is generally used to mitigate any skewness caused by particularly high-income households; however, for the purposes of this model those high-income households may equally be paying off a student loan.

For the aim of the HCIs, the mean salary of full-time graduate employees (excluding bonuses) is used from the Office for National Statistics (ONS) Labour Force Survey (LFS). These estimates were derived in line with the [Graduates in the UK labour market: 2017 publication](#). A graduate is defined as a person aged 21 to 64 who has left education with a qualification above A-level standard, which includes higher education or a degree. Using graduate salaries and income thresholds over the time period 2005 to 2018, the monthly repayments for the average graduate are estimated. The unchained price index is obtained as follows:

$$index_{i,y}(Jan_y = 100) = \frac{(s_{Jan,y} - t_{i,y})9\%}{(s_{Jan,y} - t_{Jan,y})9\%} \times 100$$

Where s_{Jan} is the mean salary in January of the calendar year y , and t_i is the threshold income for month i (which is constant throughout a financial year).

The price index for student loan repayments is an input for the higher-level price index for Education, which is aggregated with other spending classes to derive the HCIs.

As for the weights, household-level expenditure data are drawn from the Living Costs and Food Survey (LCF), whereas total expenditure is provided by the [Student Loan Company](#) and consists of mandatory repayments between 2005 and 2016. Total expenditure data are price uprated in line with standard Consumer Prices Index (CPI) practice. For more information, please refer to the [Consumer Price Indices Technical Manual](#).

4.2. OOH costs and Council Tax

Prices and expenditure for owner occupiers' housing (OOH) costs and Council Tax are the same as those used in [CPIH\(payments\)](#). For the sake of clarity, discussion on OOH costs and Council Tax is presented separately.

4.2.1. Council Tax

In the [first preliminary HCIs estimates](#), published in December 2017, and in the [OOH publications up until Q1 2018](#), Council Tax was included in OOH(payments). Thereafter, for the publication on [Measures of owner occupiers' housing costs](#) and for the latest HCIs release, Council Tax has been recorded separately.

As a result of this change, differences could arise between the [new second preliminary HCIs estimates](#), with Council Tax sitting separately from OOH costs, and the [former HCIs series](#), with Council Tax recorded within OOH. When the change was originally introduced, the [impact analysis on CPIH](#) (holding constant any other change) suggested that the impact of removing Council Tax from OOH was found to be small for headline CPIH. This was due to the relatively small weight allocated to Council Tax. However, the same comparison at the OOH (payments) level of analysis revealed differences, especially between 2008 and 2010 when the pattern of mortgage interest payments was unusual.

4.2.2. OOH costs (payment approach)

At the same time as the changes to Council Tax, OOH costs underwent some methodological improvements. In the [first preliminary HCIs estimates](#) and in the [OOH publications up until Q1 2018](#), the Carli formula was used in some of the OOH costs' components, as a result of drawing them from the RPI. From the [Q2 2018 OOH publication](#) it was replaced by the Jevons formula for dwelling insurance, home-buyers survey and house conveyancing. Hence, the second preliminary estimates of the HCIs have been similarly updated.

As discussed in the publication on [Measures of owner occupiers' housing costs](#), the formula change has caused the year-on-year growth of OOH(payments) to be lower than previously estimated. This is because the Carli formula is an arithmetic mean, whereas the Jevons formula is a geometric mean, which is always less than or equal to an arithmetic mean. The change could therefore impact on the HCIs.

For a full list of OOH(payments) component indices, please refer to the [first methodological paper](#).

4.3. Insurance premium

The types of insurance captured by the HCIs relate to dwelling (house contents), transport and health, and additionally buildings insurance which is included within OOH costs.

CPIH captures expenditure on the service charge (net premium) whereas the HCIs expenditure is the full insurance premium (gross premium), including the "claims pool". They are called "net weights" and "gross weights", respectively.

In CPIH, aggregate household expenditure for the net weight is calculated as the difference between expenditure on insurance premiums and the amount paid out in claims. In the HCIs, aggregate household expenditure for the gross weight is drawn from the LCF.

Owing to the infeasibility of deriving prices for the service charge only, price indices for insurance in both CPIH and the HCIs are based on the gross cost of the premium.

4.4. Interest payments on credit card debt

Interest payments are out of scope for CPIH, which focuses on consumption goods and services. Hence, the HCIs' inclusion of interest payments on credit card debt requires the computation of a new price index and weight for this component. It is assigned to its own class of spending within the COICOP structure.

With respect to the price index, the base data consist of the Bank of England's (BoE) interest rates (not-seasonally adjusted) on credit card debt. Owing to BoE changes in data collection and processing, two series are currently used. The first series ([CFMHSDG](#)), which is a not seasonally adjusted weighted average interest rate on credit card loans to households, spans from January 2005 to December 2015. The second series ([CFMZ6IR](#)), which is a not seasonally adjusted weighted average interest rate on credit card loans to individuals, is used from January 2016 onwards.

The price index for interest payments is derived through a "revaluation approach". The rationale is that, to obtain a "price" for interest payments, the effective interest rate has to be applied to a stock of debt which is a monetary value, where the (purchasing) value of money varies with inflation. Since a fixed stock of debt, on which interest is charged, changes in value through time, an adjustment for the changing value of the stock of debt due to inflation is required. This gives a price estimate which is comparable through time. For the HCIs, the adjustment is carried out through a re-evaluation of a change in interest rate based on the corresponding change in CPIH; that is, they are multiplied together to provide an adjusted series for inflation.

With regard to expenditure data, household-level data are specifically captured by the LCF, whereas total expenditure is obtained as a product of the UK number of households with the expenditure per household for interest debt (similarly based on the LCF).

5 . Weighting methodology

The Consumer Prices Index including owner-occupiers' Housing costs (CPIH), on which the Household Costs Indices (HCIs) build, could be broadly considered a Lowe price index, which is the method used by most statistical agencies to construct their headline CPIs. The Lowe price index in CPIH "uses current-period price information alongside expenditure weights that are price-updated" ([Flower and Wales, 2014](#), p12). With household data, the Lowe index "weights the price experience of different households by their share of expenditure" ([Flower and Wales, 2014](#), p13). Put otherwise, households contribute to the index with a weight proportional to their expenditure share, which leads to high-spending households having a larger weight than low-spending households. This weighting mechanism, defined as "plutocratic weighting", is appropriate for macroeconomic indicators such as the CPIH.

An alternative mechanism, the so-called "democratic weighting", assigns instead equal weight to each household's share of expenditure and, consequently, is deemed to be more appropriate for the HCIs. Democratic weights are obtained as follows. First, each household's expenditure on a class of spending is divided by the household's total expenditure. Secondly, the average expenditure share for this class is calculated, which provides a democratic weight. This procedure is then repeated for each class of spending within the basket of goods and services.

Note that in populations where all households purchase goods in equal proportions, a price index is the same independently of the selected approach (plutocratic versus democratic) since the weights are homogeneous across the households. On the other hand, the more the expenditure basket differs across households, the larger the difference between a price index under the two approaches.

The formulae for the plutocratic and democratic weighting can be found in the [first methodological paper](#). Additional information on the two methods can be found in the following articles: [Investigating the impact of different weighting methods on CPIH](#), and [Methodology to calculate CPIH consistent inflation rates for UK households; Variation in the inflation experience of UK households: 2003 – 2014](#).

6 . Results

This section presents results associated with the inclusion of student loan repayments, and other methodological changes from the former Household Costs Indices (HCIs) historical series.

6.1. Education

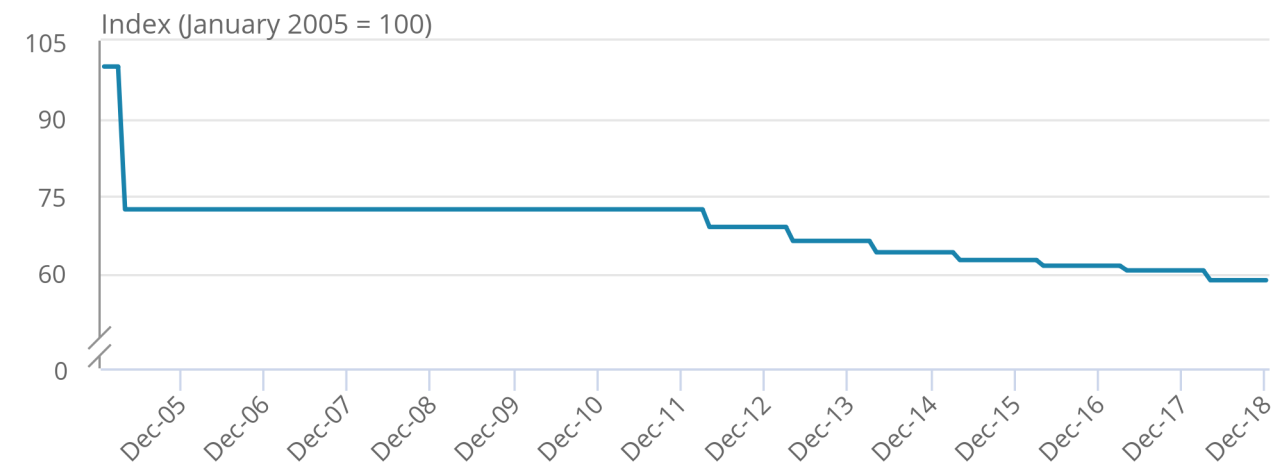
As discussed earlier, a student loan repayments price index was developed for inclusion in the HCIs. Figure 1 shows that the price index has a downward trend. This is attributable to the repayment income thresholds increasing faster than mean graduate salaries. For example, the large decrease in the index seen in 2005 is due to the monthly repayment threshold increasing from £833.33 to £1,250.00, by far the largest threshold increase seen over the period.

Figure 1: The cost of student loan repayments has decreased steadily since 2005

Price index for student loan repayments, UK, 2005 to 2018

Figure 1: The cost of student loan repayments has decreased steadily since 2005

Price index for student loan repayments, UK, 2005 to 2018



Source: Office for National Statistics - Household Cost Indices

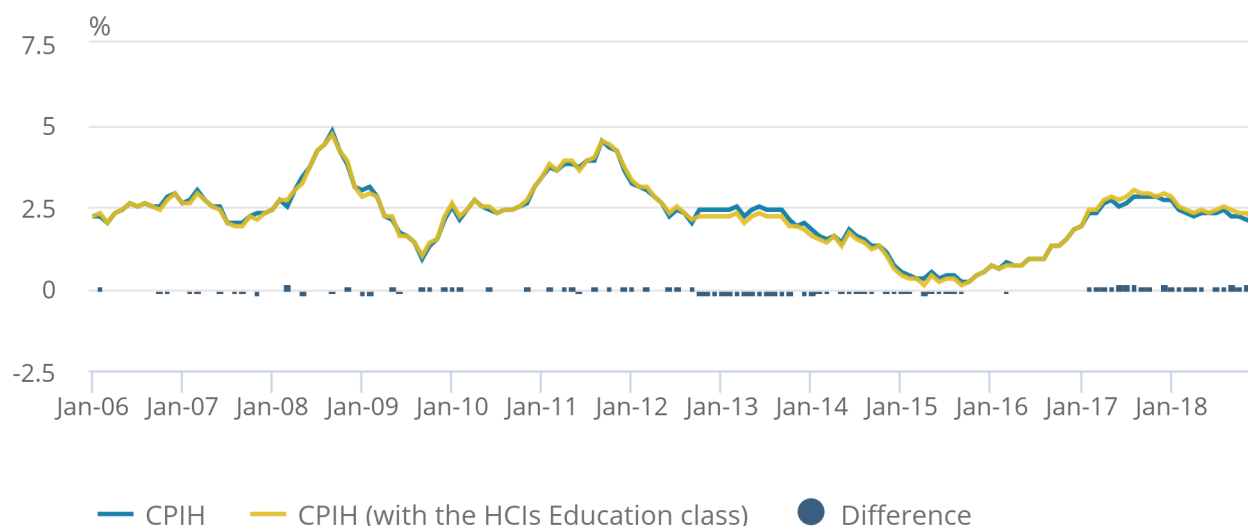
This student loan repayments index replaces the tuition fees index that was previously used in the HCIs and continues to be used in Consumer Prices Index including owner occupiers' Housing costs (CPIH) and CPI. The resulting change in the Education class may impact on the HCIs. Consistent with the [previous methodological publication](#), the potential impact is inferred from CPIH. This allows us to understand the impact in isolation from other HCI-specific effects. In particular, the all items CPIH (as published) is compared with CPIH obtained when the new method for measuring the costs associated with student loan repayments is uniquely applied. Figure 2 shows a notable difference between 2013 and 2015, when all items CPIH (as published) is slightly higher.

Figure 2: The effect of education was noticeable between 2013 and 2015

Year-on-year growth rate of CPIH (as published) and with the HICs Education class, UK, 2006 to 2018

Figure 2: The effect of education was noticeable between 2013 and 2015

Year-on-year growth rate of CPIH (as published) and with the HICs Education class, UK, 2006 to 2018



Source: Office for National Statistics

6.2. First (2017) versus second (2019) preliminary HICs estimates

In the following, the impact of methodological changes between the first preliminary HICs estimates in 2017 and second preliminary HICs estimates in 2019 is presented for households with and without children, retired and non-retired households, and second lowest and second highest income decile, which were estimated for both series. The impact is not presented for households by tenure type (subsidised rented, rented and owner occupied) as this is a new categorisation which was introduced for the first time in the [second preliminary HICs release](#).

A common approach to reporting inflation is through the year-on-year growth rate, which compares prices for the latest month with the same month a year ago. The growth rate is thus “determined by the balance between upward and downward price movements of the range of goods and services included in the index” ([Consumer price inflation, UK: December 2018](#), p2). By extension, the impact of methodological changes between two similar series could be explored through the contributions to the difference in their growth rate (alternatively defined as decomposition).

The first and the second HCIs preliminary series are not comparable in the strict sense due to a number of changes in the underlying component indices. First of all, in the second preliminary series, the Education class of spending includes student loans repayments for the first time. As the inclusion of teaching fees paid upfront requires applying specific weights for the type of payment (upfront or through a loan) which are under development, teaching fees is omitted in the second publication. The latter was instead included in the first preliminary series, when student loan repayments were not accounted for. However, the difference between the growth rates of Education with and without student loan repayments, and with and without teaching fees, does not equal the relative contribution of student loan repayments and teaching fees. This is because the removal of teaching fees and the addition of student loan repayments causes adjustments in the weights of the other components of Education.

On the other hand, Education is not the only class of spending with changes between the first and second preliminary series. As described in the Background section, OOH costs are no longer computed with the Carli formula and they no longer include Council Tax, which is captured elsewhere. Nevertheless, the decomposition of the difference in the HCIs' growth rate between the first and the second series does not reduce to the sum of the contributory effects of changes to Education, Council Tax and OOH costs. This is because a change in a component modifies overall expenditure, resulting in changes in both household shares and in the distribution of total expenditure across the full spectrum of the Individual Consumption According to Purpose (COICOPs). This results in democratic weights partly differing between the former and the new HCIs series.

While in a plutocratic weighting approach, a price index will alter in relation to the modification of higher classes of spending, a price index estimated through democratic weighting is more sensitive to changes across the shares. This also means that the greater the variety of expenditure patterns across households in a subgroup, the greater the changes between the former and the new HCIs series.

In the following, to illustrate the robustness of the results and the impact of recalculating weights, the contributions to the year-on-year growth rate for the first and the second preliminary HCIs estimates are presented. These are accompanied by charts showing the change in growth rate between the first and second estimates, as a result of methodological changes. The impact is measured through the decomposition of the difference between the two series into five components:

- OOH costs including Council Tax (OOH), which shows the impact of removing Council Tax from OOH in the second release, and other minor methodological improvements discussed above
- the miscellaneous good and services class of spending (Misc.), which shows the impact of including interest payments on credit cards in this category for the second preliminary HCIs publication (moved from housing)
- housing, water, electricity, gas and other fuels without OOH or Council Tax (Housing excl. OOH), which shows the inverse effects of moving Council Tax and interest payments on credit card debt
- the Education class of spending (Education), which shows the impact of replacing tuition fees with student loan repayments
- the contributions of other classes of spending resulting from weight adjustments (Residual scaling differences)

Sensitivity analysis indicated that the change in interest payments on credit card debt is overall small, as a result of the low weight. This finding concurs with the [previous methodology article](#), which observed a very small impact on CPIH when interest payments on credit card debt were uniquely applied and compared with all items CPIH.

Another set of charts is presented in Annex A, which shows the separate contribution of Council Tax and OOH without Council Tax (mainly driven by mortgage interest payments), relative to the full OOH category.

Results are presented for each subgroup separately.

6.2.1. Households with children

For households with children, Figures 3 and 4 show a similar scale of contribution across classes of spending in the first and second preliminary HCIs series. Exceptions are Education and OOH. Figure 5 shows how methodological changes contribute to the difference between the first and second preliminary HCIs estimates. In particular OOH has a major downward impact on the 12-month growth between January 2009 and January 2010. This could be explained as follows. Firstly, the removal of Council Tax increases the relative weight of mortgage interest payments that are a large negative contributor ([Measures of owner occupiers' housing costs, UK: April to June 2018](#)) and are expected to be a significant element in the budget of households with children. This is confirmed by Figure 1A (in Annex A) which points to the larger contribution of OOH without Council Tax within the OOH category. Secondly, the impact of OOH could be due to switching from the Carli formula to the Jevons for dwelling insurance, homebuyers survey and house conveyancing. As mentioned earlier, the Jevons formula gives lower index values than the Carli, thus leading to a lower growth rate in the second preliminary HCIs series. This effect could be observed in household subgroups with first and second or subsequent buyers, such as households with children.

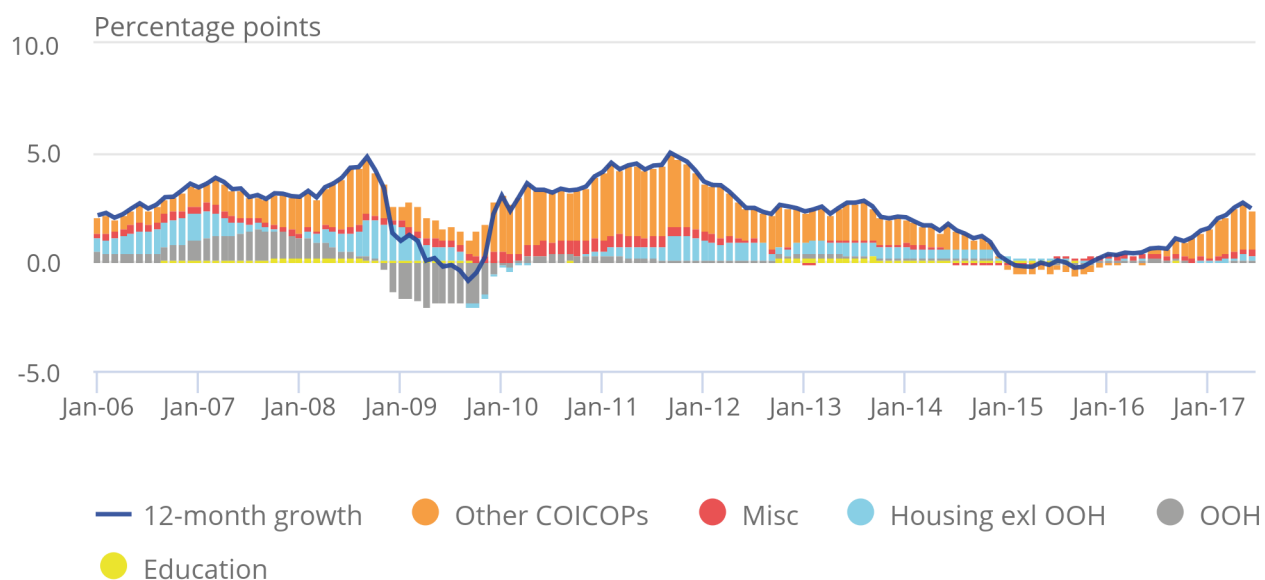
Education also plays a role in the difference between the first and the second preliminary estimates, which could be ascribed to the repayment of student loans in relatively young households, such as those with children.

Figure 3: OOH had a major downward impact

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, households with children, UK, 2006 to 2017

Figure 3: OOH had a major downward impact

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, households with children, UK, 2006 to 2017



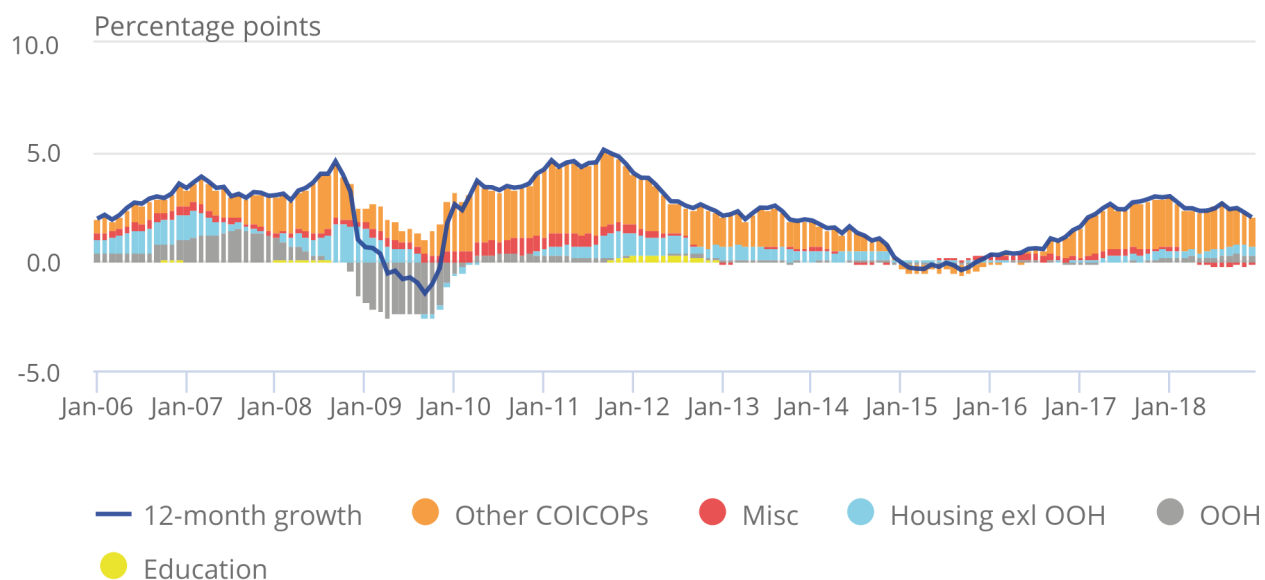
Source: Office for National Statistics - Household Cost Indices

Figure 4: OOH had a major downward impact

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, households with children, UK, 2006 to 2018

Figure 4: OOH had a major downward impact

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, households with children, UK, 2006 to 2018



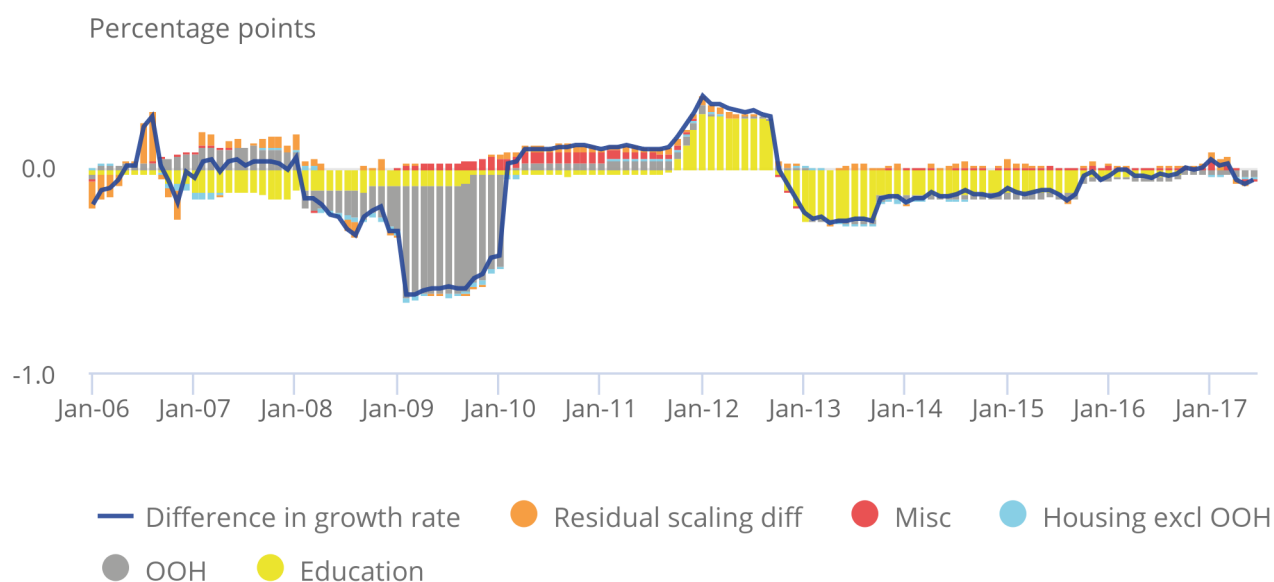
Source: Office for National Statistics - Household Cost Indices

Figure 5: OOH made the largest contribution to the difference

Impact of methodological changes to year-on-year difference in growth rate, households with children, UK, 2006 to 2017

Figure 5: OOH made the largest contribution to the difference

Impact of methodological changes to year-on-year difference in growth rate, households with children, UK, 2006 to 2017



Source: Office for National Statistics - Household Cost Indices

6.2.2. Households without children

The cross-sectional estimates for households without children point to a regular pattern, with minor differences for Education and OOH in the new series (Figures 6 and 7). This reflects a difference in growth mostly fluctuating around zero, with isolated peaks for OOH (Figure 8).

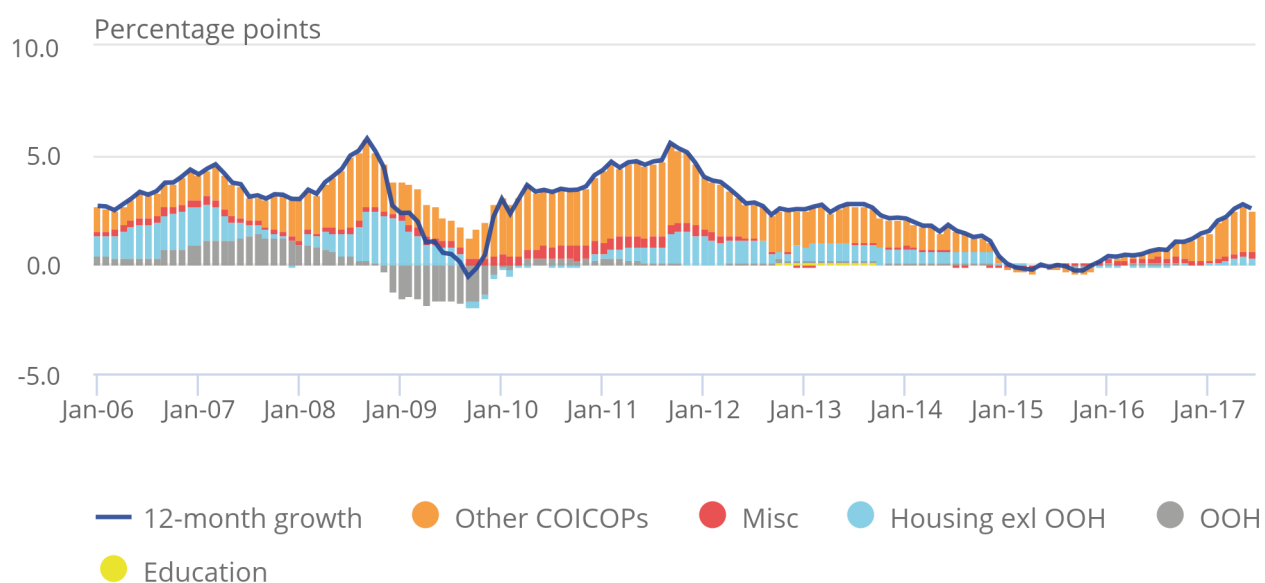
The lower impact of OOH, relative to the subgroup with children, could be ascribed, on the one hand, to the fact that this subgroup may have a large element of single and young couples with budget constraints which prevent them from getting on the property ladder. Therefore, the price index will be negligibly impacted by mortgage interest payments. On the other hand, mortgage interest payments will also have a negligible role for the retired or older element of the subgroup, as they may have paid off their mortgage.

Figure 6: Housing excluding OOH made a large contribution to the growth

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, households without children, UK, 2006 to 2017

Figure 6: Housing excluding OOH made a large contribution to the growth

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, households without children, UK, 2006 to 2017



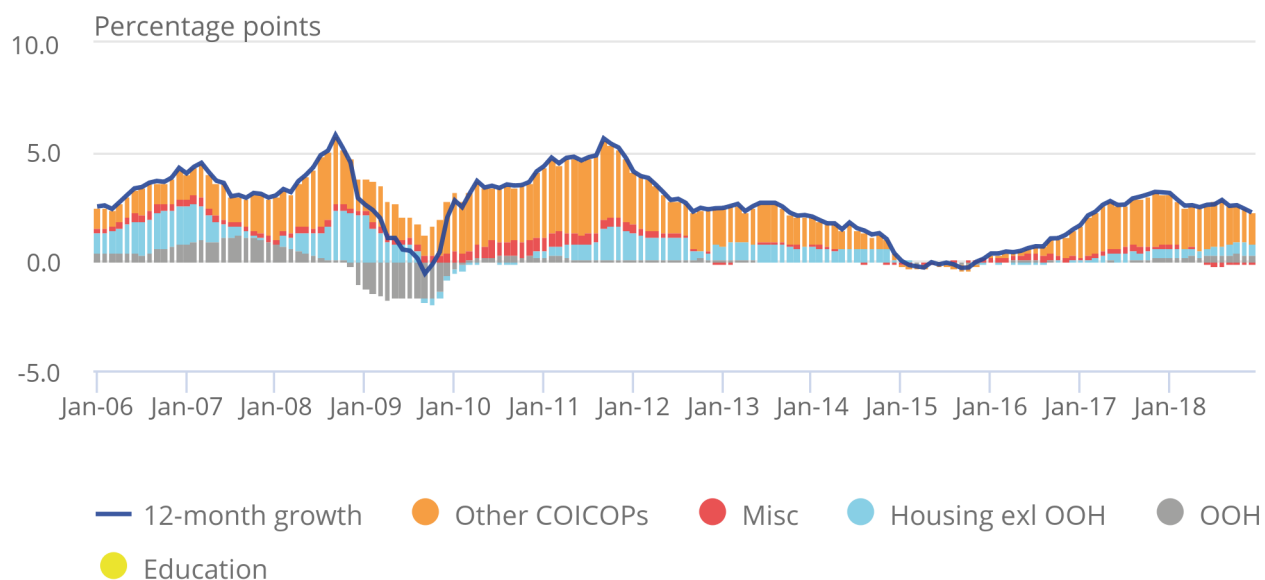
Source: Office for National Statistics - Household Cost Indices

Figure 7: Housing excluding OOH made a large contribution to the growth

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, households without children, UK, 2006 to 2018

Figure 7: Housing excluding OOH made a large contribution to the growth

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, households without children, UK, 2006 to 2018



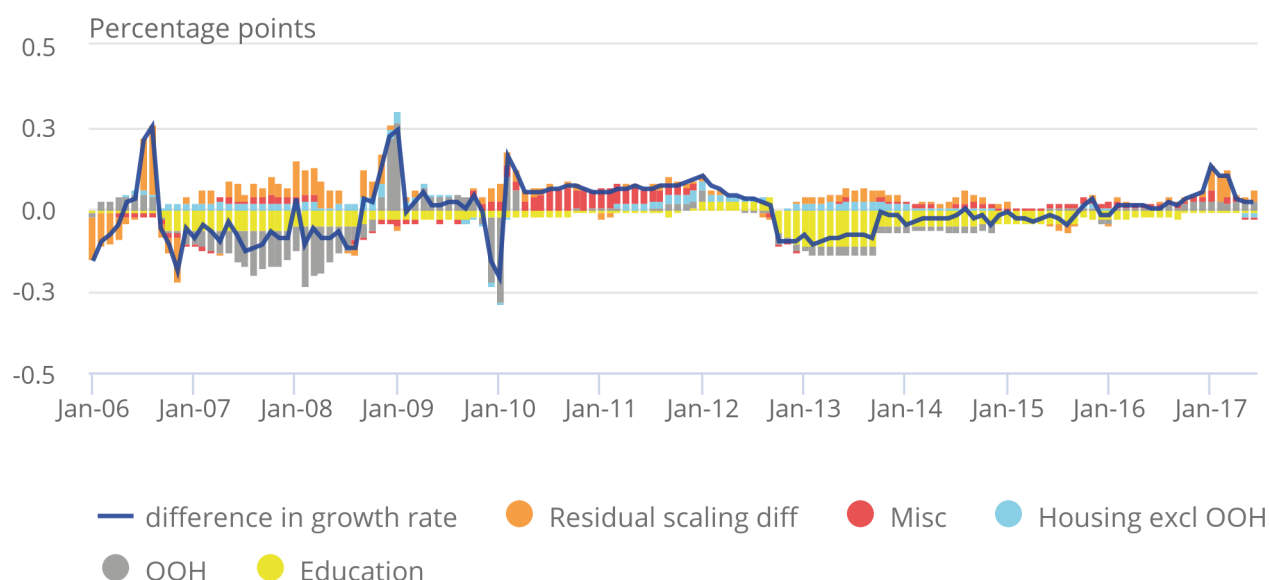
Source: Office for National Statistics - Household Cost Indices

Figure 8: The difference in growth fluctuates around zero

Impact of methodological changes to year-on-year difference in growth rate, households without children, UK, 2006 to 2017

Figure 8: The difference in growth fluctuates around zero

Impact of methodological changes to year-on-year difference in growth rate, households without children, UK, 2006 to 2017



Source: Office for National Statistics - Household Cost Indices

6.2.3. Retired households

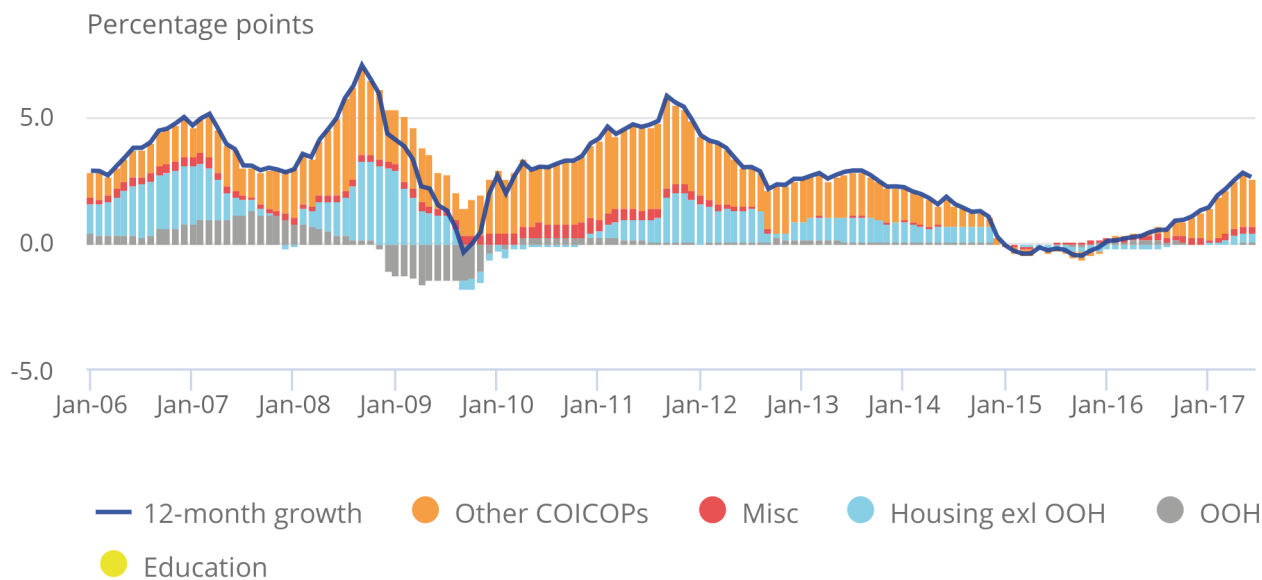
For retired households, contributions to the 12-month growth rate for the first and second preliminary estimates are similar (Figures 9 and 10) except for OOH. Changes to OOH result in the downward contribution being considerably reduced between January 2009 and January 2010 in the new series. Consistently, the change in OOH dominates the difference in growth rate between the first and second preliminary HCIs estimates, which otherwise fluctuates around zero (Figure 11). Weight adjustments associated with removing Council Tax from OOH are likely to have contributed to the impact for retired households since mortgage interest payments, the other major component of OOH, are not a standard outgoing for this subgroup. This can be seen from the larger relative contribution of Council Tax within the OOH category for retired households compared to other subgroups (see Annex A).

Figure 9: OOH and Housing excluding OOH made large contributions

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, retired households, UK, 2006 to 2017

Figure 9: OOH and Housing excluding OOH made large contributions

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, retired households, UK, 2006 to 2017



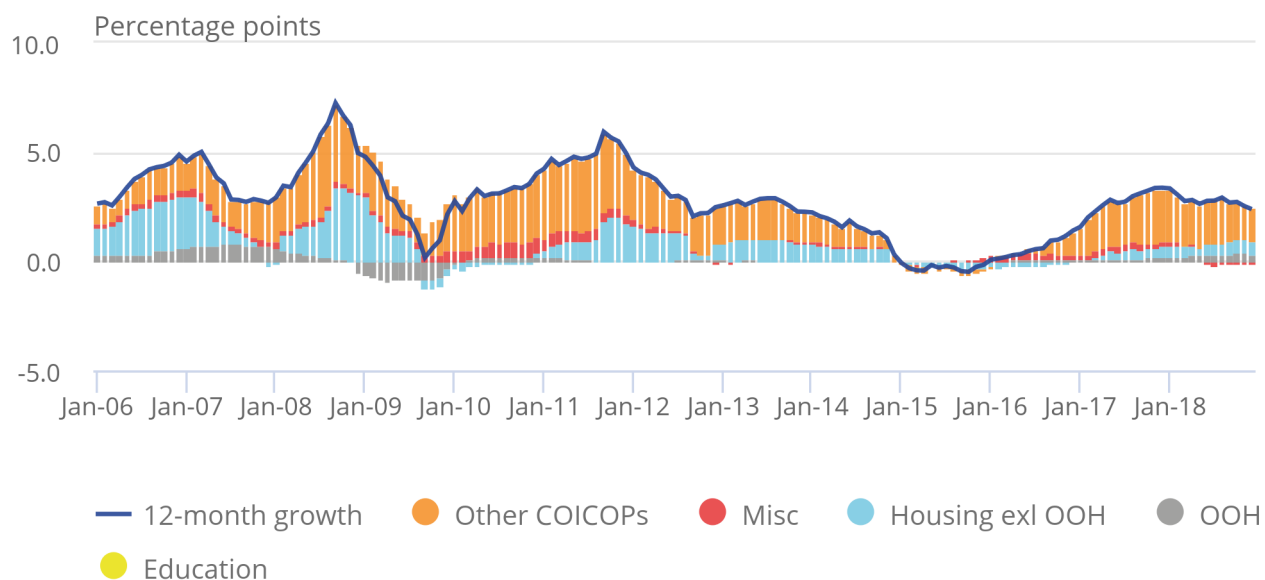
Source: Office for National Statistics - Household Cost Indices

Figure 10: Housing excluding OOH made the largest contribution

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, retired households, UK, 2006 to 2018

Figure 10: Housing excluding OOH made the largest contribution

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, retired households, UK, 2006 to 2018



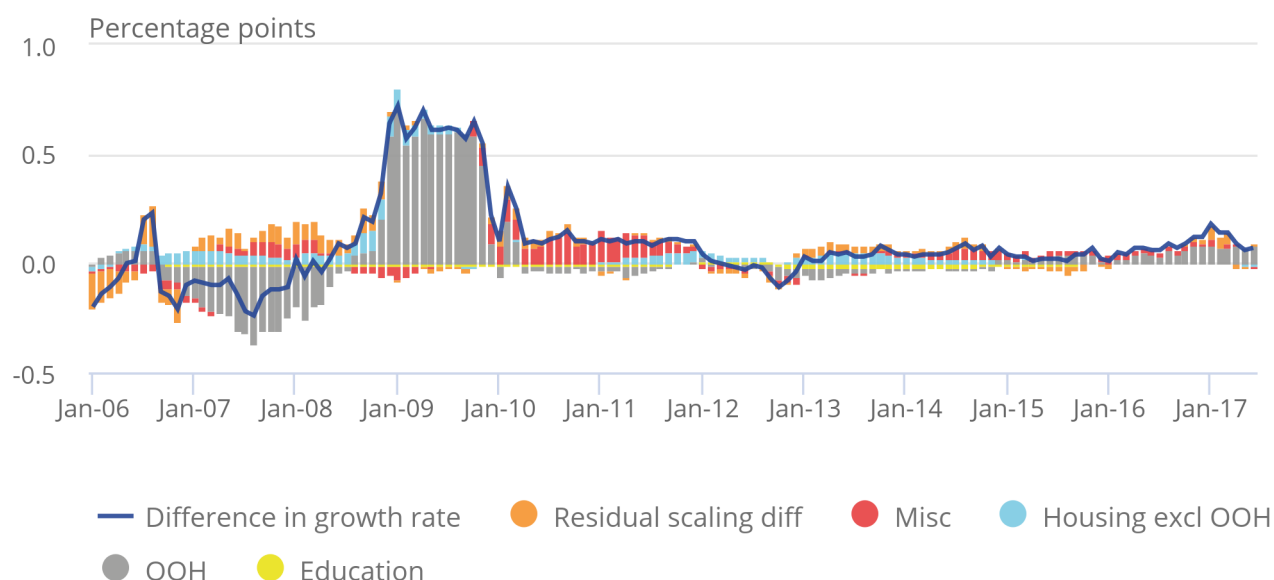
Source: Office for National Statistics - Household Cost Indices

Figure 11: OOH had the largest impact to the difference

Impact of methodological changes to year-on-year difference in growth rate, retired households, UK, 2006 to 2017

Figure 11: OOH had the largest impact to the difference

Impact of methodological changes to year-on-year difference in growth rate, retired households, UK, 2006 to 2017



Source: Office for National Statistics - Household Cost Indices

6.2.4. Non-retired households

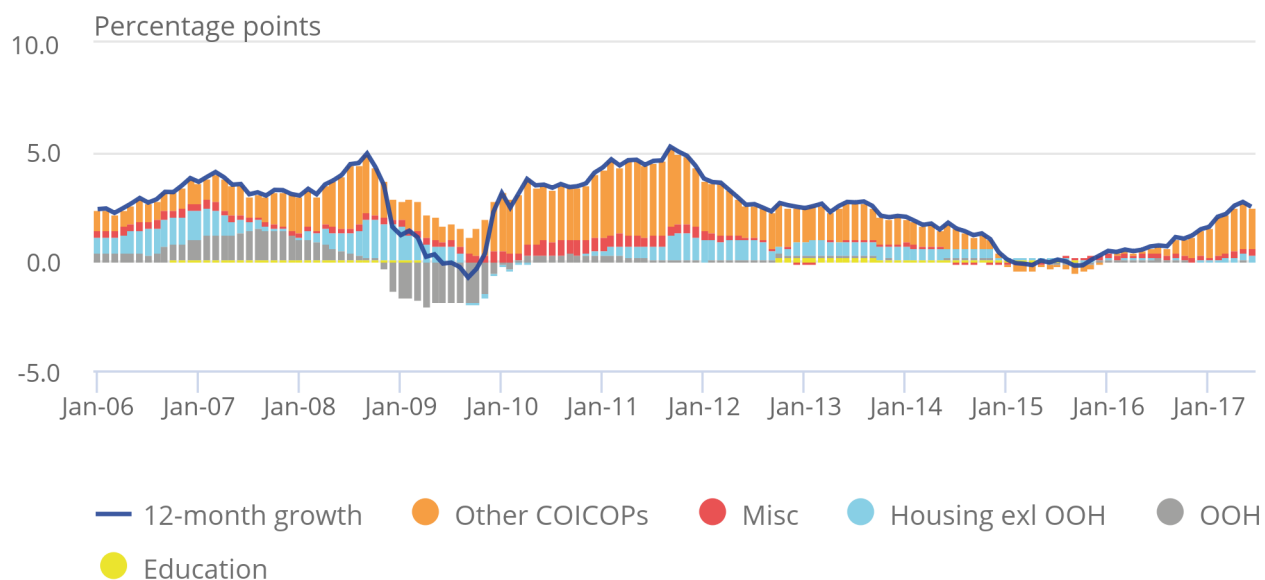
Non-retired households show similar contributions in the first and second HCIs preliminary estimates, apart from the OOH and Education categories (Figures 12 and 13), highlighted in the decomposition of the difference in growth rate between the two series points (Figure 14). For OOH costs, this finding might reflect the greater presence of first and subsequent buyers amongst non-retired households. Indeed, as mentioned earlier, the removal of Council Tax leads to an increase in the influence of the mortgage interest payments component, which is a notable negative contributor. A further reason for the impact of OOH could relate to the replacement of Carli indices with the Jevons, whose effect is apparent in subgroups with a larger representation of house buyers. Regarding Education, the finding is explainable with the repayment of student loans in non-retired households.

Figure 12: The largest contributors were OOH and Housing excluding OOH

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, non-retired households, UK, 2006 to 2017

Figure 12: The largest contributors were OOH and Housing excluding OOH

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, non-retired households, UK, 2006 to 2017



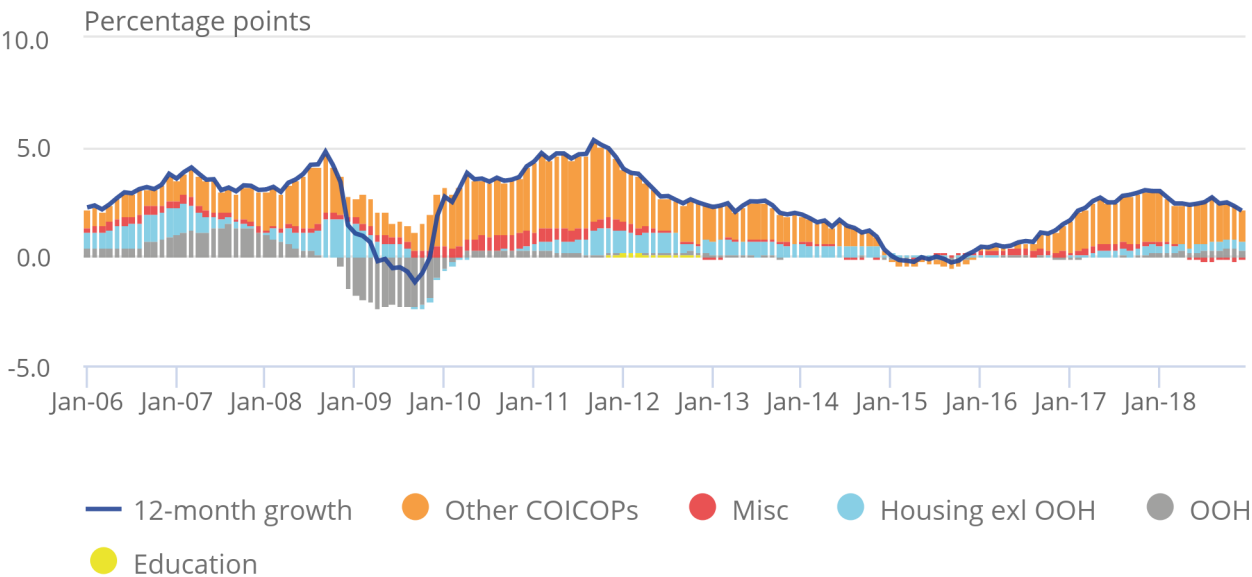
Source: Office for National Statistics - Household Cost Indices

Figure 13: OOH had a major downward contribution

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, non-retired households, UK, 2006 to 2018

Figure 13: OOH had a major downward contribution

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, non-retired households, UK, 2006 to 2018



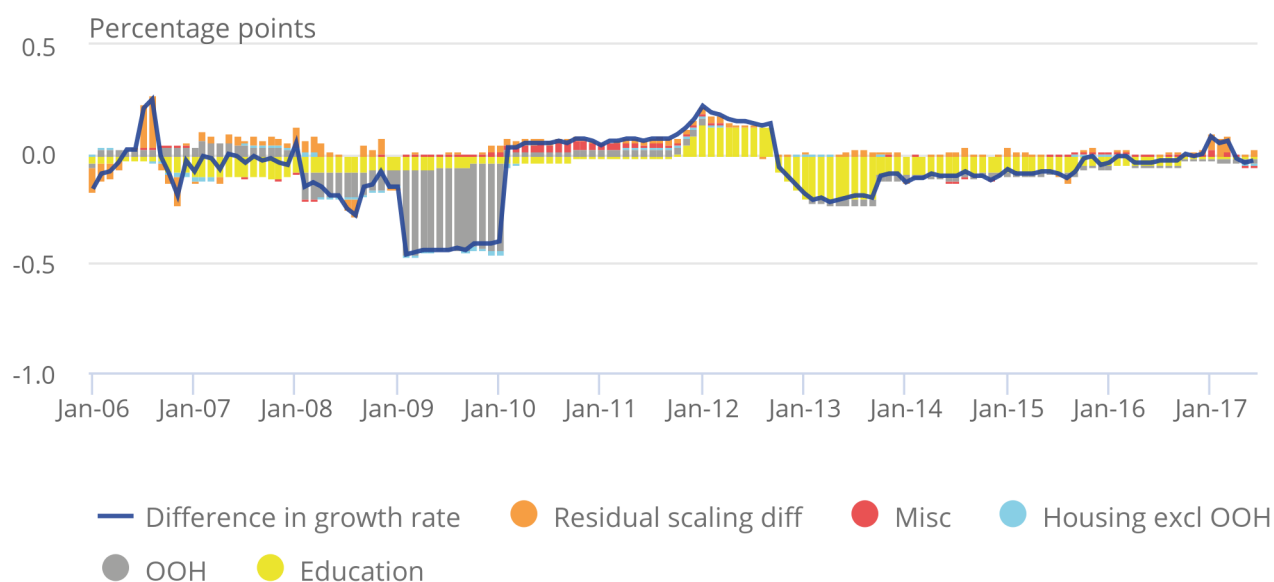
Source: Office for National Statistics - Household Cost Indices

Figure 14: The largest difference in spending was in OOH and in education

Impact of methodological changes to year-on-year difference in growth rate, non-retired households, UK, 2006 to 2017

Figure 14: The largest difference in spending was in OOH and in education

Impact of methodological changes to year-on-year difference in growth rate, non-retired households, UK, 2006 to 2017



Source: Office for National Statistics - Household Cost Indices

6.2.5. Second lowest income decile

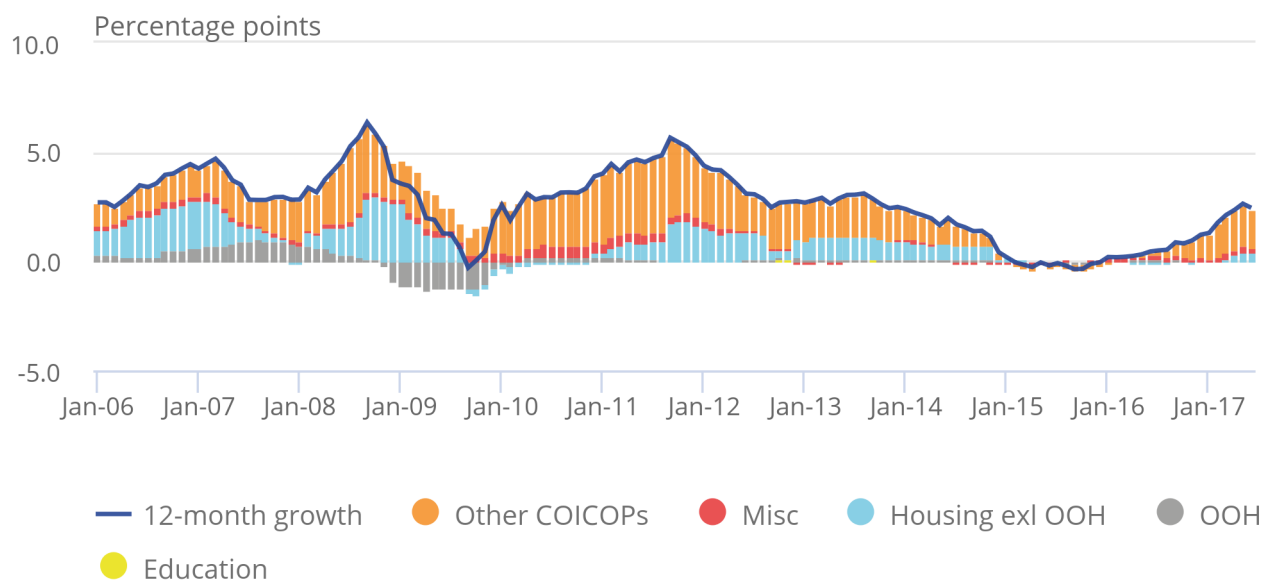
For the second lowest income decile, contributions to the 12-month growth rate for the first and second preliminary estimates are similar (Figures 15 and 16), except for OOH which dominates the difference in growth rate between the two series (Figure 17). The removal of Council Tax from OOH is likely to have contributed to the impact for the second lowest income decile since mortgage interest payments are not a standard outgoing for this subgroup. Results are similar to those observed for retired households which are a large component of this subgroup.

Figure 15: Housing excluding OOH was the main contributor

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, second lowest decile, UK, 2006 to 2017

Figure 15: Housing excluding OOH was the main contributor

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, second lowest decile, UK, 2006 to 2017



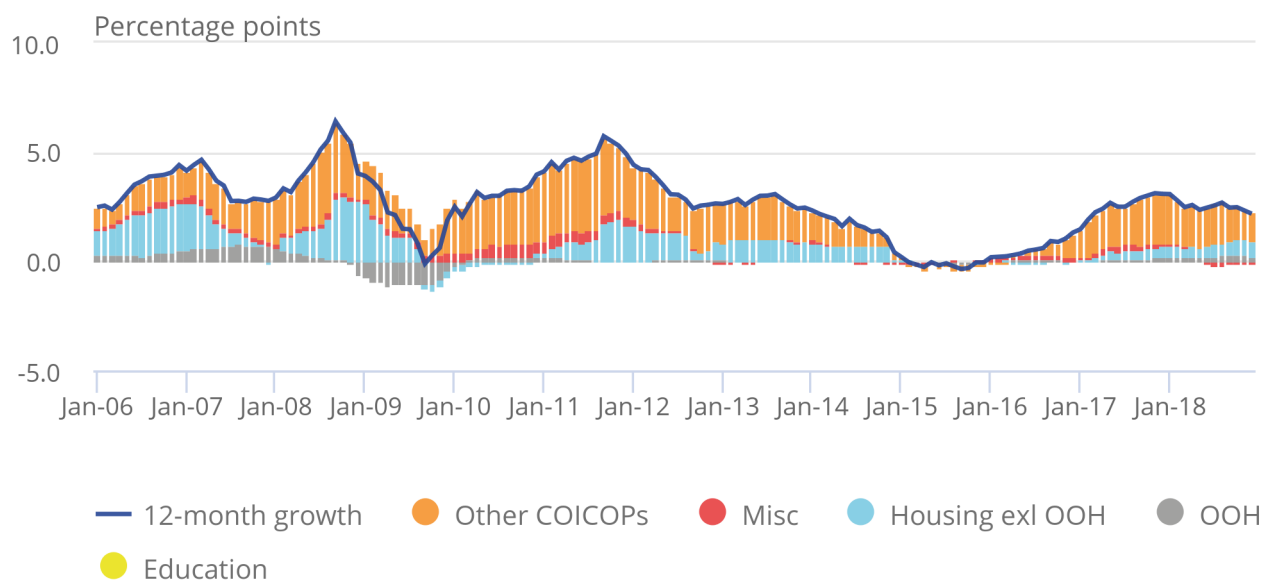
Source: Office for National Statistics - Household Cost Indices

Figure 16: Housing excluding OOH was the main contributor

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, second lowest decile, UK, 2006 to 2018

Figure 16: Housing excluding OOH was the main contributor

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, second lowest decile, UK, 2006 to 2018



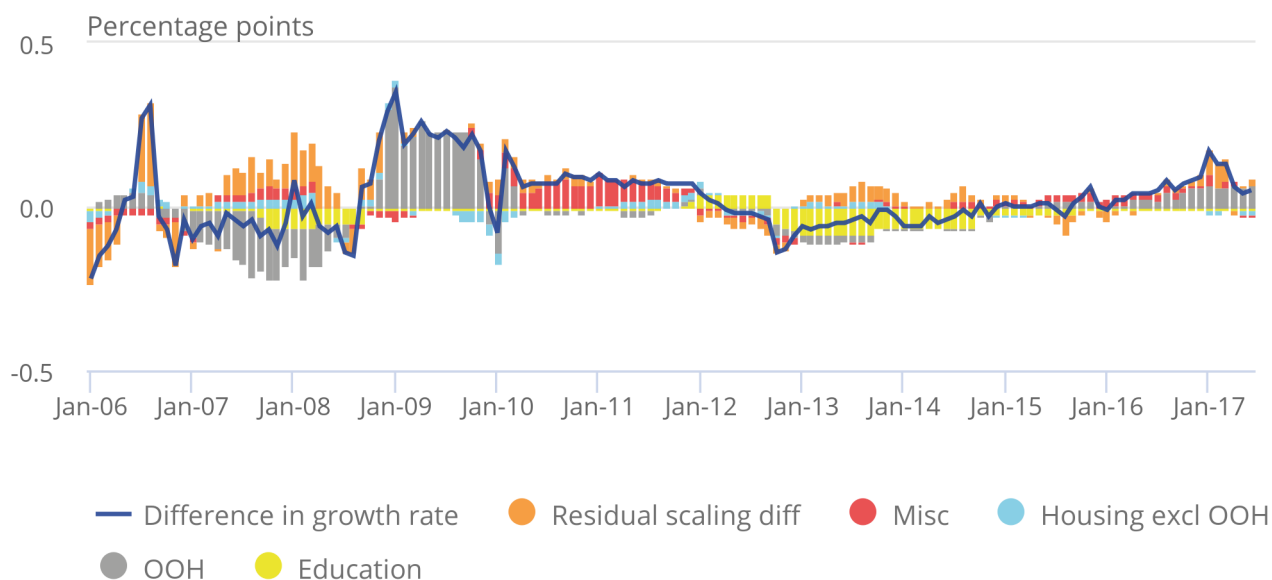
Source: Office for National Statistics - Household Cost Indices

Figure 17: OOH had the largest impact to the difference

Impact of methodological changes to year-on-year difference in growth rate, second lowest decile, UK, 2006 to 2017

Figure 17: OOH had the largest impact to the difference

Impact of methodological changes to year-on-year difference in growth rate, second lowest decile, UK, 2006 to 2017



Source: Office for National Statistics - Household Cost Indices

6.2.6. Second highest income decile

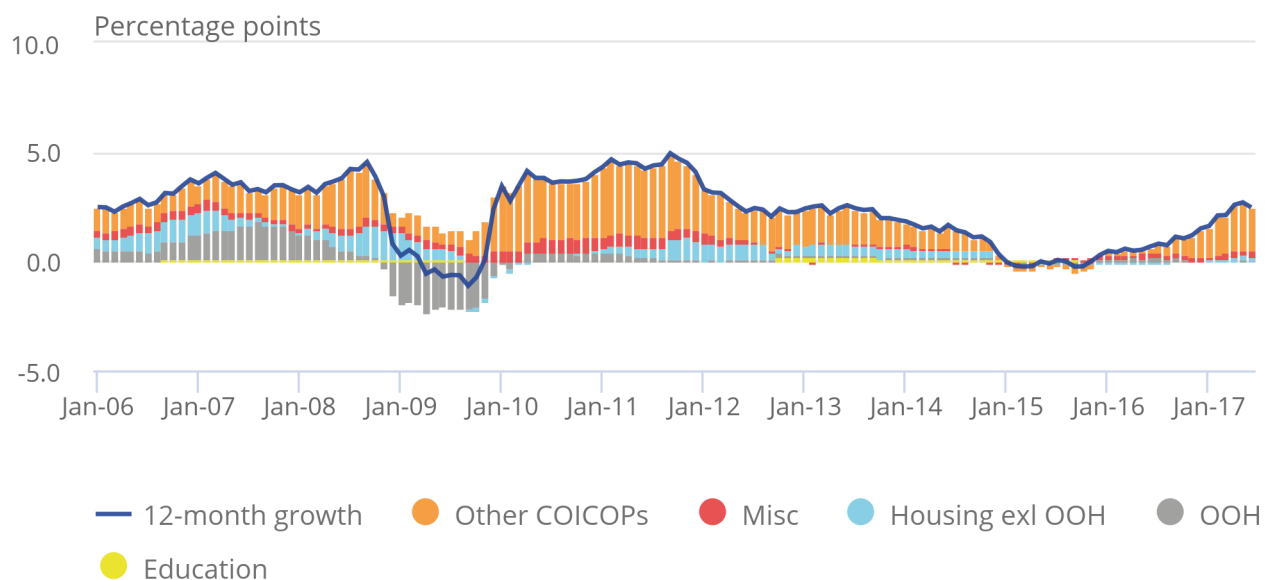
For the second highest income decile, differences between the two HCIs series are localised to the components which underwent technical improvements; that is, Education whose positive contribution to the growth diminishes in the latest series as a result of adding student loan repayments and removing teaching fees, and OOH costs with a considerably larger negative effect on the 12-month growth in the second preliminary estimates (Figures 18 and 19). Notably, the larger effect of OOH costs in this subgroup aligns with the considerable spending in this category, as illustrated in the [second HCIs preliminary estimates](#). Accordingly, the difference in growth between the first and second preliminary estimates is largely dominated by the change in OOH costs (Figure 20). This finding could be explained by the effect of mortgage interest payments, which becomes more evident after removing Council Tax. In this regard, Figure 6A (in Annex A) confirms the larger contribution of OOH costs without Council Tax.

Figure 18: OOH made a large downward contribution

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, second highest decile, UK, 2006 to 2017

Figure 18: OOH made a large downward contribution

Contribution to the total year-on-year growth rate, first preliminary HCIs estimates, second highest decile, UK, 2006 to 2017



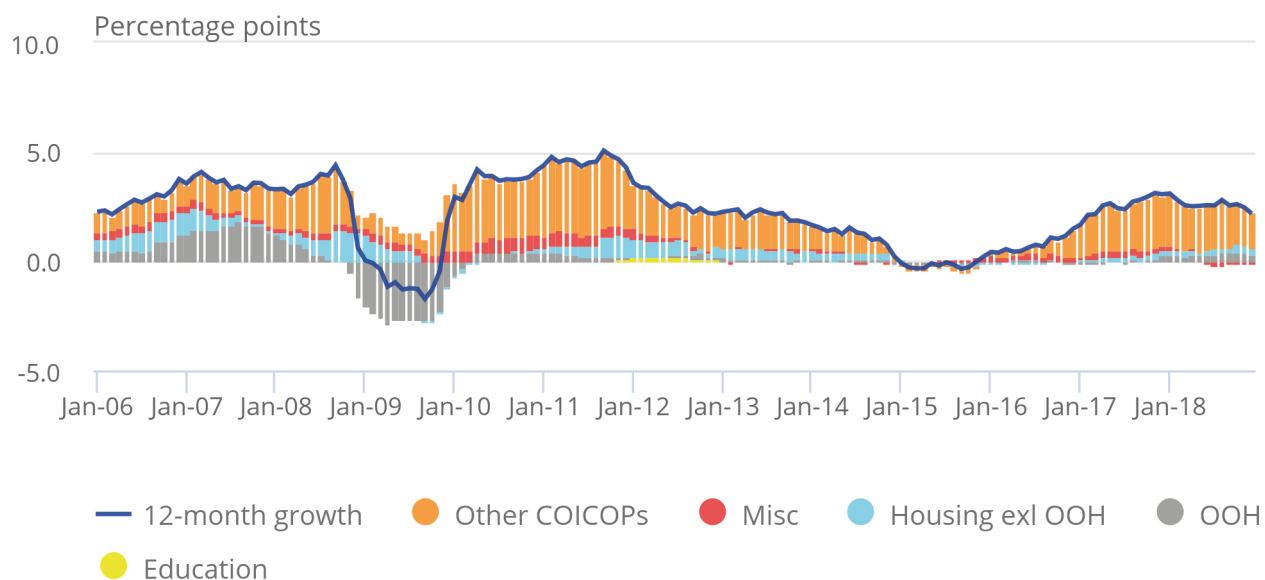
Source: Office for National Statistics - Household Cost Indices

Figure 19: OOH had a major downward impact

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, second highest decile, UK, 2006 to 2018

Figure 19: OOH had a major downward impact

Contribution to the total year-on-year growth rate, second preliminary HCIs estimates, second highest decile, UK, 2006 to 2018



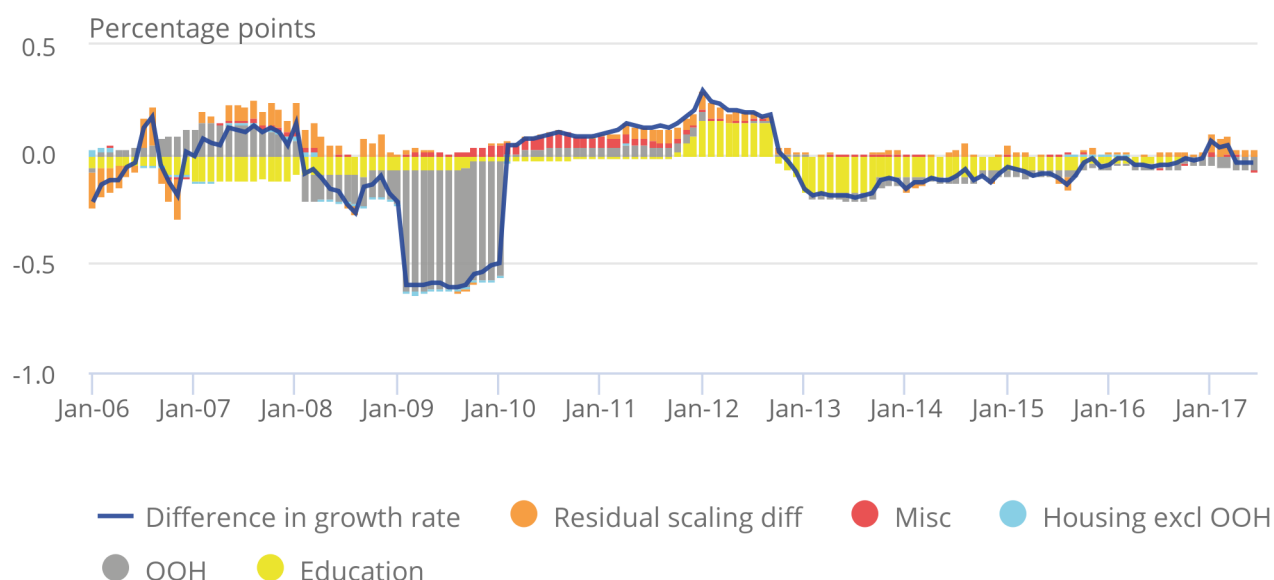
Source: Office for National Statistics - Household Cost Indices

Figure 20: The largest difference in spending was in OOH

Impact of methodological changes to year-on-year difference in growth rate, second highest decile, UK, 2006 to 2017

Figure 20: The largest difference in spending was in OOH

Impact of methodological changes to year-on-year difference in growth rate, second highest decile, UK, 2006 to 2017



Source: Office for National Statistics - Household Cost Indices

7. Limitations

There are limitations to the construction of the Household Costs Indices (HCIs) that warrant discussion. These refer both to the data, and to limits inherent in the way that democratic weighting has been applied. The discussion is reported separately for data input and method.

7.1. Data (prices and weights)

The data input's limitations are as follows:

The HCIs are intended to measure the experience of changing prices and costs for UK households; hence, household-level spending data should refer to all UK households. However, micro-level data are survey-based and, therefore, they miss a proportion of the population that live in institutional households, that is, care homes and student halls. For example, expenditure related to the use of health services for people in care home is not captured by the LCF. This limitation is partly overcome through the redistribution of household expenditure based on aggregate expenditure from the System of National Accounts. In fact, this latter makes adjustments to ensure that the estimated expenditure covers the entire UK population.

Other limitations arise for HCIs-specific items:

Interest payments captured are mortgage interest (part of the OOH costs), interest on student loans (captured by student loan repayments) and credit card debt. Other forms of debt also exist, and work is underway to develop measures for inclusion in the HCIs.

The payment-based approach for OOH requires some caution. In particular, feedback from the [Advisory Panel on Consumer Prices – Technical](#), and a recent [ESCOE](#) workshop on HCIs, has suggested that mortgage interest payments could be estimated differently in future.

A limitation arises for student loan repayments because the expenditure data include maintenance loans. It could therefore be argued that we are double counting. This is the case because maintenance loans are used to fund purchases of goods and services, and these expenditures are already accounted for across the range of COICOP categories. It follows that the expenditure would be counted again through the inclusion of maintenance loan repayment expenditure. We are considering the disaggregation of maintenance and teaching fees loans as a development element for the next release.

Double counting expenditure may also be a drawback for insurance premia, with respect to the goods and services that are purchased from insurance claims.

Another limitation of the current student loan repayments approach is that we do not incorporate voluntary repayments. Although these are minor compared with mandatory payments, a fraction of household expenditure is not considered at present. We will address this in future development.

Tuition fees paid up front are currently unaccounted for. Their inclusion requires establishing the relative weight of tuition fees paid up front and through a loan for each academic year so that these two components could be aggregated into the HCIs. While the present release refers to student loan repayments only, an estimation method is being designed that will allow teaching fees paid upfront to be similarly accounted for in the next release.

A further drawback is that the HCIs do not adjust at present for student loans which were taken out on or after 1 September 2012 ([Plan 2](#)). This limitation is, however, minor, not only because the first student loan cohort graduated recently (in 2015), but also because under Plan 2 repayments begin after earning over a higher threshold compared to Plan 1. For example, in the financial year 2017 to 2018, the income threshold was £17,775 for Plan 1 and £21,000 for Plan 2.

7.2. Limitations of the weighting method

One of the primary limitations of the democratic weighting approach relates to the intended coverage of the HCIs. The price indices which inform the method are either extracted from Consumer Prices Index including owner occupiers' Housing costs (CPIH) or are constructed based on aggregated data. However, the calculation of "true" household group-specific price indices would require the use of household-specific prices. As price data are collected from retailers rather than by asking households the prices they have paid for each item, separate price indices are not available for different types of household. The methodology thus assumes that households all experience the same changes in price.

The "democratic" weighting gives an equal weight to each household, rather than to each individual in the economy as would be the case in a "truly" democratic index ([Flower and Wales, 2014](#), p13). This latter would pose however major challenges for data representativeness and implementation. Furthermore, in a "true" democratic approach, individuals would be followed longitudinally to capture their expenditure trajectories through time, which is not feasible. More information could be found in the article [Variation in the inflation experience of UK households: 2003 – 2014](#).

8 . Strengths

In spite of the above limitations, the Household Costs Indices (HCIs) have a major strength. Indeed, they address the requirement, outlined in the [international manual of consumer prices](#), of measuring “price inflation as experienced and perceived by households in their role as consumers” (p17). The addition of student loan repayments, which has a long-term impact on the budget of UK households, represents a further step towards developing such an index in the UK. Results by type of household and income decile enable the identification of the differential experience of inflation across the economic spectrum. This is supplemented by the [CPIH-consistent results for UK household groups](#) that are constructed through recognised economic principles.

9 . Acknowledgments

The work has benefitted from the input of a range of ONS experts including, but not limited to, Tanya Flower, Philip Gooding, Michael Hardie, Chris Jenkins, Andy King, Huw Pierce and Helen Sands. We also acknowledge the useful advice provided by external experts on the Advisory Panels on Consumer Prices – Technical. In particular, we are grateful to John Astin and Jill Leyland for their continued support towards the development of this work.

10 . Authors

Christopher Payne, Domenica Rasulo

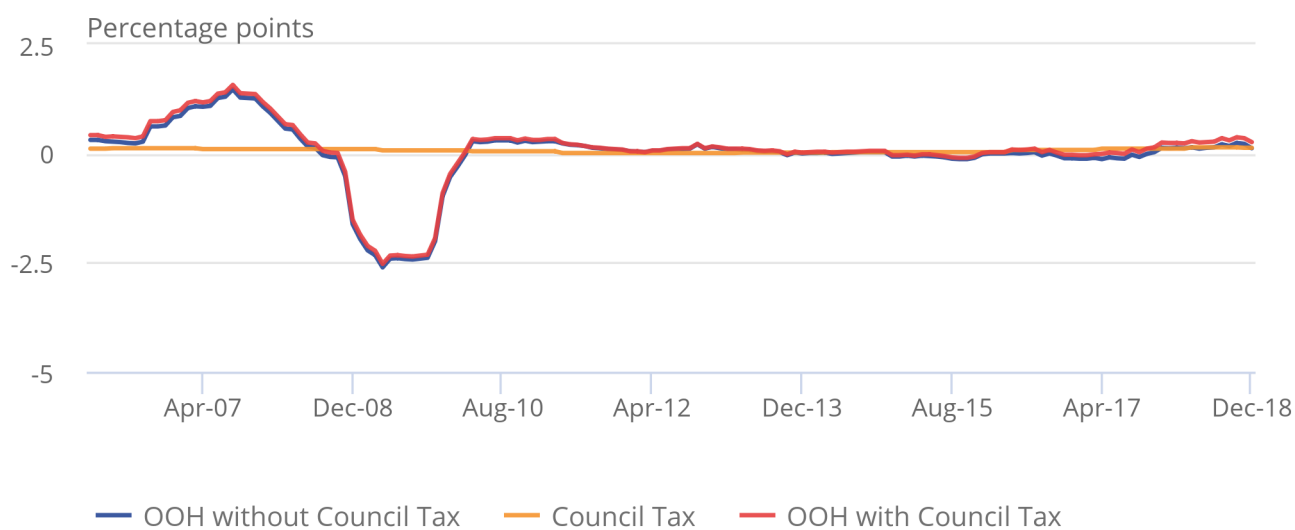
11 . Annex A

Figure 1A: OOH costs made the largest contribution for households with children

Contribution of Council Tax and of OOH costs with and without Council Tax. Households with children. Second preliminary HCLs estimates. UK, 2006 to 2018

Figure 1A: OOH costs made the largest contribution for households with children

Contribution of Council Tax and of OOH costs with and without Council Tax. Households with children. Second preliminary HCLs estimates. UK, 2006 to 2018



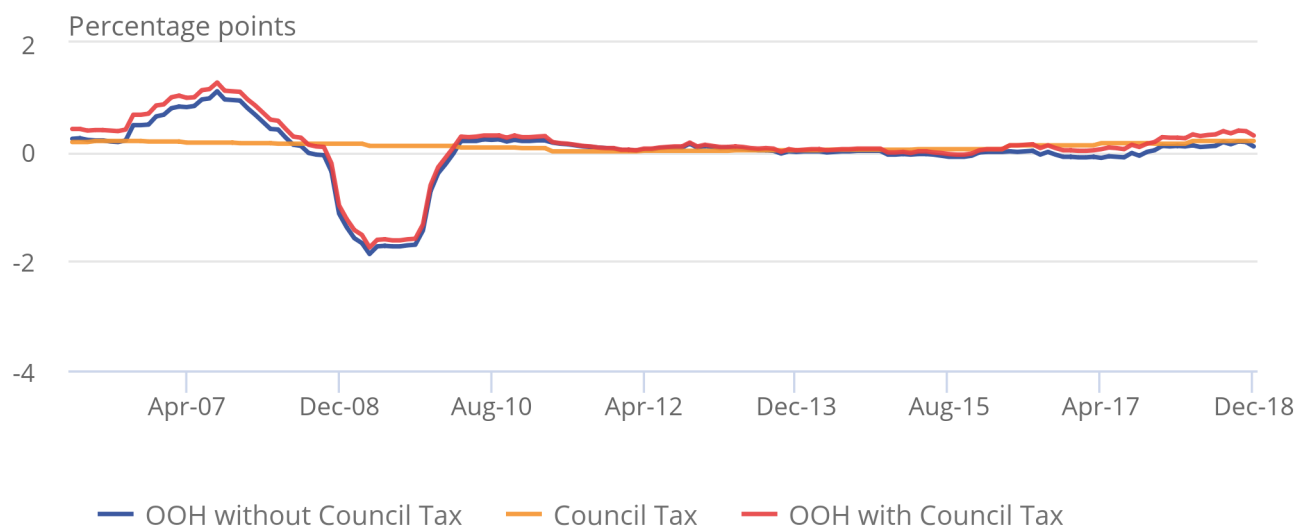
Source: Office for National Statistics - Household Cost Indices

Figure 2A: OOH costs made a large contribution for households without children

Contribution of Council Tax and of OOH costs with and without Council Tax. Households without children. Second preliminary HCs estimates. UK, 2006 to 2018

Figure 2A: OOH costs made a large contribution for households without children

Contribution of Council Tax and of OOH costs with and without Council Tax. Households without children. Second preliminary HCs estimates. UK, 2006 to 2018



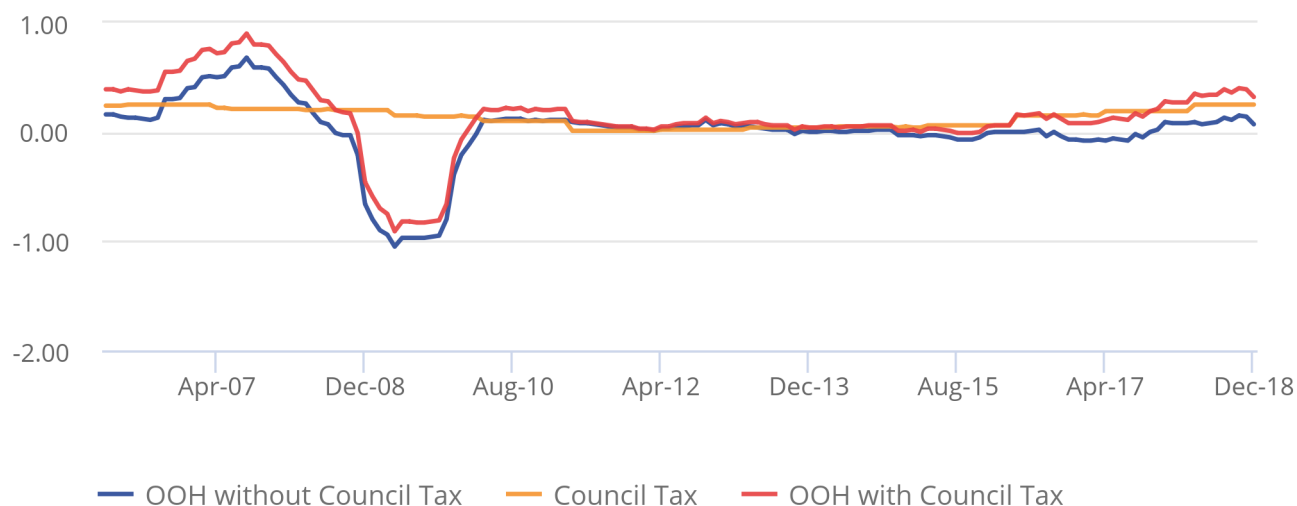
Source: Office for National Statistics - Household Cost Indices

Figure 3A: Council Tax had a small upward contribution for retired households

Contribution of Council Tax and of OOH costs with and without Council Tax. Retired households. Second preliminary HCIs estimates. UK, 2006 to 2018

Figure 3A: Council Tax had a small upward contribution for retired households

Contribution of Council Tax and of OOH costs with and without Council Tax. Retired households. Second preliminary HCIs estimates. UK, 2006 to 2018



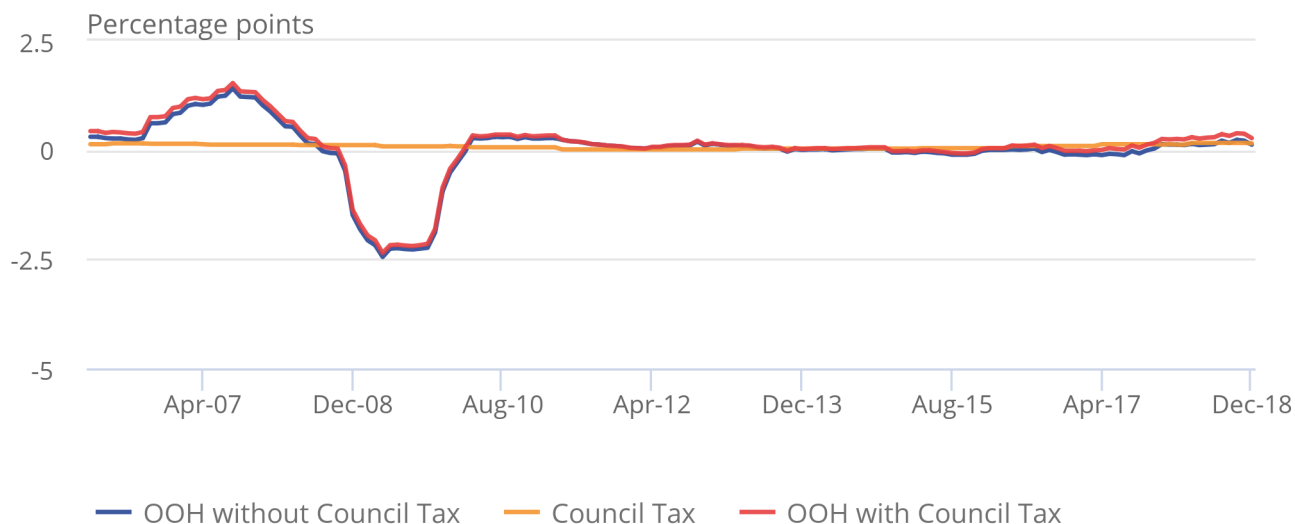
Source: Office for National Statistics - Household Cost Indices

Figure 4A: OOH costs made the largest contribution for non-retired households

Contribution of Council Tax and of OOH costs with and without Council Tax. Non-retired households. Second preliminary HCIs estimates. UK, 2006 to 2018

Figure 4A: OOH costs made the largest contribution for non-retired households

Contribution of Council Tax and of OOH costs with and without Council Tax. Non-retired households. Second preliminary HCIs estimates. UK, 2006 to 2018



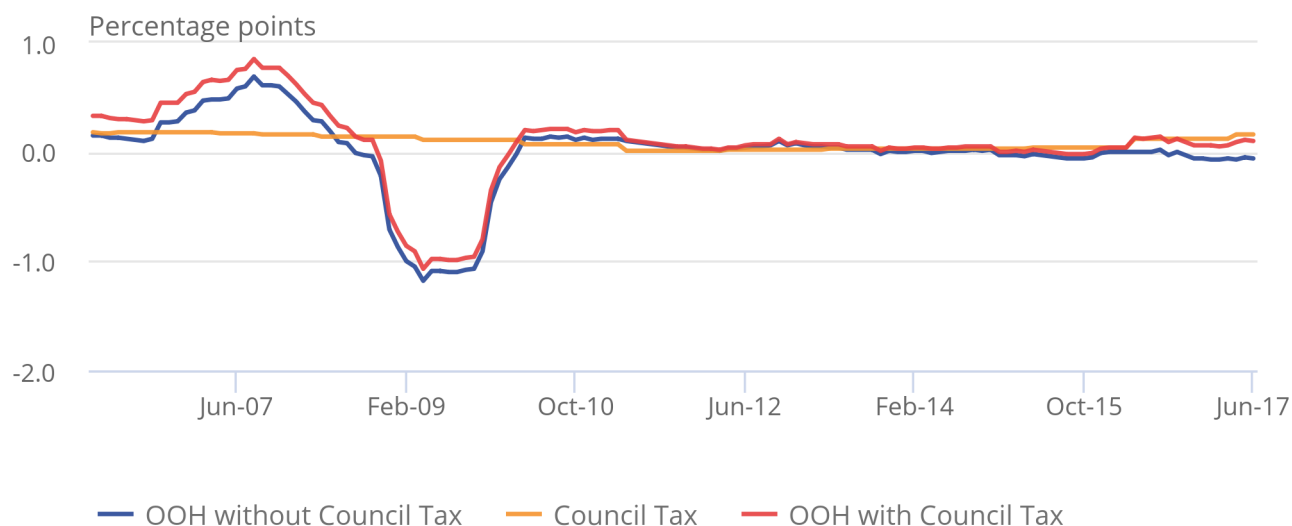
Source: Office for National Statistics - Household Cost Indices

Figure 5A: Council Tax had a small upward contribution for the second lowest decile

Contribution of Council Tax and of OOH costs with and without Council Tax. Second lowest decile. Second preliminary HCIs estimates. UK, 2006 to 2018

Figure 5A: Council Tax had a small upward contribution for the second lowest decile

Contribution of Council Tax and of OOH costs with and without Council Tax. Second lowest decile. Second preliminary HCIs estimates. UK, 2006 to 2018



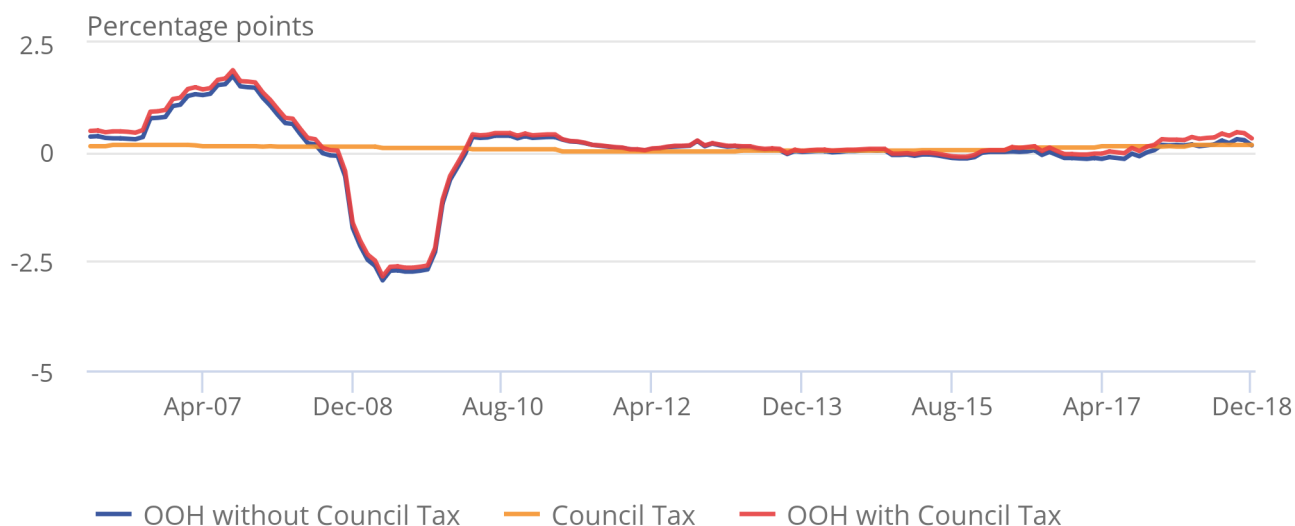
Source: Office for National Statistics - Household Cost Indices

Figure 6A: OOH costs had a major impact for the second highest decile

Contribution of Council Tax and of OOH costs with and without Council Tax. Second highest decile. Second preliminary HCIs estimates. UK, 2006 to 2018

Figure 6A: OOH costs had a major impact for the second highest decile

Contribution of Council Tax and of OOH costs with and without Council Tax. Second highest decile. Second preliminary HCIs estimates. UK, 2006 to 2018



Source: Office for National Statistics - Household Cost Indices

12 . Annex B

Table 1: Development plan and timeline for the HCIs

For completion by Q1 2020

Category	Subject	Detail
Improving the current methodology	Tertiary education	Establish the relative weight of tuition fees paid up front and through a loan Investigate inclusion of voluntary repayments
Improving the current methodology	Insurance premia and student loan repayments	Investigate double counting issues
Expanding the scope of the current indices	Interest on debt	Expand the interest on debt class to include additional measures

For completion by Q1 2021

Category	Subject	Detail
Improving the current methodology	OOH(payments)	Review the approach to measuring mortgage interest payments

For completion by Q1 2022

Category	Subject	Detail
Expanding the scope of the current indices	National coverage	Investigate what changes would be needed to ensure the index reflected the national (rather than domestic) population
Increasing the timeliness of the indices	Production	Establish data collection mechanisms so that HCIs components can be produced in a timely manner for quarterly publication
Increasing the robustness of systematisation	Production	Develop and test more robust systematisation of the HCIs production round

For completion by Q1 2023

Category	Subject	Detail
Quarterly test run	Production	Test production process

From 2023

Seek National Statistic status