

Article

# Shrinkflation: How many of our products are getting smaller?

An analysis of size changes within the sample of goods used to calculate consumer price inflation in the UK, for the period July 2015 to June 2017.

Contact:  
Chris Payne  
chris.payne@ons.gov.uk  
+44(0)1633 455321

Release date:  
21 January 2019

Next release:  
To be announced

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# 1 . Summary

We identified 206 products that shrank in size and 79 that increased in size between September 2015 and June 2017. There was no trend in the frequency of size changes over this period, which included the EU referendum.

The majority of products experiencing size changes were food products and in 2016, we estimated that between 1% and 2.1% of food products in our sample shrank in size, while between 0.3% and 0.7% got bigger.

We also observed that prices tended not to change when products changed size, consistent with the idea that some products are undergoing “shrinkflation”.

## 2 . Introduction

We previously published an [article looking at shrinking product sizes](#). The article highlighted that, between January 2012 and June 2017, our prices collectors had recorded 2,529 price quotes across the UK where the size of the tracked item had shrunk.

However, there is a lot of interest, not only in the number of quotes we have received where the item has changed size but also in the total number of different products that have shrunk. Because of this we have undertaken further analysis to estimate the number of unique products in our sample that shrank or grew larger. We estimated that between September 2015 and June 2017, there were 206 products that shrank in size and 79 that increased in size.

The majority of these size changes were for food and drink products. Overall, they represented a small minority of products in our sample; of approximately 37,400 food and drink items in our sample throughout 2016 (including duplicates of the same products), we identified 361 with size reductions (between roughly 1.0% and 2.1%<sup>1</sup>) and 116 with size increases (between roughly 0.3% and 0.7%). We also examined the behaviour of prices in the month when size changes occurred and found that the price for products typically remained the same as in the previous month. This implies that the price per unit often increased or decreased as a result of the size change.

### Notes for: Introduction

1. The estimated percentage of products with size changes depends on whether the denominator includes all food and drink products or only those products which could have a change in size recorded. More information can be found in Section 6.

## 3 . Background

Shrinkflation is a term used to describe the process of a product’s size being reduced while its price remains the same. If products “shrink” in size while the price stays the same, the price has inflated, as consumers will pay the same amount of money for less. In order to accurately measure inflation, we use quality adjustment processes to account for any changes to a product’s weight, volume or size (see the [Consumer Price Indices Technical Manual](#) for more information).

Each month, price quotes are collected across different outlets and locations for each item in our [basket of goods and services](#). One of our price collectors' aims is to select products that are popular, so several price collectors will often price the same product. For example, for the item "Carton/box of chocolates", there could be several price quotes for a particular branded box of chocolates. If such a product experiences a change in size, we will pick up this change in multiple price quotes. For this reason, it was not possible to tell from our previous analysis how many unique products were represented by the price quotes with recorded size changes.

Our best means of determining the number of unique products among all the quotes with recorded size changes was to manually compare the product descriptions recorded by price collectors. This was a time-consuming process, so rather than look at the entire period covered in our previous analysis, we focused on the two-year period from July 2015 to June 2017.

It should be noted that, for the purpose of measuring inflation, we target high-expenditure, easy to follow products. As a result, the size changes in our sample will not necessarily be representative of the changes occurring in the market as a whole, so we do not recommend making this generalisation.

## **4 . Estimating the number of products that have experienced size changes**

We have estimated the total number of unique product size changes that occurred between September 2015 to June 2017<sup>1,2</sup>. This was done by comparing the product descriptions recorded by price collectors for items that we identified had changed in size.

It is not straightforward to match a particular product size change to a particular point in time, because the same size change can be observed in more than one month. For example, a change may have been observed in September 2015 in one outlet and October 2015 in another, due to different outlets beginning to sell new stock at different times. Therefore, we identified the first time a particular size change was observed and used this as our best estimate of the time that a product size change initially occurred.

Figures 1 and 2 show the total number of quotes where there was a recorded size increase or decrease, broken down into the following categories:

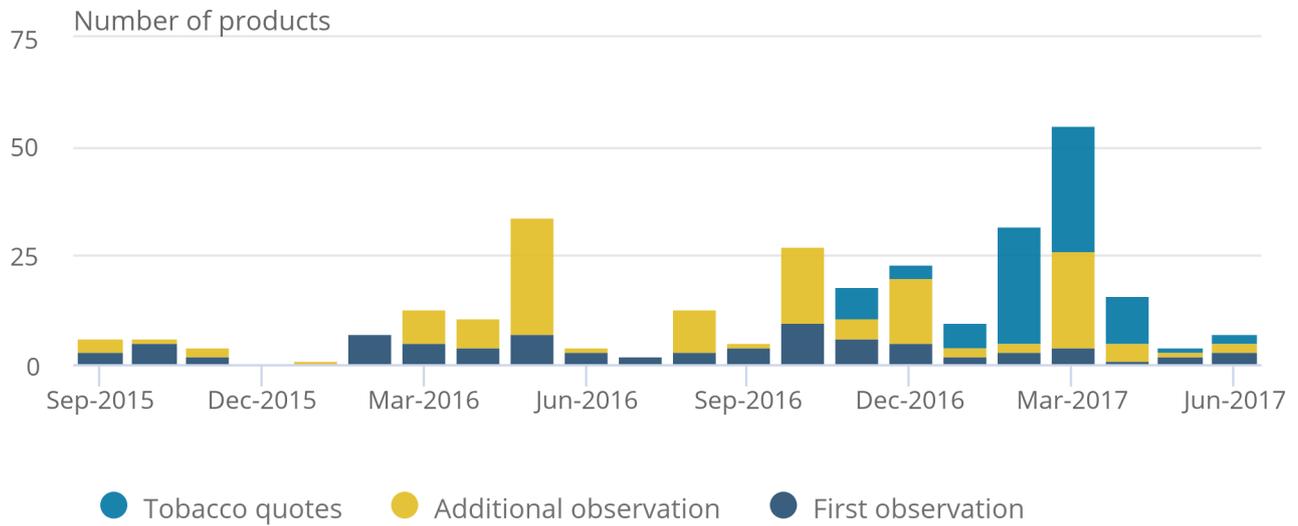
- the first observation of a particular product size change
- additional observations of the same product size change
- all quotes for tobacco products with size changes, which we excluded from our total counts of size changes; we have treated these quotes differently because of new legislation in May 2017, which enforced minimum packaging sizes for tobacco products, triggering a large number of product size changes in the preceding months

## Figure 1: Count of product size increases

UK, September 2015 to June 2017

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UK, September 2015 to June 2017



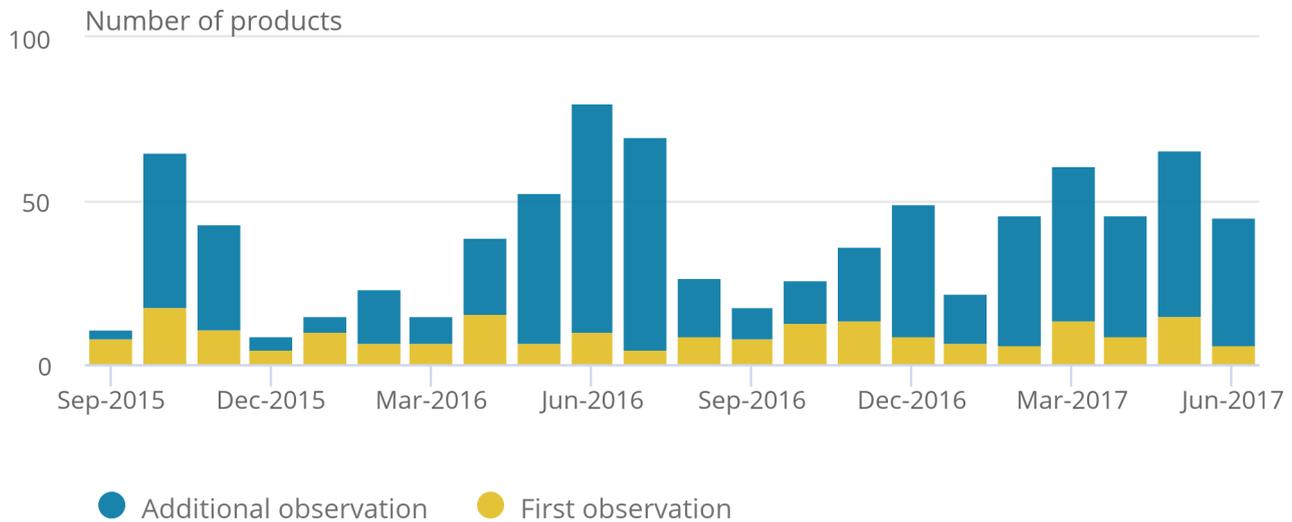
Source: Office for National Statistics

## Figure 2: Count of product size decreases

UK, September 2015 to June 2017

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UK, September 2015 to June 2017



Source: Office for National Statistics

### Notes:

1. There were no tobacco products with size reductions.

Further details about the methodology and limitations for this analysis can be found in Annex A. The total numbers of quotes with size changes in each month approximately reflect those presented in our [previous analysis](#). Small discrepancies between these figures are due to minor changes to the methodology used and due to some exclusions being made, as explained in Annex A.

The total number of “first observations” of a size change is equivalent to the total number of different size changes we observed (that is, excluding duplicates). Our analysis reveals that the total number of different size changes in each month is relatively low, with many of the quotes from the previous analysis representing duplicates of the same product size change.

In total across the 22 months, there were an estimated 214 different product size reductions observed and 81 different product size increases (excluding tobacco products). This translated to 206 different products in total having size reductions (as eight products had more than one size change) and 79 having size increases (no products had more than one size increase). In other words, 2.6 times as many products reduced in size as increased in size. For comparison, there were 865 quotes in total (that is, including duplicates of the same change) with size reductions and 212 quotes in total with size increases.

There was no apparent trend in the frequency of size reductions or size increases over time for the period studied. Consistent with our previous analysis, the trend remains stationary in the period following the EU referendum (June 2016).

#### **Notes for: Estimating the number of products that have experienced size changes**

1. The current and previously-published analyses include changes in various quantity measurements including weight, volume, number in pack, sheets per roll, Alcohol By Volume (ABV) (%) and page yield (for inkjet cartridges).
2. We excluded the first two months of data from the analysis in this section. For more information, see Annex A.

## **5 . Types of items with size changes**

All of the products in the Consumer Prices Index including owner occupiers' housing costs (CPIH) [basket of goods and services](#) are classified according to the international [Classification of individual consumption by purpose \(COICOP\)](#) system. Figure 3 shows the estimated frequencies of size reductions or size increases, for distinct products, within the different COICOP categories (at the class level) for the period July 2015 to June 2017 (only classes with at least five size changes in total are shown).

### **Figure 3: Frequencies of products with size changes, by COICOP class**

[Download the data](#)

Most of the size changes occurred in the food and drink categories of the basket; these categories contained 70% of the size reductions and 71% of the size increases<sup>1</sup>.

Food categories with larger numbers of product size changes – both increases and decreases – included bread and cereals, meat, and sugar, jam, syrups, chocolate and confectionery. The non-food categories with the most size increases and reductions were appliances and products for personal care – which includes items such as toilet rolls, nappies and tissues – and non-durable household goods – which includes items like kitchen roll and washing up liquid.

The frequencies of size changes in the different COICOP categories was often roughly proportional to the total numbers of quotes per month in each category for which a size change was recorded, suggesting that much of the variation between COICOP categories may be due to the differences in category sizes. For more details, see Annex A.

We found previously that the only category in the basket of goods where size changes had a notable impact on the class-level index was sugar, jam, syrups, chocolate and confectionery; our new analysis shows that there were more unique products with size reductions than increases in this category (over the shorter time period we studied). However, the ratio of size decreases to increases was not uniquely high in this category.

#### **Notes for: Types of items with size changes**

1. When calculating the proportion of size-change products that were food and drinks, we counted all the food and drink items within COICOP categories 1 (Food and Non-Alcoholic Beverages) and 2 (Alcoholic Beverages and Tobacco), but not COICOP category 11 (Restaurants and Cafes).

## 6 . Estimating the proportion of products in the CPIH basket with size changes

Our sample is fixed throughout the year; price collectors attempt to track the price of a particular item in the sample from month to month. We have estimated the proportion of all food and drink items we tracked in 2016 that changed size<sup>1</sup> (note that the items tracked are not all distinct products, as the same item may be tracked in different outlets and locations).

When calculating this figure, we considered the fact that not all food and drink quotes had the potential for a size change to be identified, as we do not record size as a quality indicator for all quotes<sup>2</sup>. In total, around 46% of food and drink quotes had a size recorded in 2016.

Many of those quotes without sizes recorded are unlikely to have a size change as they are a standard-sized product (such as a 250 gram block of butter) and others do not typically have a set size (for example, whole fruits and vegetables). However, for some items such as cheese, it is possible for products to change size, but we work on a basis of price per unit weight, so we do not need to record absolute sizes for our quality adjustment processes.

We have therefore calculated upper and lower bounds for the proportion of all food and drink items we tracked in 2016 that changed size, with the upper bound taking the number of size changes over the number of quotes with a size recorded and the lower bound taking the number of size changes over the total number of quotes, including those without a size recorded. The upper bound is likely to be an overestimation, as the items excluded from the calculation are disproportionately those that are less likely to have size changes, while the lower bound is likely to be an underestimation, as there are likely to be some products that changed size that were not identified.

Throughout 2016, our monthly sample contained an average of 37,408 food and drink items, of which on average around 17,100 had a weight recorded. Across 2016, we identified 361 tracked items with a size reduction and 116 with a size increase. Therefore, we estimate that between 1.0% and 2.1% of tracked items had a size decrease and between 0.3% and 0.7% of tracked items had a size increase.

Further methodological details and limitations are described in Annex A.

### Notes for: Estimating the proportion of products in the CPIH basket with size changes

1. Food and drink items within COICOP class 1 (Food and Non-Alcoholic Beverages) and 2 (Alcoholic Beverages and Tobacco) were included while those within COICOP class 11 (Restaurants and Cafes) were not included.
2. There are several reasons why quotes may not have a size recorded:
  - the weight or volume may be fixed at a standard size (for example, “Large loaf white unsliced 800 grams”)
  - the quantity may always be a single unit of goods (for example, “Doughnut, each”)
  - the price may be calculated per unit weight (for example, “Bacon, back, per kilogram”)
  - the size of the product may not be applicable when describing the product’s quality (more relevant to non-food items)
  - a size measurement may not be available for the particular product whose price is quoted

In cases where the exact weight or volume of an item is specified, a size change that took a product's size outside of this range would normally trigger its replacement with a different product of the specified size. Alternatively, a size change could result in a change to the item description to ensure that we can continue to collect a particular product or product range that has changed in size.

## 7 . How prices change when package sizes change

We have also examined how prices change when products undergo size changes.

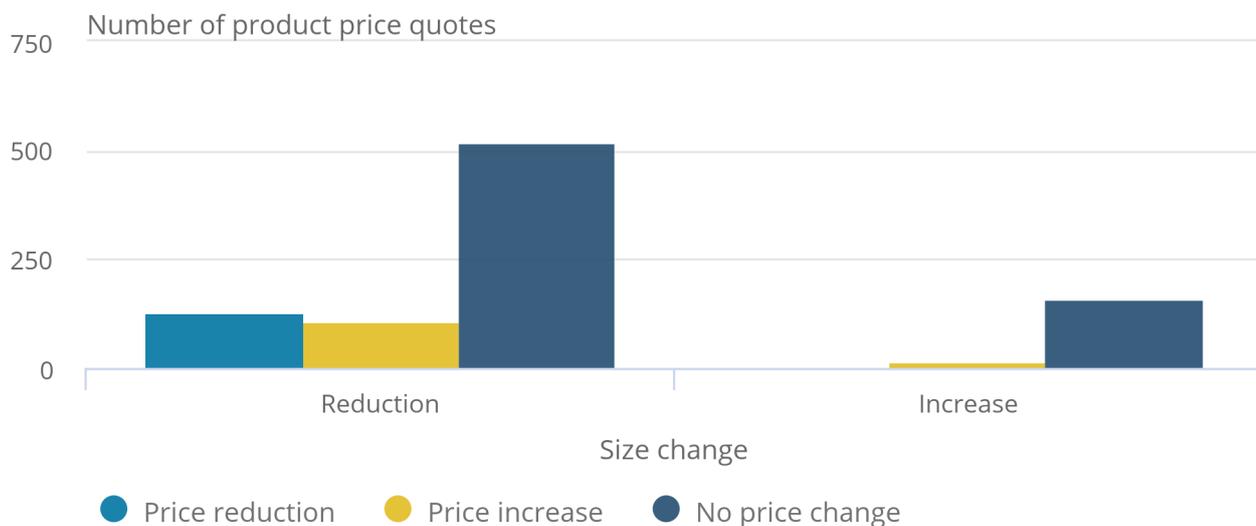
We studied the change in product prices (without adjusting for size change) between the month preceding a size change and the month with a size change, for size changes between July 2015 and June 2017. Here, we counted all price quotes, since prices for a given product can differ from one quote to another (they may be from different retailers, for example). However, this does mean that there may be some duplicates of the same price changes.

**Figure 4: How prices change when size changes occur**

UK, July 2015 to June 2017

Figure 4: How prices change when size changes occur

UK, July 2015 to June 2017



Source: Office for National Statistics

We found that the prices we recorded tended not to change when size changes occurred, regardless of whether the size change was an increase or a decrease (Figure 4). For size reductions, there were similar numbers of quotes with price increases and price decreases, which would be consistent with products going on and coming off promotion in roughly equal proportions. For size increases, there were 17 price increases and seven price decreases.

When interpreting these findings, it should be remembered that this analysis does not distinguish between longer-term changes to a product's price and price changes that are related to temporary promotions.

This analysis suggests that when size changes occur, the prices charged for the products frequently remain the same, meaning that when products get smaller, consumers tend to end up getting less good value for their money – in other words, products undergo “shrinkflation”. Conversely, when products get bigger, consumers may end up getting better value for their money. It should be remembered, however, that this analysis focuses only on a snapshot of prices in the month when a size change was recorded, so, for example, any price changes occurring in the months following a size change would not be captured.

## 8 . Authors

Joanna Corless, Office for National Statistics.

## 9 . Annex A: Methodological notes

In Section 4 we have indicated the months in which size changes for particular products were first observed. However, this method would be likely to introduce a bias affecting the first part of the time window we studied. If a size change was introduced in some stores before the first observation period, we should have observed the change in a period preceding our time series; however, in practice it may have been observed (in other stores) in one of the first few months of our analysis. This would have the effect of “front-loading” the first observations of products in the first few months of the time series.

To address this bias, we carried out an analysis in which we ignored data from the first three months that we originally analysed and observed the effect of this on the frequency of “first” observations in the following months (tobacco products were excluded). Figures 5 and 6 show that most of the impact is seen in the first month of the time window.

Based on this analysis, we excluded the first two months of data from our analysis in Section 4 (Figures 1 and 2). This should eliminate or reduce the bias in the data we have presented.

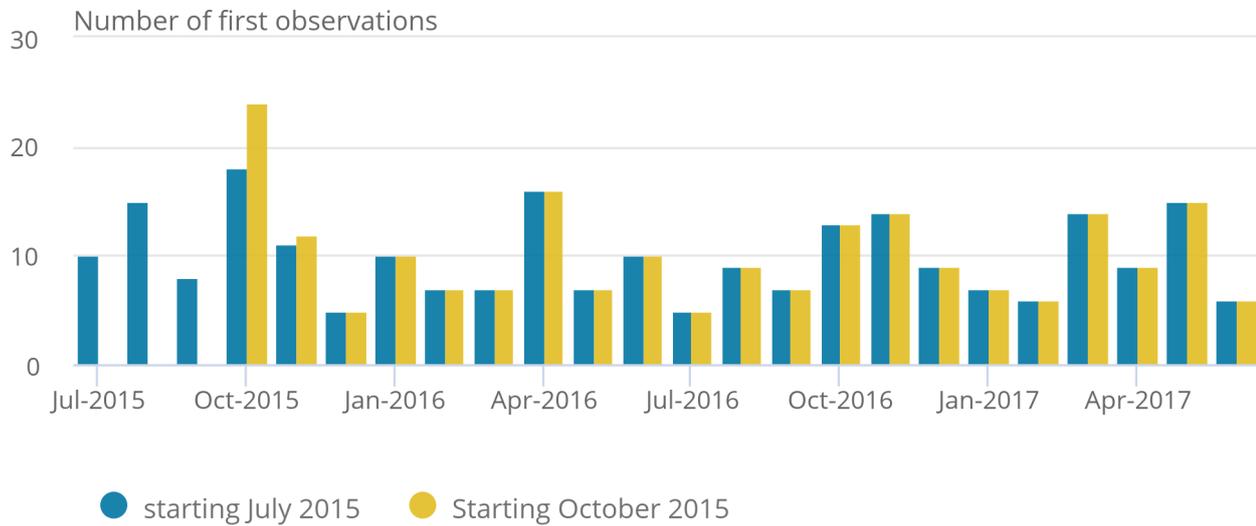
Data were not excluded from the subsequent analyses, since these were not time series (or they used counts of price quotes rather than unique products), so they would not be affected by the identified bias.

**Figure 5: Effect of delaying analysis by three months on number of first observations, for size reductions**

UK, September 2015 to June 2017

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UK, September 2015 to June 2017



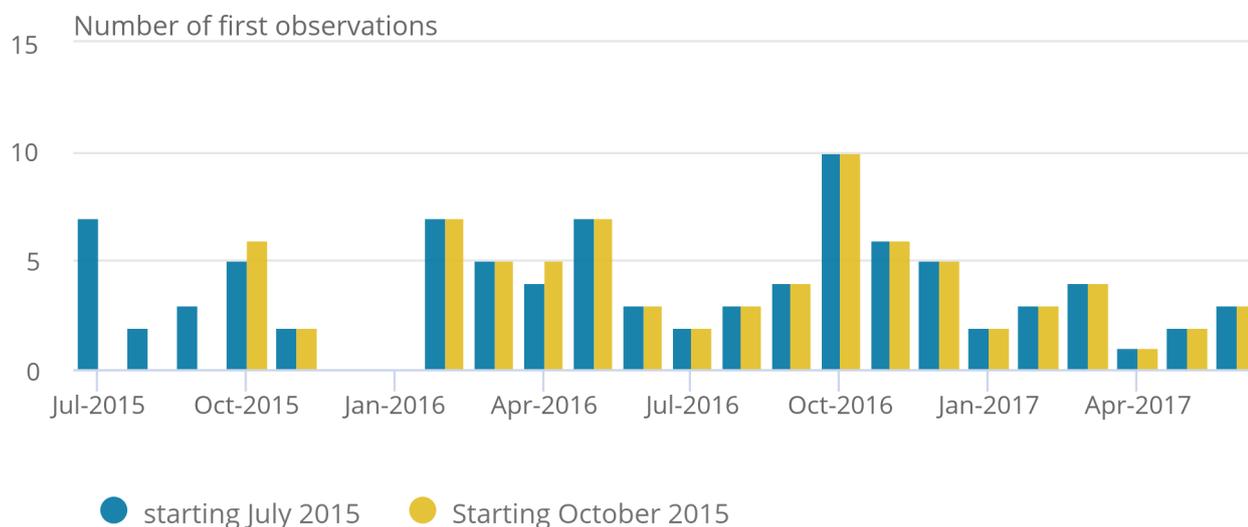
Source: Office for National Statistics

**Figure 6: Effect of delaying analysis by three months on number of first observations, for size increases**

UK, September 2015 to June 2017

## Figure 6: Effect of delaying analysis by three months on number of first observations, for size increases

UK, September 2015 to June 2017



Source: Office for National Statistics

When categorising size changes as a “first observation” or “additional observation” to determine the number of unique product size changes in Section 4, we used the two following principles.

If more than one size change was observed for a given product in the period studied, each distinct size change was counted separately. For example, if a size reduction occurred in May 2016 and a further size change was observed in February 2017, these size reductions would be counted as two separate occurrences. We have separately given estimates of the total number of unique products with size changes (rather than the number of size changes); for this, subsequent size changes in the same direction were excluded.

Where multiple products were part of the same product range, they were not treated as distinct from one another; only one “first observation” of a product was counted per range. For example, if a range of crisp products in different flavours all had identical size changes, only the first of these changes would have been counted.

In order to categorise a size change as an increase or decrease, we compared the quote in the month where the size change occurred with the last quote collected for the same tracked item.

In some cases, the item was not available in the month directly before the size change. We searched up to five months for a previous quote; if no quote was found, the size change was excluded. We also only compared quotes from within the same year, meaning, for example, that for a size change in March 2016 we did not look for a previous quote from any earlier than January 2016.

In Section 7 we compared prices before and after a size change. Here, we wanted to look only at cases where the price change and size change occurred in the same month. Therefore, we only included cases where there was a quote available in the month directly preceding the size change.

In Section 5 we presented the product size changes by COICOP class. The number of price quotes in the sample for CPIH varies between the different COICOP classes, so we would expect this to influence the number of product size changes across the classes. Figure 7 shows estimates of the total number of quotes per month in the CPIH sample for each COICOP class featured in Figure 3 (Figure 7 shows total quotes per month in 2016 only; however, we would expect these totals to remain largely similar from year to year).

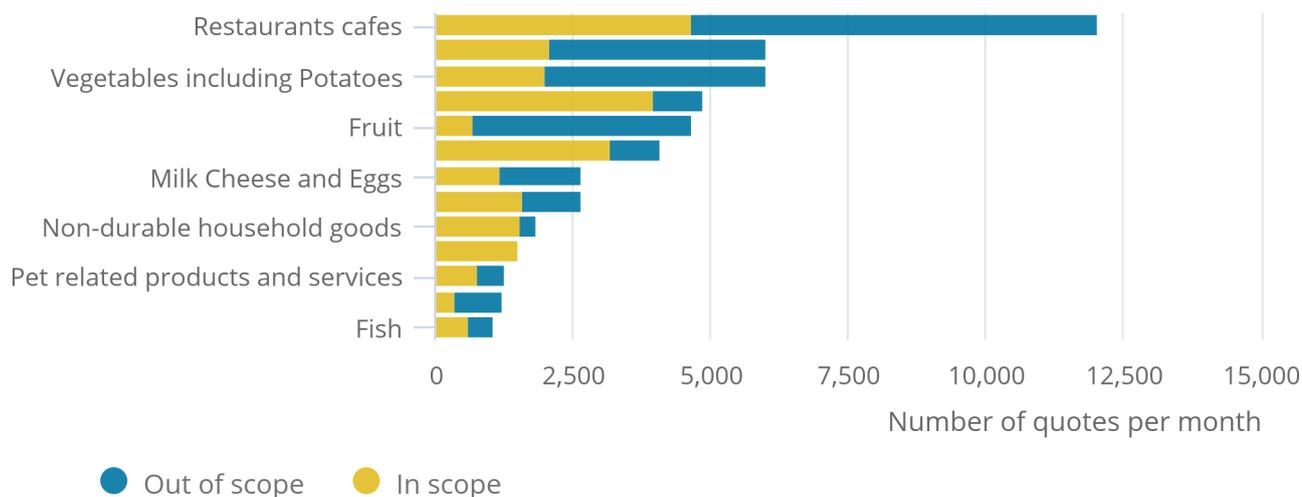
Not all quotes have a size recorded as this is not always required for our index calculations. Only those quotes with sizes recorded would be able to have a size change in our analysis. Therefore, the total quotes per month is further divided into those quotes that are “in scope” of our analysis of changing product sizes and those that are “out of scope”.

**Figure 7: Estimated number of quotes per month in 2016, by COICOP class**

UK, 2016

Figure 7: Estimated number of quotes per month in 2016, by COICOP class

UK, 2016



Source: Office for National Statistics

In general, the frequencies of size changes in the different COICOP categories is often roughly proportional to the total numbers of quotes per month in each category for which a size change was recorded, suggesting that much of the variation between COICOP categories may be due to the differences in category sizes.

Readers should be aware that counts in Figure 3 and Figure 7 are not on an equivalent basis, as Figure 3 refers to numbers of unique products whereas Figure 7 refers to numbers of price quotes. Therefore, simply calculating a proportion by dividing counts of product size changes in a COICOP class by counts of quotes in that class would not be meaningful and the comparison is made to give an indication only.

To estimate the proportion of food and drink items with size changes in 2016 in Section 6, we needed to estimate the total number of items we track from month to month. We similarly estimate the total number of items in the sample for various COICOP classes in this annex.

There is not a definitive figure for the total number of tracked items in the sample for specified parts of the CPIH basket, as some items temporarily drop out of the sample, giving rise to some variation. Therefore, in Section 6 and Annex A we took the average number of total quotes from each month for the relevant part(s) of the basket as an approximation of this “total” figure. We did not exclude quotes for temporarily unavailable items, where no data were obtained, when calculating these averages. However, we did exclude quotes with no data when calculating the average monthly percentage of quotes with size changes in Section 6.

The figures for the numbers of total price quotes in our sample which are “in scope” or “out of scope” of our weight change analysis in Section 6 and Annex A are presented as rough estimates, as they are based on raw size measurements before validation has taken place so may be subject to some error.

Although in principle our sample of items is fixed in a given year, in practice our price collectors have to deal with situations where the product we are trying to follow is no longer stocked. In this case they will aim to replace it with something similar (see the [Consumer Price Indices Technical Manual](#) for more information). Therefore, in Section 6 when we looked at the proportion of tracked items that had size changes in 2016, the identity of the “tracked item” could change over the period studied. However, a size change was only recorded in cases where we observed a particular product changing size.