ADVISORY PANEL ON CONSUMER PRICES – TECHNICAL

Collecting discounted prices

Purpose

1. The impact of including multi-buy discount offers in consumer price statistics and possible approaches to implementing this are being investigated in a pilot study. This paper presents the results of the study so far.

Actions

2. Members of the Panel are invited to:
   a) advise on whether multi-buy discounts should be included in ONS consumer price statistics
   b) advise on how take-up rates of multi-buy offers should be applied

Background

3. Price reductions are currently included in our consumer price statistics, however most other offers, such as multi-buy discounts, loyalty card schemes and vouchers are not included. This limits the extent to which we are capturing the prices consumers are actually paying.
4. If the prevalence of multi-buy offers changes over time then this could introduce bias to inflation statistics. For example, if multi-buy offers became more prevalent but these prices were not measured, inflation may be overestimated. Conversely, if multi-buy offers were replaced with price reduction offers or lower regular prices, inflation could be underestimated.
5. In the Johnson review (Johnson, P., 2015), the treatment of discounts was assessed. Two recommendations were made. ONS should:
   a. Examine a range and scale of different types of discounting and the extent to which this has been changing over time. It should publish an estimate of the likely effects on CPIH of different ways of dealing with these discounts.
   b. Seek to reflect a wider range of discounts, such as multi-buy discounts, in our consumer price statistics, based on the outcome of its studies.
6. We have asked Kantar (who carry out the price collection for consumer price indices) to carry out a pilot data collection on discounted prices, which has been running since July 2016. The pilot collects discount types and prices for food and drink items in regional supermarkets alongside the regular CPIH price collection. The “regional supermarkets” represent 71 supermarkets spread across the different government regions in the UK and contribute approximately a third of the total food and drink price quotes in the standard CPIH collection.
7. The pilot discounts collection includes multi-buy offers but does not include discounts through loyalty card schemes and vouchers. The guidance for the HICP states that only discounts available to all potential customers should be included and specifically that prices in connection with loyalty cards should not be included.
8. The first six months of the collection (June to December 2016) was used to bed in any quality issues; indices in this paper use data from January 2017 to June 2019. The pilot is currently commissioned until January 2020.

Data collection

9. In the pilot study, a price quote is categorised according to the discount type and a "discounted price" is derived. For example, the category could be "buy X for £Y", in which case values of X and Y would be recorded and a discount price calculated as £Y/X.
10. Table 1 shows the categories of discount used in the pilot study and whether they are considered a price reduction, multi-buy discount or other discount type.

Table 1: Categories of discount used in pilot study

Discount category	Discount type
No discount	No discount
£x off price	Price reduction
x% off price	Price reduction
x items for price of y items	Multi-buy
x% free	Other
Buy x get y free	Multi-buy
x items for £y	Multi-buy
Buy x items save £y	Multi-buy
Other Discount	Other
Was £x now £y	Price reduction
x packs for £y (price per kilo)	Multi-buy
£x off y grams	Price reduction
Buy one get one half price	Multi-buy
Buy x save y%	Multi-buy

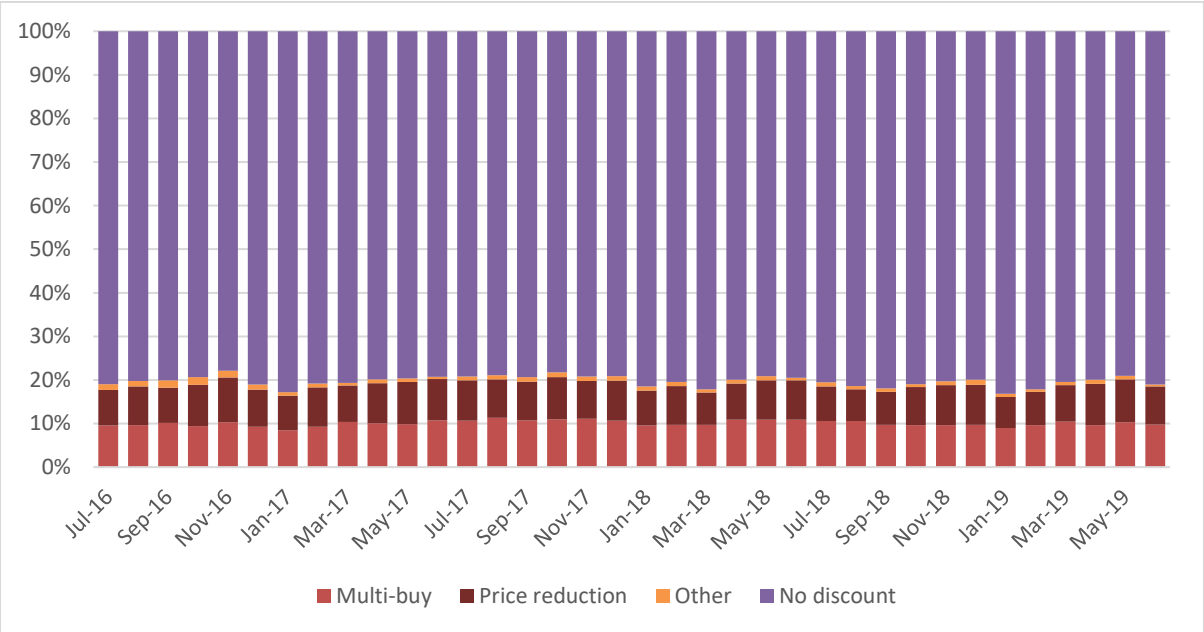
11. An important question to address in this pilot is how take-up rates of multi-buy offers should be estimated, since this determines the relative weighting of discounted and non-discounted prices in price index calculations. When using conventional collection methods, the percentage of multi-buy offers taken up by consumers is unknown. In this paper, indices are presented for a variety of take-up rates and possible assumptions that could be made about the rate of take-up are put forward.

Discount types and prevalence

12. If the prevalence of multi-buy discount offers was changing over time, this could lead to bias in inflation estimates: if multi-buy offers were becoming more prevalent, inflation may be overestimated, and conversely if multibuy offers were becoming less prevalent, inflation may be underestimated.
13. Consumer panel data from Kantar from 2007 to 2013, cited in the Johnson Review (chapter 13.4, figure 13.2), showed that the use of discounts in groceries as a proportion of total sales increased year-on-year between 2007 and 2012. Then, from 2012 onwards, the proportion of sales accounted for by multi-buy promotions started to fall, with temporary price reductions accounting for a greater share of total sales.

14. Research from Assosia reveals there was a 29% fall in multibuys across the major supermarkets between 2015 and 2016, with multi-buys accounting for 21.6% of featured space promotions in 2016 down from 30.8% the previous year
15. We looked at the proportion of price quotes with different offer types, including multi-buys, for seven major supermarkets, referred to here as supermarkets A to G. Overall there is no trend to suggest that the prevalence of multi-buy discounts has changed over the course of the study so far, between July 2016 and June 2019 (fig. 1). However, there are some trends when looking at data for individual supermarkets; these data are presented in Annex A. Supermarkets A (Annex A - fig. 1) and B (Annex A - fig. 2) have a higher proportion of multi-buy discounts towards the end of the pilot, while supermarket C (Annex A - fig. 3) had slightly more multi-buy offers in 2017 than the preceding and subsequent periods. Supermarket D (Annex A - fig. 4) has mostly phased out multibuy offers between late 2018 and the present. There is also month-to-month variation in the prevalence of multi-buy offers for each supermarket. Supermarket E committed to phasing out multi-buy offers by August 2016; our data shows essentially no multi-buy discounts recorded in this supermarket throughout the pilot collection (Annex A – fig. 5).

Figure 1: Proportion of price quotes with multi-buy discounts, price reductions and no discount, across all supermarkets



Impact of multibuy discounts on CPIH index and growth rates

16. CPIH price index aggregates and growth rates were produced using pilot data. While only regional supermarkets were included in the pilot collection, which would normally contribute only a proportion of prices for item indices, in the current pilot these quotes alone were used to produce item indices. Overall, the food and drink categories make up 10.3% of CPIH by weight
17. There were also some differences in the methodology used for index construction with the pilot data compared to published CPIH: to simplify the analysis, some validation steps were omitted and no quality adjustment was performed.
18. To show the impact of the differences described in paragraphs 16 and 17, figures 2 and 3 show a comparison of COICOP2-level aggregates produced with pilot data, before making any adjustments for multibuy discounts, and published aggregates
19. Consistent with CPIH methodology, a Jevons formula was used to calculate the food and drink item indices

Figure 2: Food and non-alcoholic beverages, pilot index (without multibuy discounts) and published index

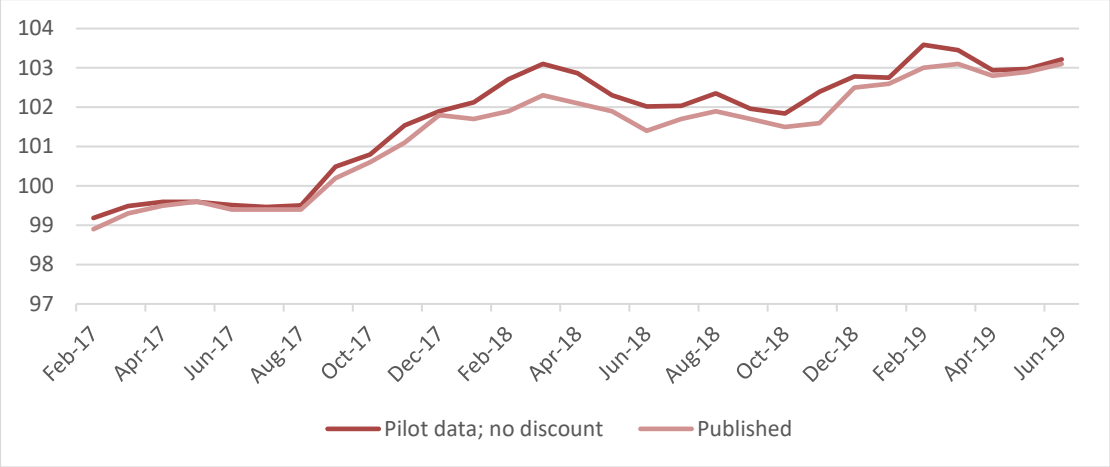
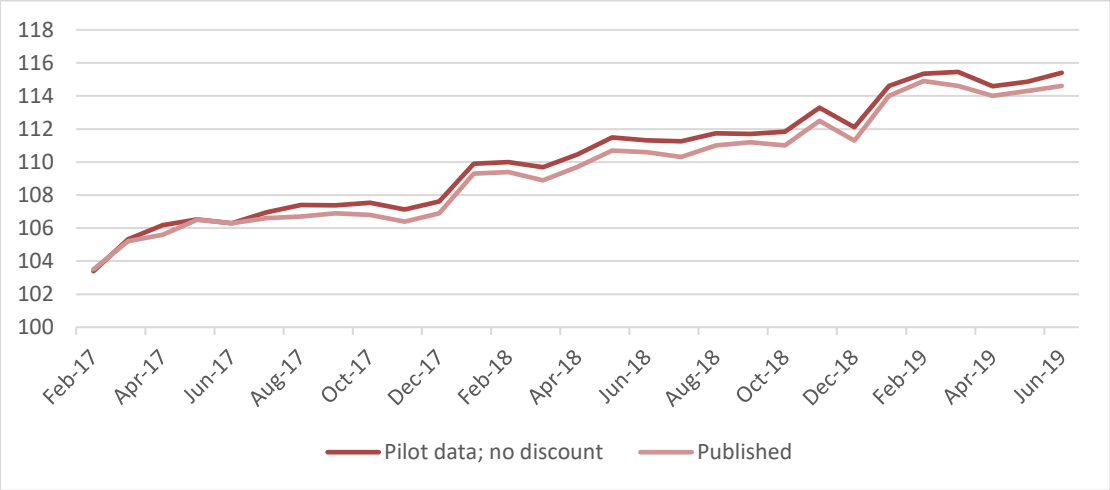
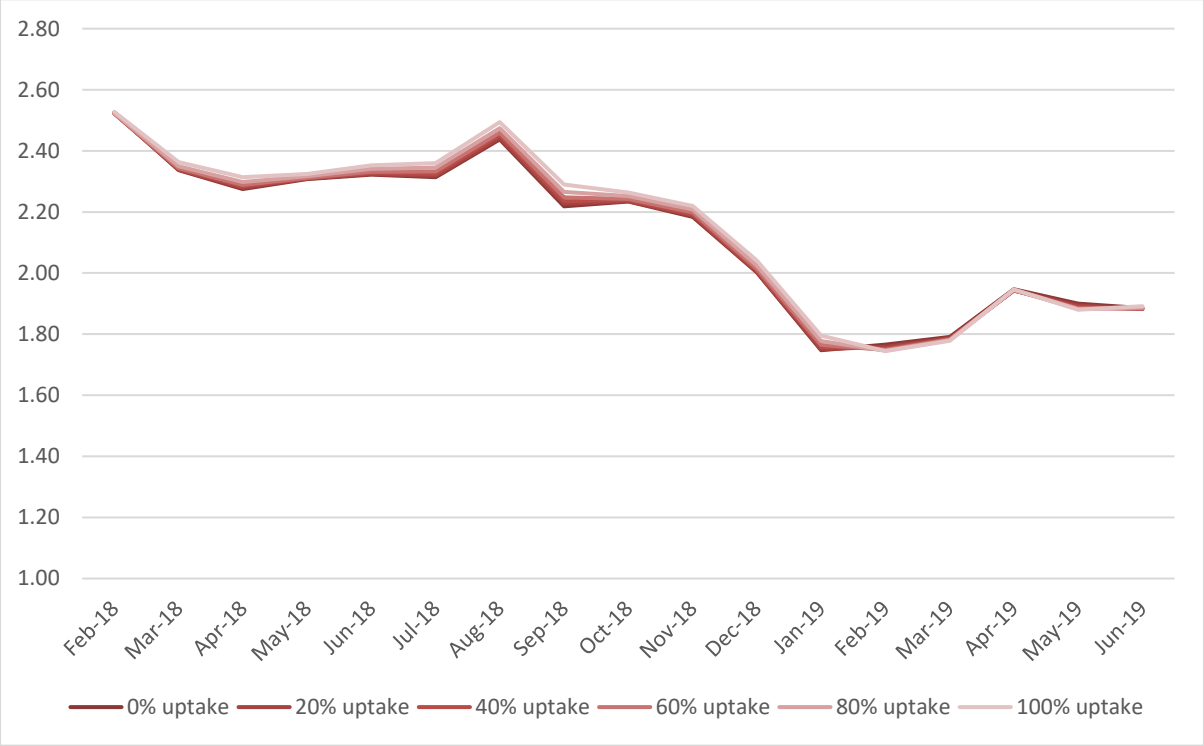


Figure 3: Alcoholic beverages and tobacco, pilot index (without multibuy discounts) and published index



20. Figures 4 to 6 show the impact of including multibuy discounted prices on growth rates for overall CPIH and COICOP2-level aggregates, with assumed offer take-up rates of 0, 20, 40, 60, 80 and 100%. The indices that underlie these growth rates are presented in annex B. It should be noted that, since price indices show the change in price of goods, rather than the absolute price, there is no reason to assume that index values will be lower for discounted goods than non-discounted goods.
21. The impact on CPIH annual growth rate was always less than 0.1% (fig. 4) with the highest impact in September 2018, where the growth rate with 100% offer take-up was 0.07% higher than the growth rate with 0% take-up.

Figure 4: CPIH annual growth rate with pilot data



22. The impact at the COICOP2 level was slightly greater, with the growth rates for food and non-alcoholic beverages up to 0.7% higher with multi-buy discounts (fig. 5). The growth rates for alcoholic beverages and tobacco were up to 0.2% higher (fig. 6).

Figure 5: Food and non-alcoholic beverages growth rate with pilot data

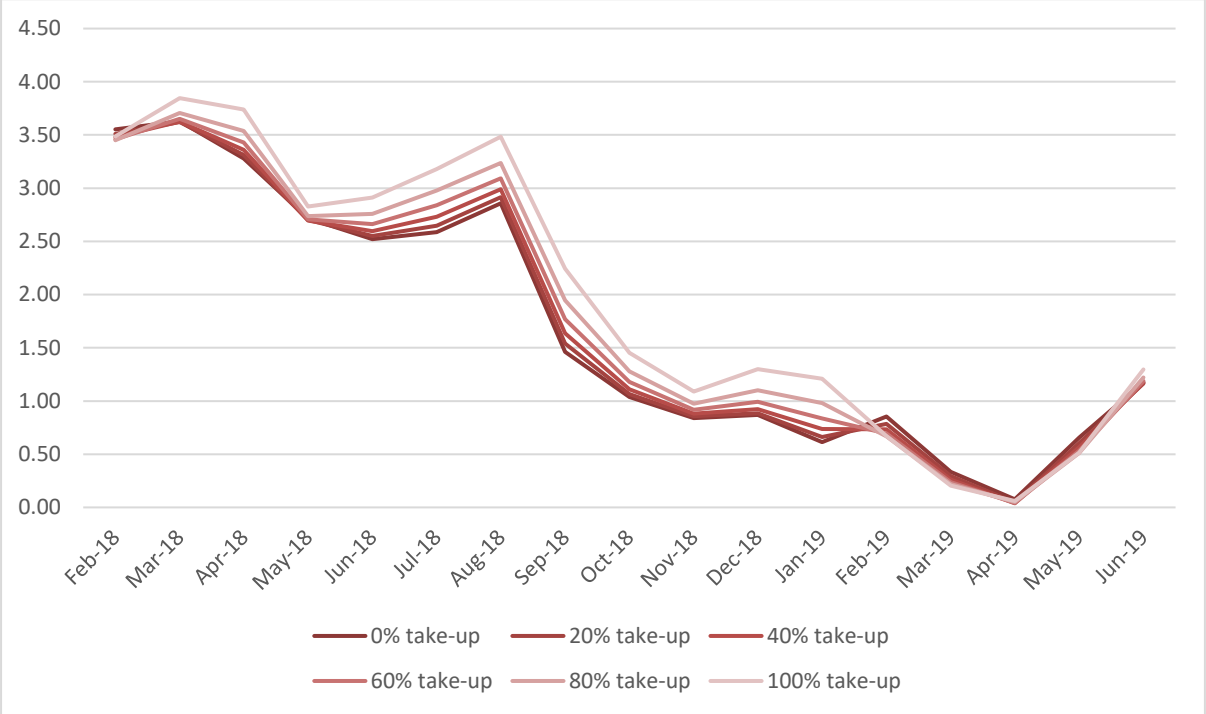


Figure 6: Alcoholic beverages and tobacco growth rates with plot data

23. The impact on index levels and growth rates was more noticeable at the COICOP3 level (fig. 7 to 12) and was particularly big for non-alcoholic beverages (fig. 9 and 10). Interestingly, the indices for food (fig. 7) and alcoholic beverages (fig. 11) both tended to be lower with multibuy prices than without multibuy prices, whereas non-alcoholic beverages (fig. 9) tended to have higher index levels for multibuy prices than non-multibuy prices. These opposite trends are eliminated by aggregation in the index for Food and non-alcoholic beverages (annex B - fig. 2)

Figure 7: Food index with pilot data

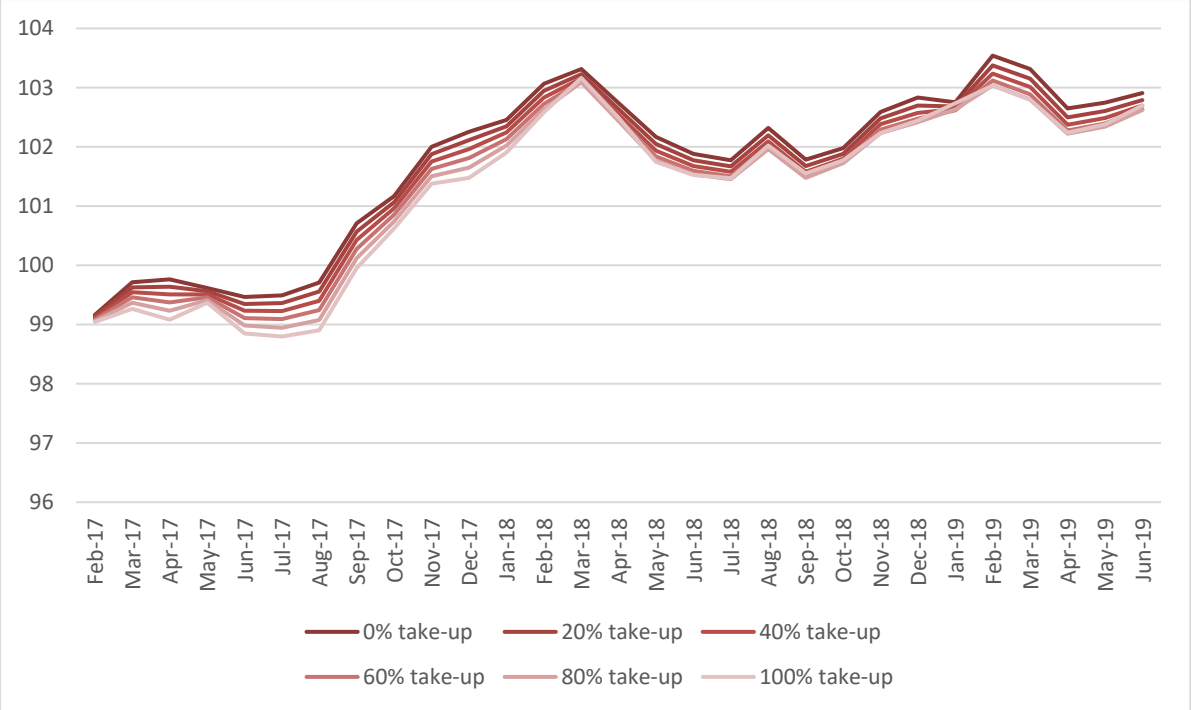


Figure 8: Food growth rates with pilot data

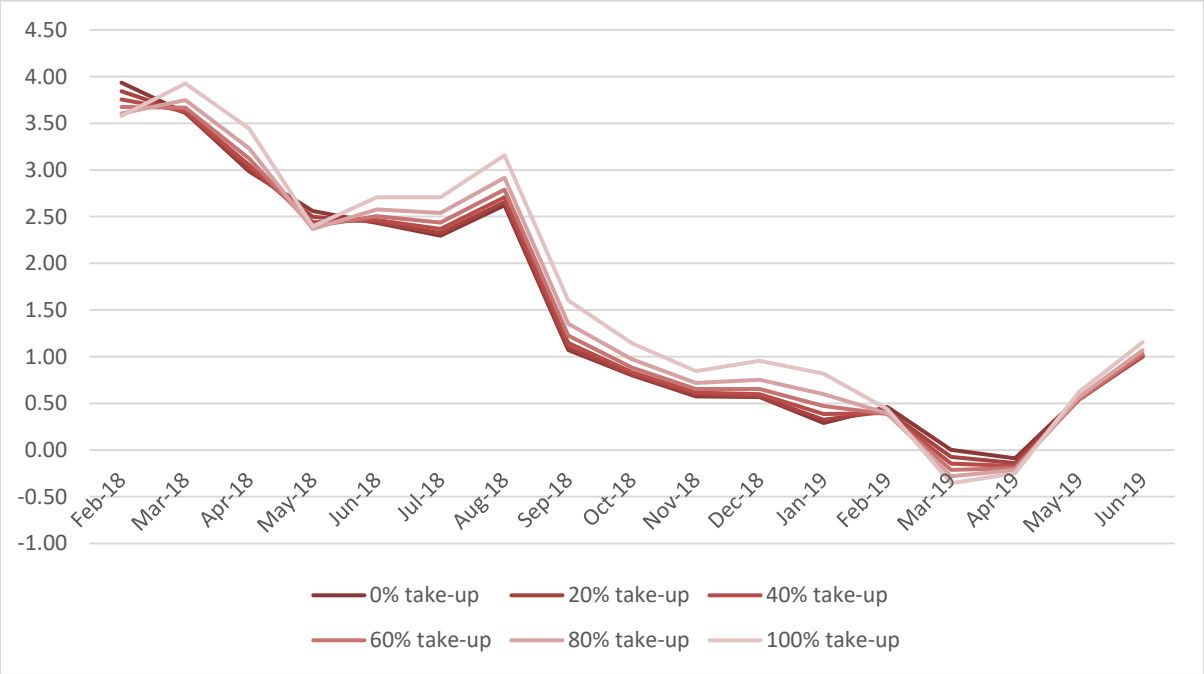


Figure 9: Non-alcoholic beverages index with pilot data

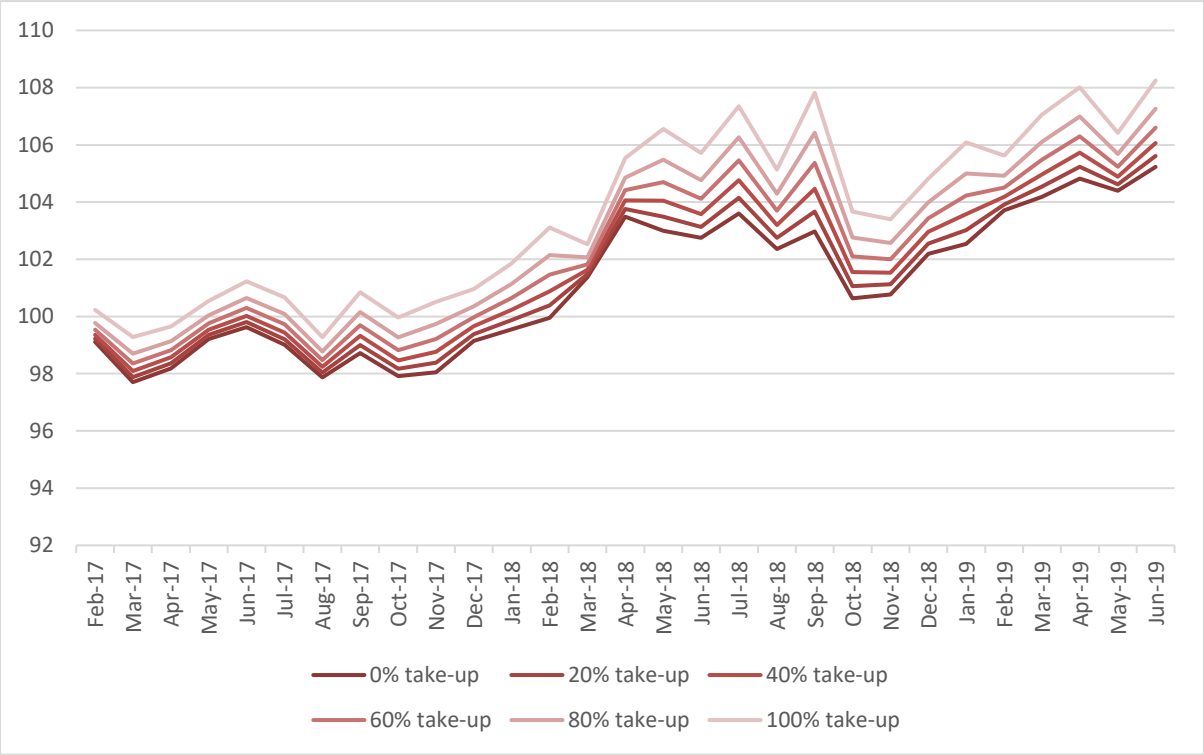


Figure 10: Non-alcoholic beverages growth rates with pilot data

Figure 11: Alcoholic beverages index with pilot data

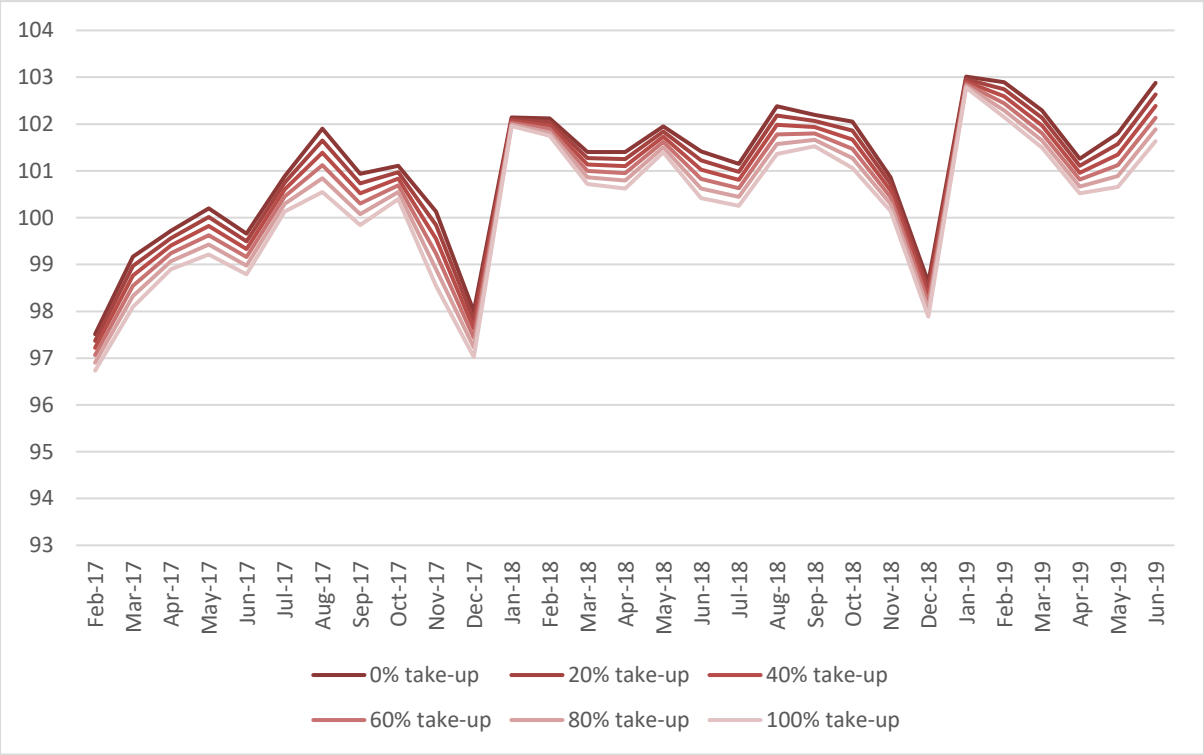
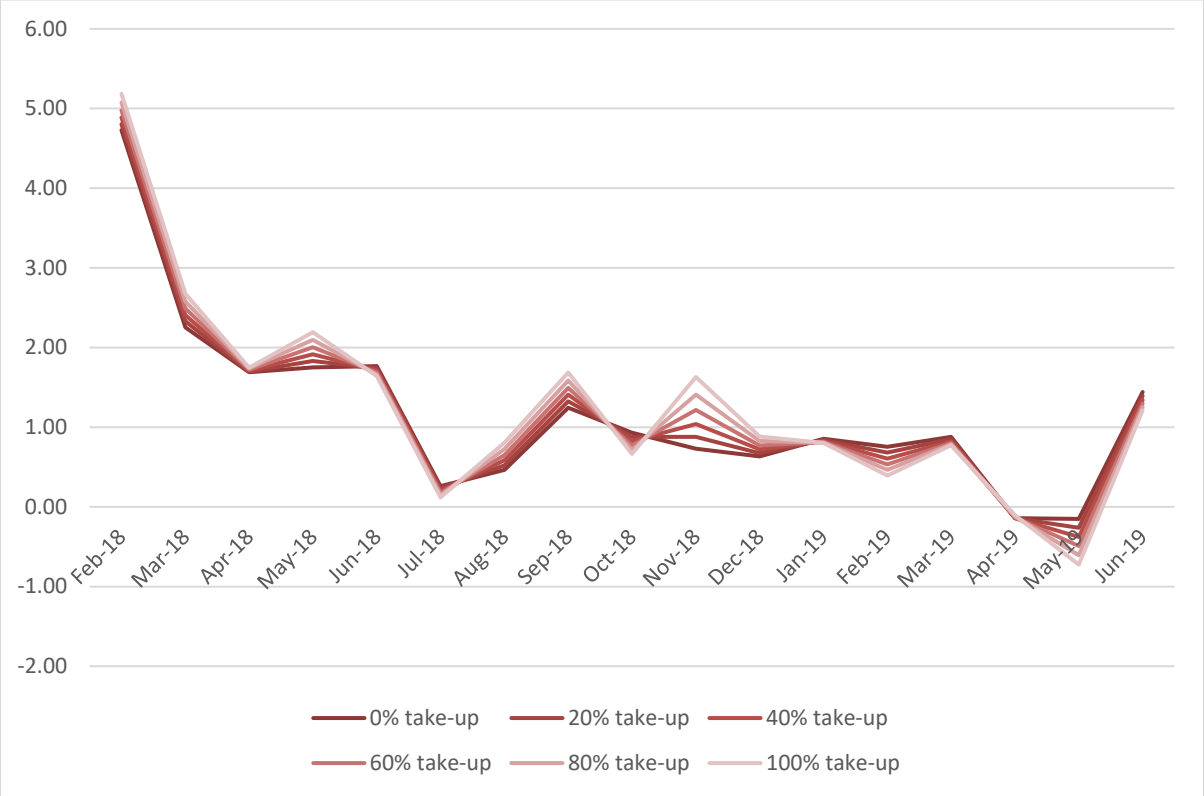


Figure 12: Alcoholic beverages growth rates with pilot data



Approaches to applying take-up rates

24. In this pilot study, conventional price collection methods have been used, meaning we do not have any information about the percentage of multi-buy offers that were taken up by consumers. If we were to include discounted prices in our consumer price indices using conventional collection methods, we would need to make some generalised assumptions about the take-up rate of offers.
25. Possible approaches to applying take-up rates could include:
    a. Assume no offers are taken up, i.e. do not include multi-buy offers in price indices
    b. Assume 100% take-up of offers
    c. Assume 50% take-up of offers, in the absence of definitive information
    d. Use market research and/or other commercial data to estimate
        i. an average take-up rate across all items and offer types
        ii. take-up rates which vary for different item categories and/or offer types
26. The take-up of offers is likely to depend on factors such as the type of item, the quantity of item that must be bought and the size of the discount. For example, if an item is highly perishable then consumers may be less likely to take-up a multi-buy discount on the item. Similarly, if a large quantity must be purchased or the discount is small, consumers may be less likely to take up the offer.
27. Table 2 shows the percentage of products purchased using a discount on offer from mySupermarket's website between July 2016 and June 2017. The data is for all retailers available on mySupermarket's website as of 2017. The results are broken down by item category and offer type. N/A means either there were no such offers in the department or insufficient shopped products.

Table 2: Percentage of products purchased using a discount on offer from mySupermarket website between July 2016 and June 2017

Example	Buy 2 get 2nd for half price	Buy 2 for £1.80	Buy 1 get 1 free	Buy 2 save £1.00
Type of discount	**Buy X get Y for % discount**	**Buy X for Y**	**Buy X get Y**	**Buy X save Y**
DEPARTMENTS				
Baby	63.0%	80.5%	83.3%	84.6%
Bakery	71.3%	78.4%	79.8%	83.7%
Beauty & Health	88.2%	87.0%	81.1%	N/A
Dairy & Eggs	85.7%	84.7%	93.0%	86.0%
Drinks	61.2%	89.5%	93.7%	N/A
Frozen	82.4%	83.3%	85.1%	N/A
Fruit & Vegetables	52.4%	75.4%	72.4%	N/A
Household & Pets	70.4%	85.2%	77.3%	68.1%
Meat, Fish & Poultry	68.3%	81.5%	94.7%	N/A
Packets & Cereals	70.5%	84.2%	86.9%	60.8%
Ready Meals	61.8%	79.9%	83.2%	87.5%
Snacks & Sweets	75.4%	88.7%	95.2%	74.5%
Tins, Jars & Cooking	70.1%	84.2%	83.4%	83.3%

28. The percentage take-up of offer varies quite considerably across both the item categories and the different offer types. It should be noted that all offer types except for the 'Buy X get Y' (eg. Buy 1 get 1 free) type are in principle inter-changeable (eg. 'buy 1 for £1, 2nd for half price' is equivalent to 'buy 2 for £1.50' or 'buy 2 save 50p'), so it may not be easy or desirable to treat them as distinct offer types with differing methodologies.
29. As we move towards scanner data sources, take-up rates will be implicit in the data and may allow us to calculate them. We could extrapolate these to supplementary locally collected or web scraped data to represent the take-up rate for these items also. This could be a longer-term strategy for including discount types in our CPIs

Future plans

30. Produce quality-adjusted indices with pilot data to more closely replicate the methodology of CPIH
31. If it is feasible in the future, consider using scanner data to get take-up rates of multi-buy offers

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August, 2019

References

Johnson, P. (2015). UK Consumer Price Statistics: A Review.

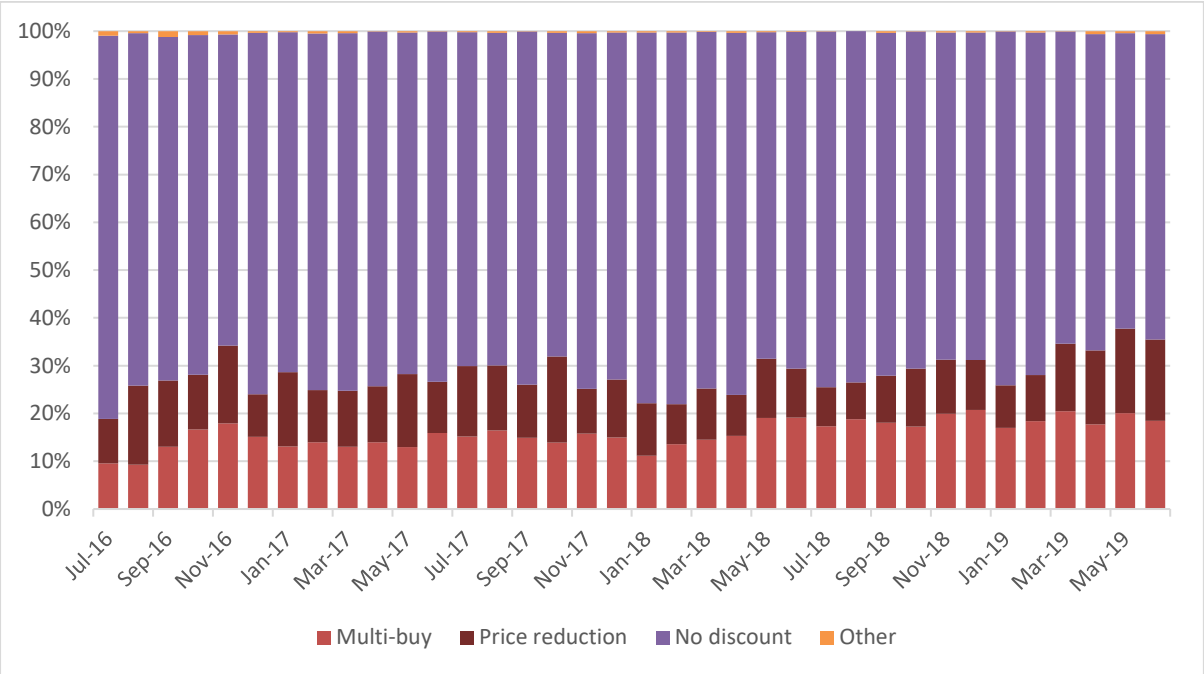
List of Annexes

Annex A	Trends in discount types for additional supermarkets
Annex B	Additional CPIH indices with pilot data

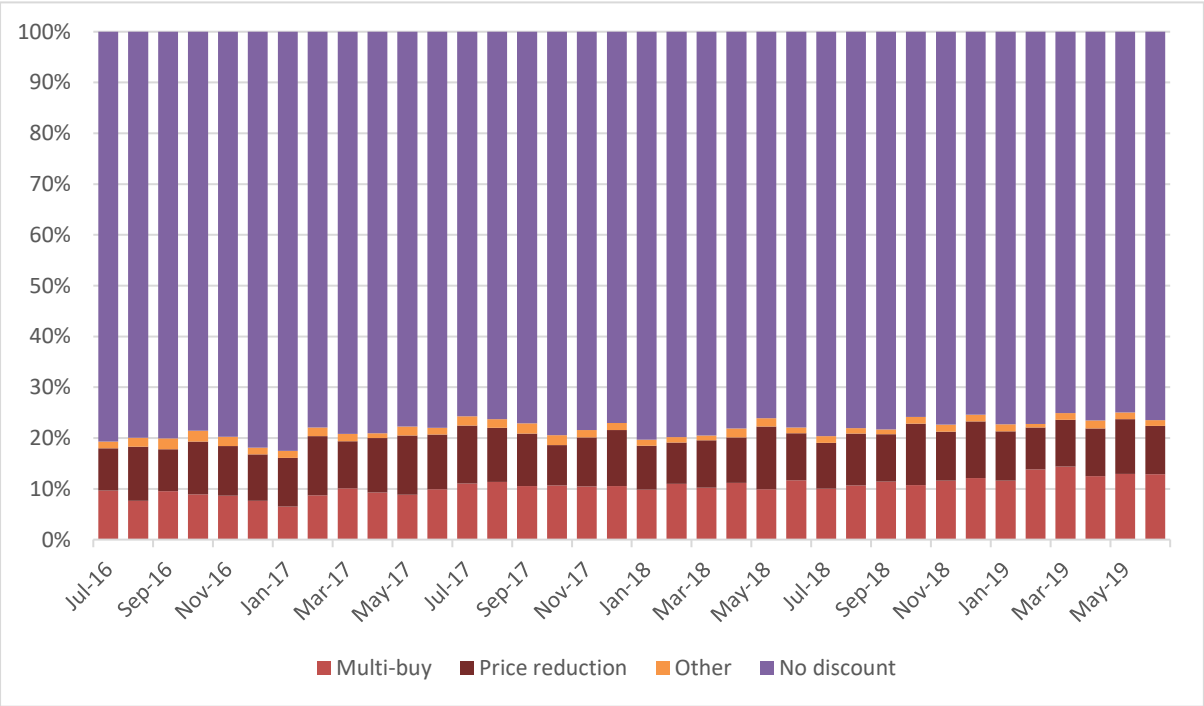
Annex A – Trends in discount types for supermarkets

1. Figures 1 to 7 show the proportion of different discount types for other supermarkets in the pilot collection

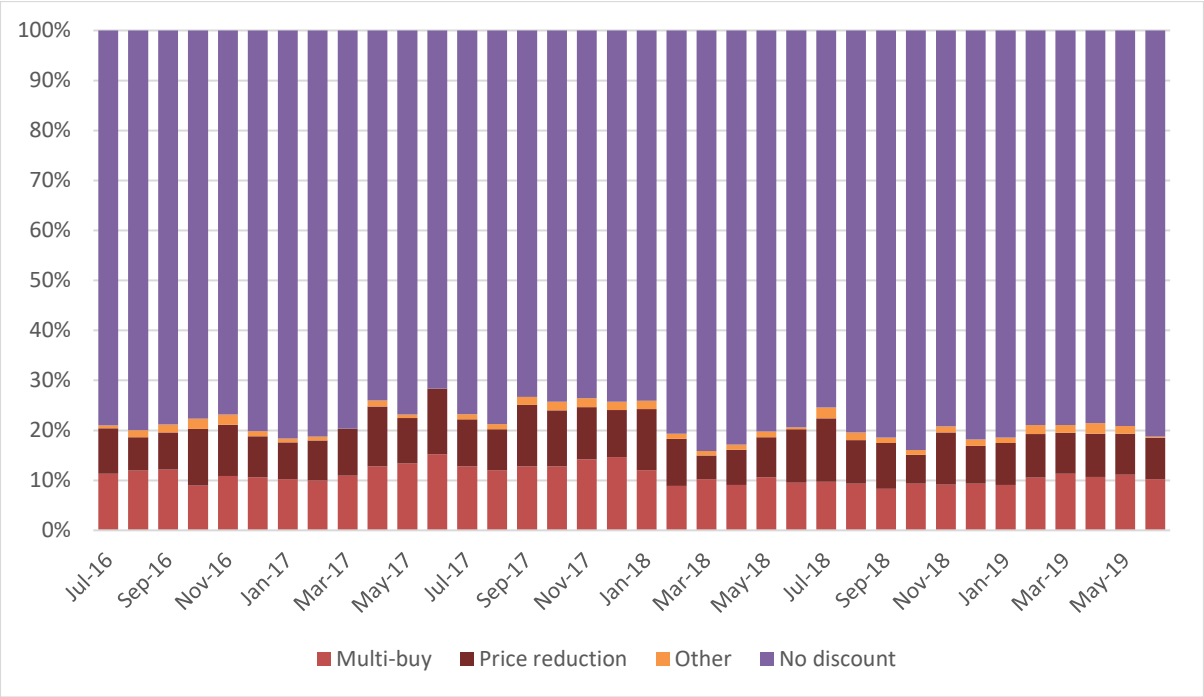
Annex A - Figure 1: Supermarket A has a higher proportion of multi-buy discounts towards the latter part of the pilot collection period



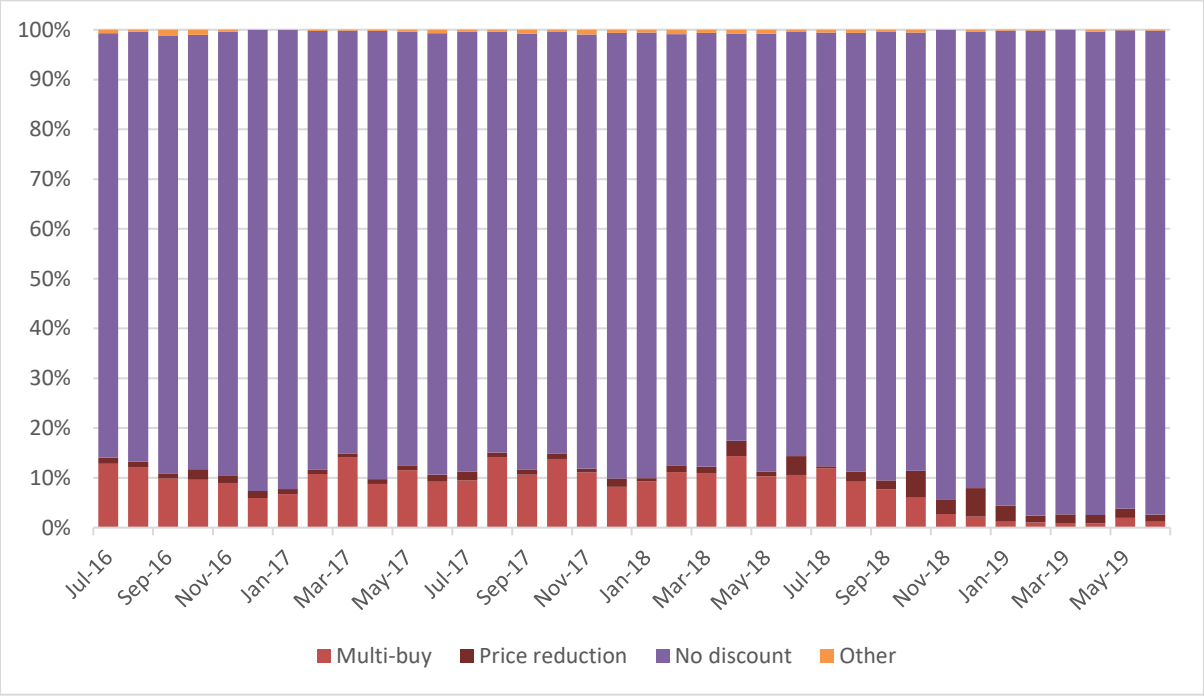
Annex A - Figure 2: Supermarket B shows a slight upward trend in the prevalence of multi-buy discounts



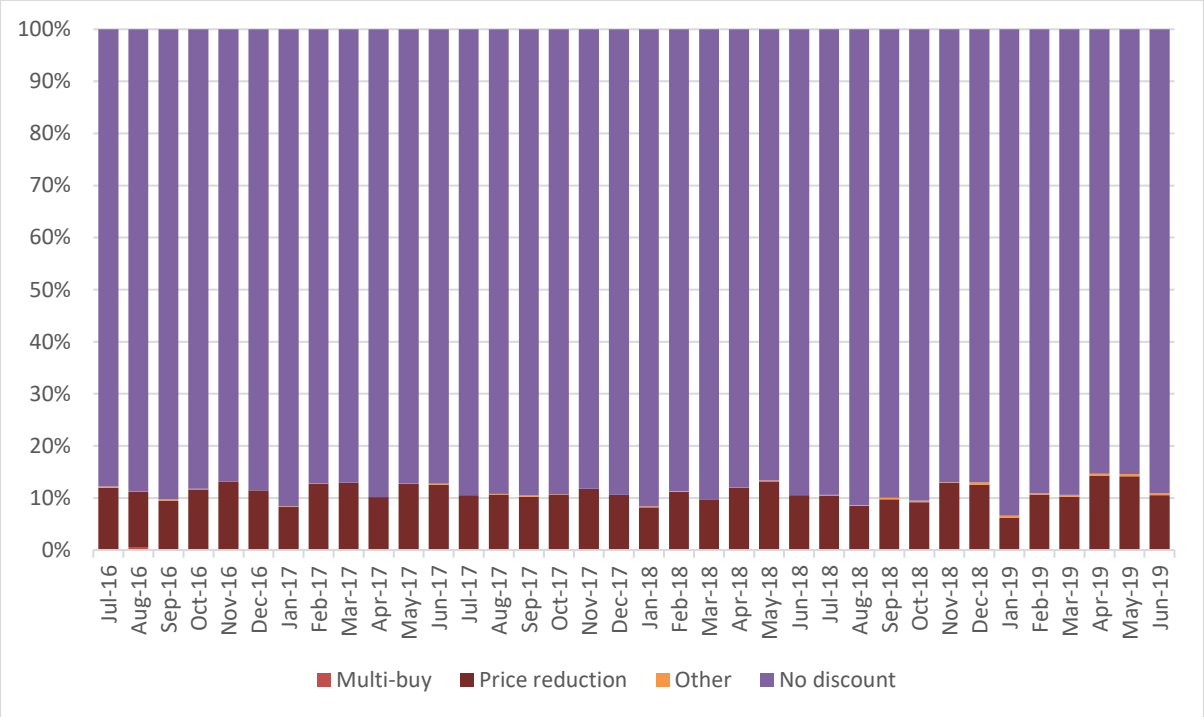
Annex A - Figure 3: Supermarket C had slightly more multi-buy discounts in 2017 than the preceding and subsequent periods



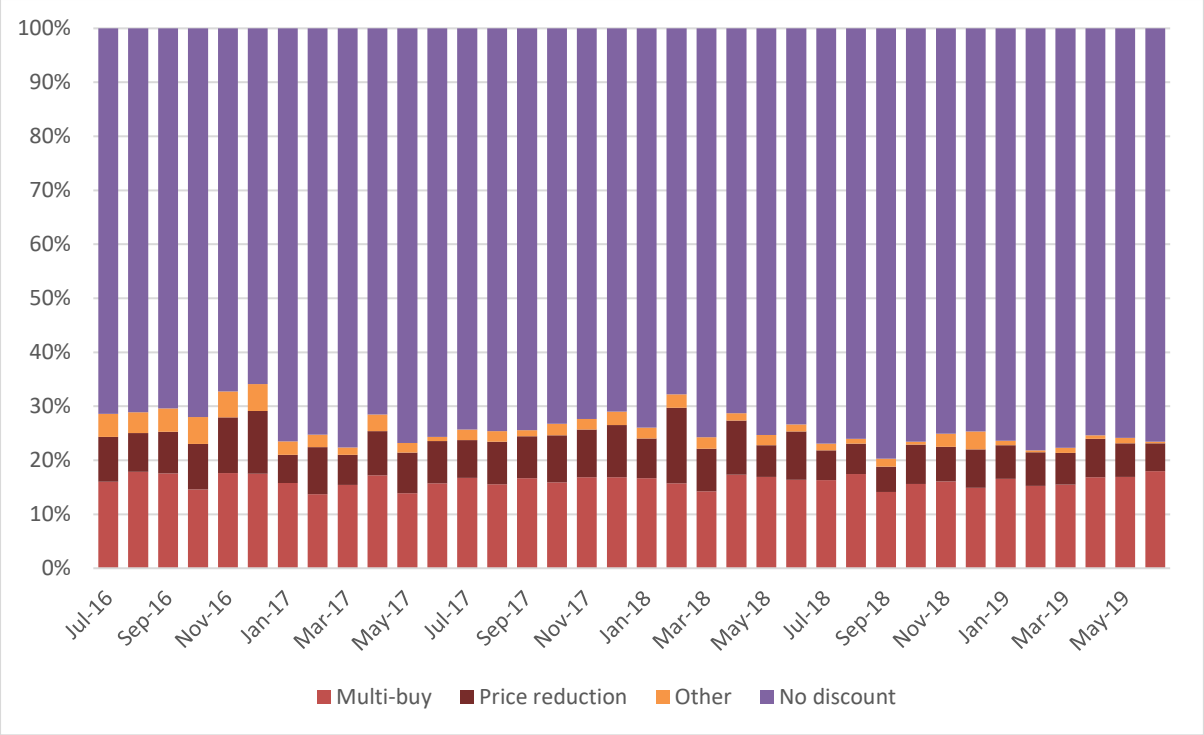
Annex A - Figure 4: Supermarket D has substantially reduced the proportion of multi-buy discounts over 2018 and 2019.



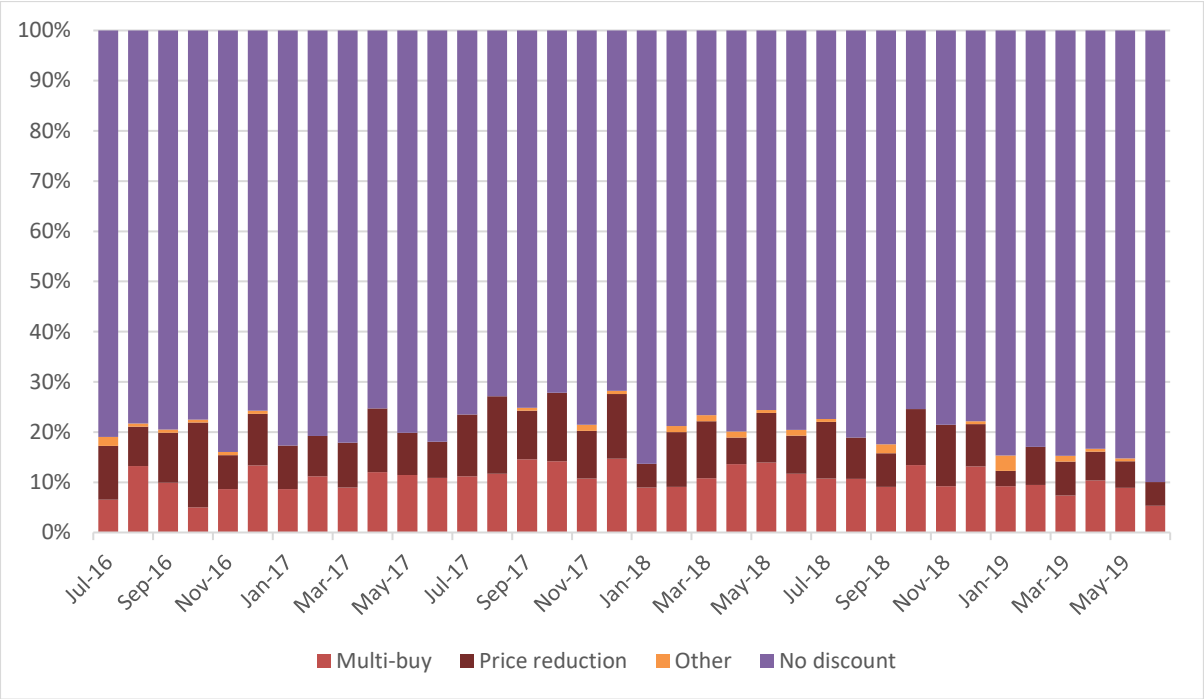
Annex A - Figure 5: Supermarket E has almost entirely phased out multi-buy offers



Annex A - Figure 6: Supermarket F showed no trend in the rate of multi-buy offers

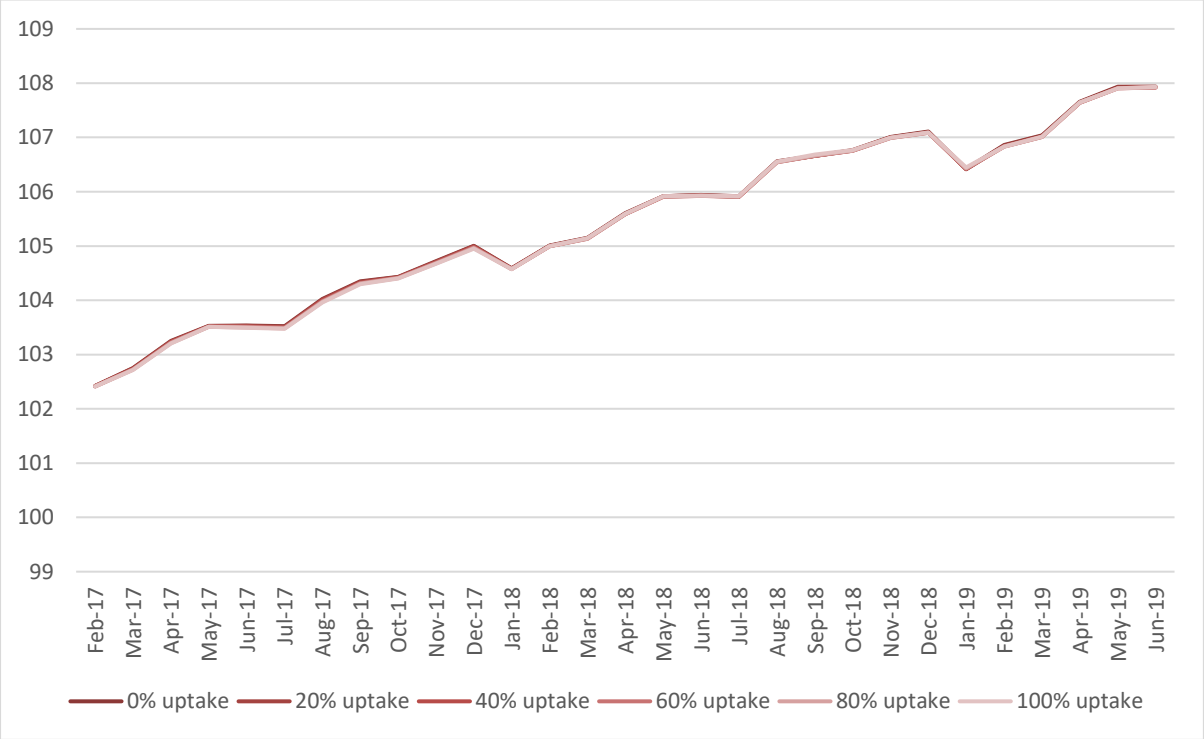


Annex A - Figure 7: Supermarket G showed no trend in the rate of multi-buy offers, with fewer price reduction offers towards the end of the pilot collection

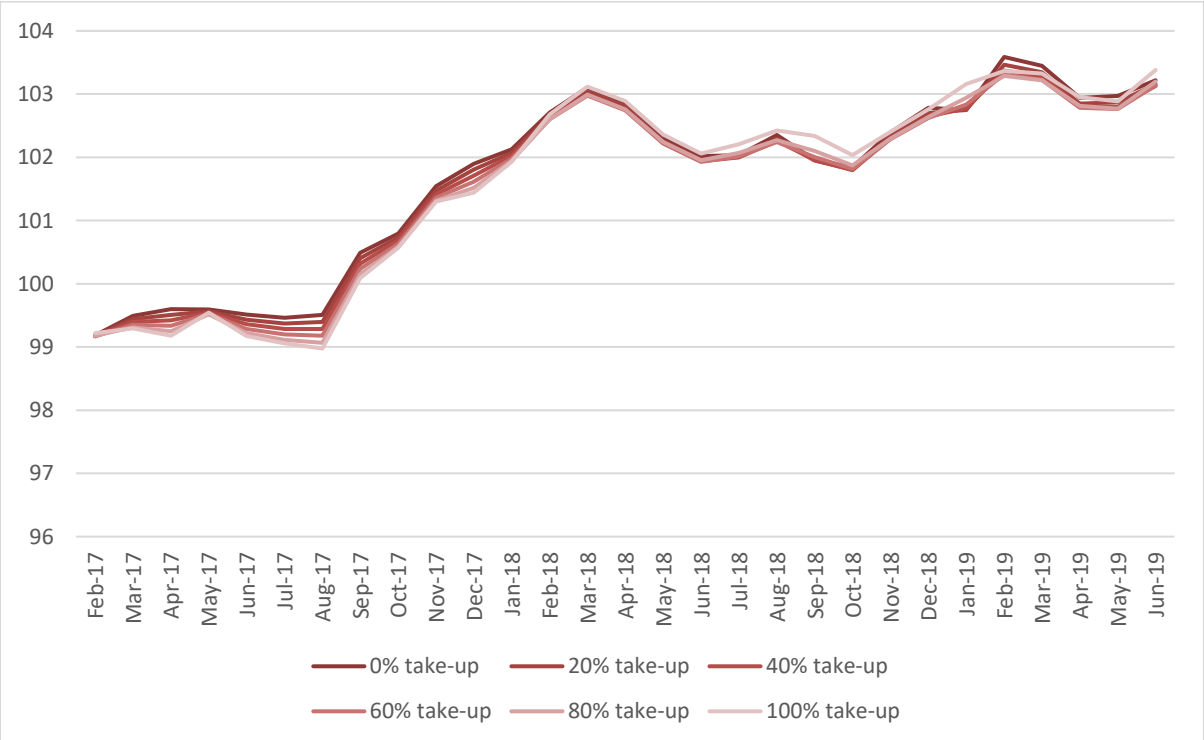


Annex B – Additional CPIH indices with pilot data

Annex B - Figure 1: CPIH overall index



Annex B - Figure 2: Food and non-alcoholic beverages index with pilot data



Annex B - Figure 3: Alcoholic beverages and tobacco index with pilot data