Supermarket Promotions and Food Prices

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Abstract

Using a large and comprehensive data set containing the average weekly prices of barcode specific products sold in seven national food retailers in the UK, we present statistical evidence on two pricing practices that have attracted public interest. Analysing price dynamics before and after periods of promotional discounting the investigation finds first, no evidence of a general tendency for sales to disguise rises in the regular price, and second, some evidence for prices to rise prior to sales in a manner that is consistent with the exaggeration of the discount.

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Supermarket Promotions and Food Prices

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Abstract

Using a large and comprehensive data set containing the average weekly prices of barcode-specific products sold in seven national food retailers in the UK, we present statistical evidence on two pricing practices that have attracted public interest. Analysing price dynamics before and after periods of promotional discounting the investigation finds first, no evidence of a general tendency for sales to disguise rises in the regular price, and second, some evidence for prices to rise prior to sales in a manner that is consistent with the exaggeration of the discount.

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1 Introduction

Food retailing in the UK is dominated by national grocery multiples. With a CR4 of 76% (Kantar WorldPanel, 2013) the sector has attracted unparalleled levels of scrutiny by the competition authorities in recent years, as evidenced by two statutory inquiries by the Competition Commission (2000, 2008) and a raft of investigations by the Office of Fair Trading (2010, 2011 and 2012). The use of promotional activity or 'sales' has emerged as a key area of focus, sales being an increasingly important means of consumer budgeting amidst rising food prices and economic recession. According to a recent Mintel report, 68% of consumers always look out for sales and almost 40% of all groceries purchased in supermarkets are under some form of promotion (Wisson, 2012).

This paper evaluates two aspects of the debate that have caught media attention. The first involves the use of sales to disguise price rises, whereby sales occur immediately prior to price rises, thereby distancing the new higher regular price from its previous level in the mind of consumers (Guardian, 2010). The second relates to the artificial inflation of prices prior to a promotion, thereby exaggerating the depth of a subsequent discount (Sunday Times, 2013). In its recent report on promotional pricing in the UK, the OFT found that supermarkets had not broken consumer law or engaged in misleading promotional practices, although they did find ' . . . that there was a variety of approaches to interpreting and applying relevant legislation across the food/drink retail sector' (OFT, 2012). A set of principles setting out fair practice has subsequently been agreed by eight national UK food retailers.

Using a sample comprising nearly a quarter of a million weekly prices, this note presents findings relevant to these issues in a period prior to the establishment of the principles governing the use of promotions. While prices alone say nothing about the intention to 'disguise' a price rise or 'exaggerate' the depth of a subsequent sale, the price movements that give rise to such accusations are easily investigated. Mindful of this caveat we proceed to outline the microdata and following a brief discussion of the price dynamics involved, test them empirically.

2 A Dataset of Scanner Prices

The dataset contains weekly prices of commonly purchased grocery products in the UK's seven largest retail chains during the sample period. Prices derive from the information read by laser barcode scanners as products pass through supermarket checkouts. Data have been acquired from Nielsen, a leading international market research company, and span 137 weeks from 8th September 2001 to 17th April 2004, giving some 231,069 prices in all.[1] As such the dataset represents one of the largest and most comprehensive panels of weekly supermarket food prices ever assembled in the UK.

In the dataset products are identified at a highly detailed (barcode) level. In general, two products are distinct if they have different barcodes. The dataset contains the prices of 507 products in 15 categories of grocery spending.[2]

Since many of the products are national brands that are sold by many, if not all, retail chains we identify each retailer-product combination with a Unique Item Code (UIC) and refer to them as items. For example, the 100 gram jar of *Nescafe Gold Blend* sold in Tesco is one such item. The same product sold in Sainsbury is another item. In all, there are 1,704 items in the sample so on average each product is stocked in just over three supermarkets; 92 products are stocked in all seven. While the dataset does not fully reflect consumer spending on food, for example most fresh products are excluded since they do not carry unique barcodes, the range of categories is broad, spanning beverages and foods, across a range of formats namely fresh, chilled, ambient and frozen. Private label products account for nearly one-fifth of the items.

The prices themselves are average revenues - the ratio of total value to units sold - at the barcode level by retail chain in each week. As a national average price weighted by the proportion of the units sold at each price they neatly represent each retailer's price. By their construction, these average revenue prices tend to fluctuate week-on-week by small amounts reflecting variation

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[1]For a more detailed description of the dataset see Lloyd et al. (2012)

[2]The 15 categories are: orange juice, instant coffee, breakfast cereals, teabags, yoghurt, wrapped bread, tinned tuna, tinned tomatoes, tinned soup, corned beef, fish fingers, frozen peas, frozen chips, jam and frozen pizza. Retailers are annoymised in this paper but include both prestige and mainstream chains and soft discounters.

in shelf prices in the stores of each retail chain (indeed half of the price changes observed in the raw data are less than one penny), although national pricing strategies are considered the norm in UK retailing (Competition Commission, 2000).

Most importantly, average revenue prices incorporate the effect of promotional activity, what we simply refer to here as 'sales', whether these are in the form of price reductions ('50% off') or quantity promotions ('buy one, get one free'). Sale prices are identified using the simple algorithm proposed by Lloyd et al. (2012) who define a sale as a period of x% price reduction of no longer than 12 weeks. Given that all such definitions are to some extent arbitrary, thresholds of 10%, 25% and 35% are considered here.

3 Do Sales Disguise Price Rises?

One specific practice that has attracted attention is the use of sales to mask increases in the regular (non-sale) price of an item. The premise is that by acting as a barrier to the recollection of the previous regular price, a sale makes the price rise less noticeable in the consumer's memory, so 'disguising' the price rise. Such a situation is shown in Figure 1, where the price rises from P_1 to P_2.

Figure 1: A sale disguising an increase in the regular price
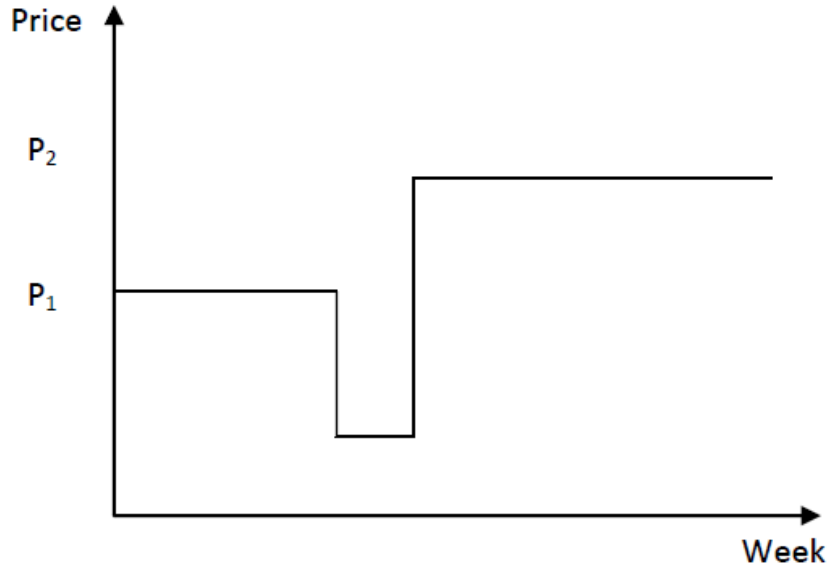
A comparison of prices in the weeks prior to and following sales of 10%, 25% and 35% is presented in Table 1. It turns out that around one-fifth of prices are higher after a sale. Interestingly, almost twice as many prices are actually lower after a sale than before a sale, so that the remainder (around 30 to 40%) of prices are the same either side a of sale.

Table 1: Comparison of prices before and after a sale, by sales threshold

	Percent		
	10% Sale	25% Sale	35% Sale
Prices after a sale are higher	21.98	20.68	21.59
Prices after a sale are lower	38.25	42.45	48.29
Prices are the same	39.76	36.86	30.12

Since the average revenue nature of scanner prices induces noise in the data, the simple frequencies in Table 1 may present a misleading picture because they take no account of the size of price changes. Using estimates of the percentage change between pre- and post-sale prices for various classifications of the dataset yields the figures in Table 2. The key finding, which

holds for all depths of sales and across supermarkets, formats and brand status is that far from masking price increases, sales had a tendency to herald lower regular food prices during the sample frame.[3] It is noteworthy that while general (all items) CPI inflation was low and stable over the period, food CPI inflation was more volatile and frequently negative (particularly in many of the categories considered here) a feature that our results would appear to reflect.

Table 2: Estimates of the percentage change in price (t ratio) following a sale

	Estimates	t ratio
Sale Depth		
10%	-0.39***	(-6.88)
25%	-0.71***	(-7.41)
35%	-1.26***	(-6.53)
Retailer		
Retailer A	-0.34***	(-3.68)
Retailer B	-0.31***	(-3.04)
Retailer C	-3.08***	(-6.24)
Retailer D	-0.14	(-0.94)
Retailer E	-0.20*	(-1.75)
Retailer F	-0.78***	(-6.46)
Retailer G	-0.23**	(-2.05)
Format		
Tinned	-0.40***	(-5.33)
Ambient	-0.71***	(-5.67)
Frozen	-0.71***	(-4.04)
Chilled	0.13	(0.50)
Fresh	-0.27***	(-2.72)
Brand		
National brand	-0.38***	(-6.79)
Private label	-0.48*	(-1.91)

Note: ***, ** and * denote that the null hypothesis is rejected at the 1% , 5% and 10% level.

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[3]To check whether prices were lower owing to a staggered return to their non-sale level following a sale, all tests were repeated using prices two weeks after the sale. Findings remain the same.

4   Do Price Rises Exaggerate Sales?

The second hypothesis we wish to test, and one of the principal concerns raised in the OFT 2012 investigation into supermarket promotions, relates to the artificial inflation of prices prior to a sale, thereby exaggerating the discount and thus reducing the true cost of the promotion to the retailer. Figure 2 illustrates this pattern.

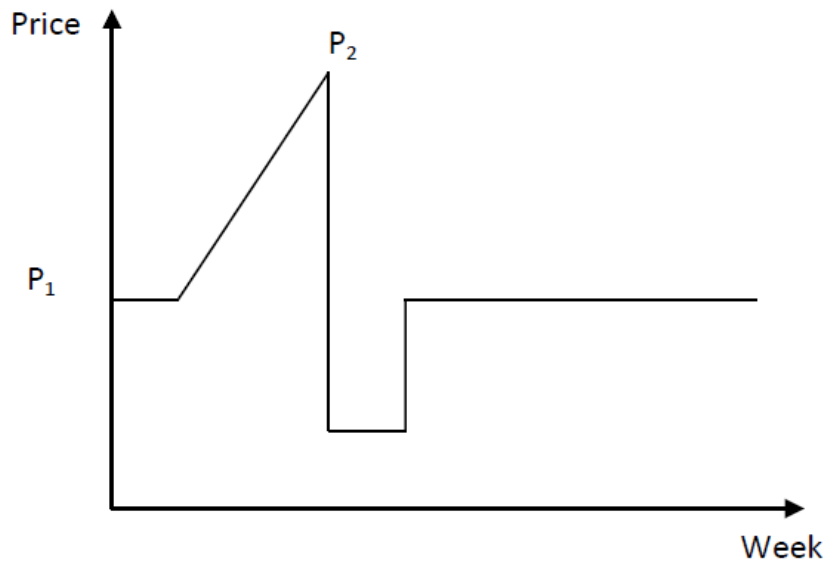Figure 2: Price rises exaggerate a subsequent sale

Table 3 reports the average percentage change in price of items in the three weeks leading up to 10%, 25% and 35% sales. Notice that the price changes are typically positive and tend to be larger the deeper the sale. For example, one week prior to 10% (35%) sales, prices grew on average by 0.39% (1.86%) more than prices in spells of regular prices as a whole. The results also suggest that prices increase two and three weeks prior to a 10% sale but thereafter, no statistically significant changes can be detected. While the figures in the table are small, they are averages and as such may reflect moderate price growth in some products and little or no change in others. The t statistics reported in the table evaluate the null of no difference between the percentage change in price in each of the weeks prior to a sale compared to the average

percentage change in regular prices over the sample as a whole in each classification. While one price change is negative, it is statistically insignificant and small in magnitude, so that overall we find that the growth in prices prior to a sale is higher than at other times, a result that is statistically significant at conventional levels.

Table 3: Percentage change in price prior to sales

Week	10% sale	25% sale	35% sale
1	0.39***	0.82***	1.86***
	(8.94)	(9.44)	(8.38)
2	0.15***	0.83***	2.64***
	(3.38)	(6.50)	(8.02)
3	0.12**	0.44***	-0.06
	(2.55)	(3.83)	(-0.20)

Note: ***, ** and * denote that the null hypothesis is rejected at the 1% , 5% and 10% level. t statistics is in ().

To investigate this in more detail, Table 4 reports results by retailer in the three weeks prior to a 10% sale. [4] While there is some evidence that most retailers had a tendency to increase prices prior to sales, the magnitude and statistical significance appears stronger for Retailers D, E and F (which were the soft discounters in the UK during the sample) rather than the others (which are either mainstream or premium retailers), with one discounter (Retailer D) displaying marked increases in prices in the run-up to sales.

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[4]Results for 25% and 35% offer a very similar picture and are available upon request.

Table 4: The average percentage change in price in the weeks prior to 10% sales across supermarkets

Week	Retailer A	Retailer B	Retailer C	Retailer D	Retailer E	Retailer F	Retailer G
1	0.11*	-0.05	-0.01	0.78***	0.39***	0.57***	0.12
	(1.81)	(-1.05)	(-0.13)	(5.66)	(4.42)	(5.98)	(1.28)
2	-0.03	0.13**	-0.05	0.44***	-0.00	0.14	0.17*
	(-0.46)	(2.53)	(-0.48)	(2.79)	(-0.04)	(1.31)	(1.66)
3	0.13	0.04	0.11	0.64***	-0.08	-0.09	-0.11
	(1.60)	(0.52)	(0.69)	(4.54)	(-0.73)	(-0.67)	(-1.16)

Note: ***, ** and * denote that the null hypothesis is rejected at the 1% , 5% and 10% level. t statistics are in ().

5 Conclusion

In an attempt to shed light on the empirical veracity of two claims about supermarket pricing and discounting, this note has investigated the dynamics of food prices before and after promotions using a large panel of micro price data from UK food retailing. As with all analyses of this type, results can at best point to simple associations in the data during a specific sample period and as such actually say nothing about the behavioural motivations that underlie the pattern of prices that is observed. Notwithstanding this caveat, we find no evidence supporting the view that sales disguise price rises. On the contrary, results indicate that post-sale prices tend to be lower than those immediately prior to a sale, a result that is robust to sales threshold, supermarket chain, product format and brand status, and most probably reflects the deflationary environment of the time. With regard to the second claim, that prices are inflated to make subsequent discounts more attractive, we find some evidence supporting this view, although the strongest evidence is found in a single discount chain.

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