RURAL POLICY CENTRE
RESEARCH
BRIEFING

Use of Supermarket Scanner Data to Measure Bread Consumption and Nutrition Choice in Scotland

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Introduction

All over the world there is a growing concern about increasing food prices and how this may affect access to and affordability of food. A key concern relates to the potential impact of price rises on an individual's food choices and ultimately their health and wellbeing. We have sought examine this important relationship between price and food choices by focusing on key staples because of their importance in the diet. In this briefing we concentrate on bread and report recent research that sought to answer the following questions: has the rise in bread prices affected the purchase of bread in Scotland? Has the effect been different by socio-economic group or by region? Is there any indication that the rise in bread prices has generated substitutions amongst the bread types?

Bread, and the effect of prices on consumption, offers a useful case study for several reasons:

1. **Important food.** Bread is a traditional key food item and represents a significant part, almost 5%, of the household expenditure on food and non-alcoholic drinks. In addition, bread remains one of the UK's favourite foods with 99% of households buying bread, of which white bread accounts for 70% of consumption.

2. **Nutritional reasons.** Regular consumption of wholegrain foods has been associated with a reduction in the incidence of cardiovascular disease and diabetes, reductions in cancer mortality and an overall reduction in premature death.

3. **Strong price inflation**. Between January 2005 and September 2008 the Retail Price Index (RPI) for all items grew by 13% while the RPI for bread rose by 33%. If one considers specific average prices of major products within the bread category, the price of the 800 grams sliced white loaf grew by 102% while the 800 grams sliced wholemeal loaf grew by 58% during the same period.

In the context of Scotland, it is important to note that The Scottish Diet Report (1993) revealed the extent of Scotland's poor diet and its adverse impact on health. Following its publication, a series of population-based targets for dietary improvements in Scotland were announced in 1994. One of these targets consisted of increasing bread consumption from daily intake of 106g/day in 1995 by 45% (to 154 g/day) by 2005, mainly using wholemeal and brown breads. Yet the 2003 Scottish Health Survey found that fewer people consumed at least two slices of any bread a day in 2003 than in 1995. Furthermore, in Scotland Wrieden *et al.*[2] evaluated the progress towards the targets using the National Food Survey (1996) and the Expenditure and Food Survey (2003/04) and found a decrease from 1996 (133g/day) to 2003/04 (116g/day). In addition, Wrieden *et al.* found that the socio-economic status of households affected the results.

Empirical work

The information used in the study comes from the Centre for Value Chain Research (Kent Business School) and was used in a project entitled "Assessing the Effect of the Rise in Food Prices on the Purchasing Power of Consumers in Scotland"[3]. The dataset comprises the evolution of the total weekly purchases at the product level from a panel of loyalty customers from one of the "big-4" supermarkets in the UK. There were 244 bread products classified in 4 categories: brown bread, premium brown bread, white bread and premium white bread. As regards data availability, they consisted of 104 points of weekly data points starting the week of the 9th of October 2006 and ending the 29th of September 2008 for three Scottish TV advertising regions (Borders, Central and North Scotland) and 10 socio-economic groupings (using CAMEO-UK, a geo-demographic classification system for assessing the socio-economic and demographic characteristics of residential neighbourhoods). The 10 groups were merged into 3 groups (Group A=affluent group, Group B=middle group, and Group C=poorer group).

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[2] Wrieden WL, Barton KL, Armstrong J, McNeill G., 2006, A review of food consumption and nutrient intakes from national surveys in Scotland: comparison to the Scottish dietary targets. Aberdeen: The Food Standards Agency Scotland.
[3] Revoredo-Giha et al., 2008, http://www.sac.ac.uk/mainrep/pdfs/foodprices.pdf.

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For comparison purposes two demand systems were estimated for bread: (1) Rotterdam and (2) Dynamic linear version of the 'Almost Ideal Demand System' (LA/AIDS). The systems where estimated by region and for Scotland and within each by socioeconomic group. Marshallian and Hicksian elasticities were computed to answer the research questions.

As shown in Table 1, all the own-price elasticities for bread for Scotland are significant and so are several of the cross-price elasticities (breads are net substitutes). Also, all the expenditure elasticities were significant. All the regional and socioeconomic elasticities (price and expenditure) were found close to the Scottish averages.

	Rotterdam demand system					LA/AIDS Dynamic				
	Brown	Premium Brown	White	Premium White	Expen-diture	Brown	Premium Brown	White	Premium White	Expen-diture
Marshallian										
Brown	**-0.539** *	-0.164 *	-0.170 *	-0.136 *	**1.009** *	**-0.779** *	-0.147 *	-0.117 *	-0.159 *	**1.202** *
Premium Brown	-0.182 *	**-0.469** *	-0.184 *	-0.125 *	**0.959** *	-0.059	**-0.568** *	-0.001	-0.083	**0.766** *
White	-0.171 *	-0.165 *	**-0.559** *	-0.178 *	**1.073** *	-0.038	-0.115 *	**-0.639** *	-0.153 *	**0.945** *
Premium White	-0.141 *	-0.119 *	-0.193 *	**-0.483** *	**0.935** *	-1.332 *	-1.101 *	-1.540 *	**-1.572** *	**2.108** *
Hicksian										
Brown	**-0.273** *	0.060 *	0.124	0.089 *		**-0.462** *	0.120 *	0.233 *	0.109 *	
Premium Brown	0.071 *	**-0.256** *	0.060 *	0.089 *		0.142 *	**-0.398** *	0.222 *	0.088 *	
White	0.112	0.073 *	**-0.246** *	0.061 *		0.211 *	0.095 *	**-0.364** *	0.058	
Premium White	0.105 *	0.089 *	0.080 *	**-0.274** *		0.129 *	0.130 *	0.076	**-0.334** *	

Source: Based on data provided by the Centre for Value Chain Research (VCR[2]) Kent Business School.
Notes: 1/ "*" stands for statistically significant at 1 per cent. 2/ Elasticities read from left to right in the table

Table 1 - Marshallian and Hicksian elasticities

Socioeconomic and regional effect of prices on bread purchases

Table 2 shows that the effect of the increase in prices produces a decrease in the total purchase of bread by the poorer group and overall. There is a decrease in the purchases of white bread in all groups and of premium brown bread in most groups. Table 3 show that the effect of prices is an overall decrease in the purchases of bread in all the regions (white bread and premium brown bread). In the case of brown bread and premium white bread the situation depends on the model.

Socioeconomic group and bread type	Rotterdam	LA/AIDS dynamic	Average change in price 1/	Socioeconomic group and bread type	Rotterdam	LA/AIDS dynamic	Average change in price 1/
	Percentages						
Group A				**Group B**			
Brown	**0.00**	**0.02**	0.25	Brown	**-0.02**	**0.01**	0.24
Premium Brown	-0.06	0.00	0.36	Premium Brown	-0.09	-0.01	0.33
White	**-0.04**	**-0.03**	0.30	White	**-0.03**	**-0.01**	0.27
Premium White	0.00	0.00	0.23	Premium White	-0.01	0.02	0.19
All bread	**-0.02**	**0.00**		All bread	**-0.03**	**0.00**	
Group C				**Altogether**			
Brown	**-0.02**	**0.03**	0.22	Brown	**-0.03**	**0.02**	0.24
Premium Brown	-0.03	-0.05	0.34	Premium Brown	-0.02	-0.02	0.34
White	**-0.04**	**-0.02**	0.30	White	**-0.04**	**-0.03**	0.30
Premium White	0.02	0.04	0.16	Premium White	0.03	0.01	0.20
All bread	**-0.02**	**-0.01**		All bread	**-0.02**	**-0.01**	

Source: Own elaboration based on data from the Kent Business School.
1/ Average weekly change in price during the period.

Table 2 - Socioeconomic analysis

Scottish region and bread type	Rotterdam	LA/AIDS dynamic	Average change in price 1/	Scottish region and bread type	Rotterdam	LA/AIDS dynamic	Average change in price 1/
	Percentages						
Borders				**Central**			
Brown	**0.00**	**0.01**	0.25	Brown	**-0.02**	**0.01**	0.25
Premium Brown	-0.05	-0.02	0.38	Premium Brown	-0.04	-0.05	0.36
White	**-0.02**	**-0.03**	0.30	White	**-0.03**	**-0.02**	0.31
Premium White	-0.02	0.02	0.17	Premium White	-0.01	0.03	0.15
All bread	**-0.02**	**-0.01**		All bread	**-0.03**	**-0.01**	
Northern				**Scotland**			
Brown	**0.00**	**0.03**	0.22	Brown	**-0.03**	**0.02**	0.24
Premium Brown	-0.02	-0.01	0.29	Premium Brown	-0.02	-0.02	0.34
White	**-0.04**	**-0.04**	0.28	White	**-0.04**	**-0.03**	0.30
Premium White	-0.05	-0.04	0.29	Premium White	0.03	0.01	0.20
All bread	**-0.03**	**-0.01**		All bread	**-0.02**	**-0.01**	

Source: Own elaboration based on data from the Kent Business School.
1/ Average weekly change in price during the period.

Table 3 - Regional analysis

Conclusions

Has the rise in bread prices affected the purchase of bread in Scotland?

- Both models indicate that the overall effect of prices (ceteris paribus) is a decrease in the purchases of bread. The specific amount of the decrease depends on the model.

Has the effect been different by socioeconomic group?

- The models predict a decrease in the total purchase of bread by the poorer group and also when all the groups are considered. All the socioeconomic groups show a decrease in the purchases of white bread and of premium brown bread in most of them. Brown bread and premium white bread differ by model and region.

Has the effect been different by region?

- There is an overall decrease in the purchases of bread in all the regions (white bread and premium brown bread). Changes in brown bread and premium white bread depend on the model.

Is there any indication that the rise in bread prices has generated substitutions amongst the bread types?

- According to the Hicksian elasticities the different breads appear to be net substitutes. The substitution effect seems to operate towards brown bread and premium white bread, especially in the dynamic LA/AIDS model. Rotterdam model indicates a decrease in the purchases of brown and premium white bread.

Given the fact that the 2003 Scottish Health survey indicated that Scotland was not hitting the target in terms of the consumption of bread, the rise in cereal and bread prices might have made this even more challenging. The rise in prices has a differentiated effect on the socioeconomic groups, especially on the poorer ones. Given the nutritional importance of bread and its relationship with several illnesses, it may suggest that specifically targeted policies to avoid the potential implications on public health are needed.

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