Empirical estimates of the impact of a fat tax

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Abstract

We estimate the impacts of a tax on saturated fats. We are particularly interested in what impact such a tax would have in markets where products are differentiated and firms have market power. We use a discrete choice demand model and household purchase level data to estimate responses to a fat tax.

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1 Introduction

Policymakers and nutrition researchers have expressed concern that individuals eat too much saturated fat.[1] Consumption of fat and in particular saturated fat is associated with heart disease and other negative health outcomes.[2] In this paper we are interested in how a tax on saturated fat would affect consumption patterns and who would bear the burden of the tax. Our contribution is to provide empirical estimates of the impact of a fat tax that account of consumer substitution patterns in differentiated product markets and where there is observed and unobserved heterogeneity in consumer preferences. We estimate a discrete choice demand model for a wide range of food products using disaggregated household level data. Nutritional information is at the product level, allowing us to capture important variation across seemingly similar products.

There is an existing literature that includes Chouinard et al (2007), Smed et al (2007), Leicester and Windmeijer (2004) and Acs and Lyles (2007). [discussion to be added]

There are at least three reasons that policy may potentially have a role to play in this area. First, even if individuals are completely rational in their private choices and consume individually optimal quantities of fat, consuming fat increases the risks of negative health outcomes and may increase the likelihood of high health costs. Since health costs are covered both by state provided and privately provided insurance, and since such increased risks of high health

[1] de Agostini (2007), Alan Johnson (UK Health Secretary) speech, (see references in footnote 1 of Chouindar et al (2007).

[2] Stong links between saturated fats and heart disease and obesity, see references in Chouinard et al (2007).

costs are not priced into the insurance system, there is an externality. Private consumption of fat thus raises the public cost of health insurance.[3] Second, if people are altruistic and care about the health outcomes of others, then individually optimal private choices of fat consumption may not take into account negative utility impacts on altruistic individuals.[4] Again there is an externality. Finally, it may be that individuals are not completely rational in their choices of fat consumption. Because keeping up to date with current nutrition research is costly, they may misunderstand the health consequences of fat consumption. Because keeping track of the fat content of foods, and of the optimal amount of fat an individual should consume, is costly, they may make suboptimal decisions. Or, as suggested in the behavioural economics literature[5], they may discount the future inconsistently or may not consistently weigh the likelihoods of low probability events such as negative health outcomes.

For these reasons, public policy may have a role to play to improve welfare by intervening in food and nutrition markets. If the government has good information about health insurance externalities or about altruism related externalities, it could design a tax system that would improve welfare. Or, if the government has better information about the negative consequences of fat consumption or the fat contents of foods, or if their is good evidence that people make irrational fat consumption choices, then a government intervention could improve welfare.

However, government intervention could also reduce welfare if the tax design is based on incorrect information about externalities or about the health conse-

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quences of fat consumption, or if it is not possible to design a tax system that takes account of all relevant nutrition research. For instance, nutrition research suggests that consumption of excessive quantities of saturated fats by adults, is associated with heart disease.[6] At the same time, children and babies need to consume larger fractions of saturated fats.[7] A simple tax on saturated fats that does not depend on who is consuming the fats, cannot simultaneously meet the requirements of adults and children. It is not obvious what the policy prescription is in this case. In addition, a government intervention in the presence of externalities or irrational behaviour may improve economic efficiency at the same time as redistributing benefits and costs. We are interested not only in the efficiency properties of any government intervention but also in who bears the burden of the tax. In this paper, we provide evidence on how a tax on fat would affect consumption and who would bear the burden of the tax.

The structure of the rest of the paper is as follows. The next section outlines the model we use. Section 3 discusses the data. Section 4 presents our results and a final section concludes. Further information on how we estimate the model are provided in an Appendix.

2 Model

We consider household demand for a basket of food products. Following Lancaster (1966) and the recent discrete choice demand literature we model households as deriving utility from the characteristics of these foods.

[6] What precisely is the nutrition knowledge?
[7] What is the evidence?

2.1 Household behaviour

Households derive utility from $g = 1...G$ types of food (e.g. milk, cheese, fresh meat, butter and margarine). We assume utility is separable across these different food types. That is,

$$U_i = U\left(u_{i1}\left(.\right), u_{i2}\left(.\right), ..., u_{iG}\left(.\right)\right).$$

For each food category $g \in (1, .., G)$ we assume that household $i \in (1, \ldots, I)$ opts to purchase the product $j \in (1, \ldots, J)$ (including the outside option) that provides it with the highest utility. We assume that the utility of any product j can be expressed as a linear function of its observed characteristics, indexed $k = 1, \ldots, K$, its unobserved characteristics and a random component reflecting the fact that households may simply have idiosyncratic preferences for different products. In particular:

$$u_{ij} = \sum_k x_{jk}\beta_{ik} + \xi_j + \varepsilon_{ij}$$

where x_{jk} and ξ_j are observed and unobserved product characteristics, ε_{ij} captures idiosyncratic household specific preferences and β_{ik} represents the 'taste' of consumer i for product characteristic k. We allow this to vary with observed household characteristics, indexed $r = 1, \ldots, R$, as well as unobserved household heterogeneity:

$$\beta_{ik} = \overline{\beta}_k + \sum_r z_{ir}\beta_{kr}^o + \beta_k^u$$

$\overline{\beta}_k$ represents the mean 'taste' across households for product characteristic k, β_k^o captures systematic response heterogeneity, telling us how 'taste' for product characteristic k varies with household characteristics and β_k^u captures unobserved 'taste' heterogeneity. Substituting (2) into (1) yields:

$$
\begin{aligned}
u_{ij} &= \sum_k \left(x_{jk}\overline{\beta}_k + \sum_r x_{jk} z_{ir} \beta_{kr}^O + x_{jk}\beta_{ik}^U \right) + \xi_j + \varepsilon_{ij} \qquad (1) \\
&= \delta_j + \sum_{kr} x_{jk} z_{ir} \beta_{kr}^O + \sum_k x_{jk}\beta_{ik}^U + \varepsilon_{ij}
\end{aligned}
$$

where

$$\delta_j = \xi_j + \sum_k x_{jk}\overline{\beta}_k.$$

The parameter vectors $\overline{\beta} = (\overline{\beta}_1, ..., \overline{\beta}_K)$ and $\beta^O = \left(\beta_{11}^O, ..., \beta_{KR}^O\right)$ are parameters to be estimated. The variables $\beta_i^U = \left(\beta_{i1}^U, ..., \beta_{iK}^U\right)$, $\xi = (\xi_1, ..., \xi_J)$ and $\varepsilon_i = (\varepsilon_{i1}, ..., \varepsilon_{iJ})$ are unobservable stochastic terms. We assume $\beta_i^U \sim N(0, \Sigma)$, ε_i are i.i.d. Type 1 extreme value random variables, and that ξ are drawn from an unknown distribution.

2.2 Outside option

[we have not yet modelled the outside option; in ongoing work we are including this in the model. For each household we choose a random shopping trip, and if the household did not purchase any goods in the food group considered then they purchased the outside option.]

2.3 The impact of a tax on fat

The impacts of a fat tax will depend on the demand relationships and on retailer responses. Here we analyse the direct demand responses to a fat tax, assuming that the taxes are fully passed on to consumers in prices and that retailer make no other responses. This will therefore represent an upper bound on the impact of the tax.[8] We assume that the tax takes the form

$$p_j^\tau = p_j + \tau f_j$$

where f_j is the saturated fat content of product j and τ is the tax rate. In future work we plan to consider retailer responses (see Appendix).

2.4 Price elasticities

Denote the unconditional probability that household i choses option j at price P_j as

$$\pi_i(j, P_j) = \int L_i(j, \theta_i, P_j)\, \phi(\theta_i,)\, d\theta_i, \tag{2}$$

where θ_i denotes all the coefficients in the model, and where

$$L_i(j, \theta_i, P_j) = \frac{e^{V_j(\theta_i, P_j)}}{\sum_k e^{V_k(\theta_i, P_k)}} \tag{3}$$

is the probability that i chose j conditional on θ_i.

The price elasticity is

$$\epsilon_{ij} = \frac{\partial \pi_i(j, P_j)}{\partial P_j} \frac{P_j}{\pi_i(j, P_j)} \tag{4}$$

[8] In future work we plan to analyse how retailers might respond to the tax, e.g. in adjusting prices of substitutes not directly affected by the tax, incomplete pass on, removal or introduction of new goods.

where

$$\frac{\partial \pi_i (j, P_j)}{\partial P_j} = \int \frac{\partial L_i (j, \theta_i, P_j)}{\partial P_j} \phi (\theta_i) \, d\theta_i, \tag{5}$$

We can approximate (2) with

$$\pi_i \widehat{(j, P_j)} = \frac{1}{N} \sum_i \pi_i (j, P_j) \tag{6}$$

where N is the number of draws from the density $\phi(\theta_i)$, and we can approximate (5) with

$$\frac{\partial \pi_i \widehat{(j, P_j)}}{\partial P_j} = \frac{1}{N} \sum_i \frac{\partial \pi_i (j, P_j)}{\partial P_j} \tag{7}$$

We find the mean derivative (to approximate the intergral) taking 10 draws of the random coefficient (as we do) and using (7), and then finding the elasticity using

$$\frac{\partial \pi_i \widehat{(j, P_j)}}{\partial P_j} \frac{P_j}{\pi (j, P_j)} = \frac{\partial \pi_i \widehat{(j, P_j)}}{\partial P_j} \frac{P_j}{\pi_i \widehat{(j, P_j)}} \tag{8}$$

We also calculate the cross-price elasticities, and the elasticity with respect to saturates.

3 Data

The data used come from the TNS World Panel for the calander year 2006. We observe all purchases of food brought into the home made by 23,400 households. Households record purchases of all items bought using handheld scanners and record prices from till receipts. The data also contains a large set of product attributes (at the barcode level) as well as household characteristics. We exclude households which purchased less than 125 individual goods over the course of 2006. We also exclude purchases that are made by households out with their official TNS participation period (i.e. purchases made prior to sign up date and following drop out date) or that involve a good with absurd npacks/expenditure or energy values.

For each household we choose one random shopping trip during the calendar year 2006. We define a 'shopping trip' as all goods purchased by a household in a given day. For most food categories we exclude shopping trips in which less than five purchases were made. (Note we do not do this for milk as it is frequently purchased in small shopping trips). We consider only products that we observe being purchased at least five times in each month. We currently consider 4 food types that represent the highest proportion of saturated fat in UK households' diet [in ongoing work we plan to consider a wider set of food products]. In total these goods account for Y% of the average households' consumption of satured fats. See Table 6.

3.1 Price

We use the unit price of each product (e.g. price in £ per kg). In our data there is price variation over time, across regions and within regions across fascia that arises due to differences in pricing strategies and differences in costs. We use the observed purchase price for observed purchases and the average price for a product in the month of purchase for unobserved purchases. [in ongoing work we are working on refining this measure of price]

3.2 Product characteristics

The relevant set of product characteristics varies by product type. For all products we have nutritional characteristics (in particular saturated fat), whether the product is branded (versus budget private label and standard private label) and what brand it is, package size, and then for each product type we have a number of characteristics that reflect flavour, variety and quality. These are detailed in Table 7. We include quantity as a characteristic.

One characteristic of particular interest is products' saturated fat content. We consider the product types that contributed most to the average household's annual saturates intake. Table 6 shows the ten food categories which on average contribute most to households' annual saturated fats intake. This table show the mean proportion of each households' saturates (from observed food purchases) that come from each food type. In each case the median lies below the mean suggesting that each categories' contribution distribution is skewed to the right. Plotting the distribution of the percentage saturates contribution for cheese (Figure 1), the largest average contributor, illustrates this and also suggests that there is a great deal of heterogeneity among households.

Dairy products make up a substantial proportion of households' saturates intake, with cheese, butter, margarine, milk, ice cream and cream together contributing 36.9% to the average household. Confectionary and meat are also significant contributors. Repeating this table for subgroups of the population reveals a remarkable degree of consistency: across all income groups and all main shopper BMI groups cheese, butter and biscuits (in the same order) remain the largest average contributors, while margarine, milk, fresh meat, chocolate and cakes/pastries are always the next biggest contributors, all be it in varying orders. Moreover, replicating the graph illustrating the distribution of the percentage saturates contribution for cheese, but this time splitting the sample into whether the main shopper is obese or non-obese (Figure 2), has little affect.

In previous studies authors have typically used some form of aggregated data. For example Chouinard et al (2007), who analyse the implications of an ad valorem tax on the fat content of dairy products, have data on purchases and attributes of several categories of dairy produce (butter, ice cream, natural cheese etc.). The substitution patterns (in response to the tax) in this model will not account for the possibility that consumers substitute between dairy products within the same food category.

To make the point concrete, take the example of butter: Figure 3 depicts the distribution of saturated fats per 100g in all butter purchased in our sample. The intensity of saturates varies from 14.2g to 57.3g with a mean of 44.4g and a median of 45.9g. If we were to treat all purchases of butter as purchases of the same product, we would be forced to pick a single value for the intensity of saturated fats in butter (as well as one for all other butter attributes). This would reduce the accuracy of our predictions for potential tax revenues and for the expenditure implications for individual households. It is likely that we would fail to account for many of the probable substitutions, as the model would be unable to generate any intra-butter substitution. Thus, following the introduction of the 'fat tax', households would be unable to substitute from a

250g tub of Country Life Standard (which has a saturates intensity of 54g) to a 250g tub of Lurpak Lighter Spreadable (which has a saturates intensity of 26g), but rather would be faced with the stark choice of continuing to consume butter or substituting away from it. Our use of disaggregated data at the barcode level allows us to avoid this limitation, permitting us to model more subtle and realistic changes in consumer behaviour.

3.3 Household characteristics

We consider a number of indicators of household characteristics including income, household type, number of people in the household, region, body mass index (BMI) of main shopper.

Table 1 shows the distribution of income across households in our sample. Income was only collected from a sub-sample of households in our sample, and the missing value represent those housholds that were not asked. Around 44% of households report their income as less than £30,000.

Table 2 is a cross-tabulation of the BMI group and sex of the main shopper. BMI was only collected from a sub-sample of households in our sample, and the missing value represent those housholds that were not asked. It shows the number of main shoppers of a given sex in each BMI group. Table 3 repeats the cross tab, excluding missing observation and expressing in percentage terms the number of a given sex in each BMI group. Of those who reported a value, 22.3% of women and 22.8% of men described themselves as obese, clinically obese or morbidly so, while 42.9% of woman and 35.5% of men described themselves as having a normal BMI. The table also includes estimates from the Health Survey for England 2006 (NHS, 2006) of what proportion of each sex falls into each BMI group for the general population.

Table 4 contains a cross tabulation between main shopper BMI group and household income. It is based on the 7,821 households that report both variables. The category obese (all) includes the main shoppers who above were classified as either obese, clinically obese or morbidly obese. Each cell shows the percentage of households within a given household income band, who fall into a given main shopper BMI category. The table shows that typically a higher proportion of main shoppers in households with relatively high incomes have normal BMIs. While the proportion of main shoppers that are underweight within each income band varies little, a higher proportion of main shoppers in poor households are classified as being obese.

Table 5 shows how type of households (young, pensioner, with kids etc) varies in our sample. About 33% of households include children and around 18% comprise pensioners.

3.4 Household saturated fat purchases

The rich nature of our data allows us to explore how much saturated fats different types of households typically consume. To do this, we construct the 'implied daily intake of saturates per household member' above the age of four in each household. This is the total amount of saturates that the household recorded purchasing in 2006, divided by the number of days the household participated in the survey in 2006 and by the number of members of the household who were over the age of four. The amount is implied since we assume that households consume all of their recorded purchases (i.e. zero waste). We can compare this to the Guideline Daily Amount (GDA) of saturates which states that men should not consume over 30g, while women and children over the age of four should not consume over 20g (see www.igd.com). Using this information we construct a household specific GDA based on the composition of each household. Tables 9 and 10 illustrate how implied daily intake of saturates per household member above the age of four and GDA vary across main shopper BMI groups and household income groups, respectively. While GDAs are relatively constant across both dimensions, implied intakes tend to be positively correlated with BMI group and negatively correlated with income. Thus households with relatively low incomes or with main shoppers who have relatively high bmis tend to buy food products which in total have high amounts of saturates relative both to their GDA and other households. Of course, as already mentioned, households with low incomes are more likely to have main shoppers with a high BMIs.

The standard deviations that are associated with impled intake, reported in Tables 9 and 10, are substantial, suggesting that even within income or main shopper BMI subgroups a lot heterogeneity remains. This poses the question of whether particular subgroups' tendency to on average consume more saturates than is recommended is driven by a general pattern of overconsumption, or by some households overconsuming by a large margin. Tables 9 and 10 report the percentage of each main shopper BMI group and household income group that consume more than their GDA, and the average overshoot margin of households that do exceed their GDA. The tables suggest that households with relatively low current incomes and households with main shoppers with large BMIs are both more likely to consume saturates in excess of their GDAs and when they do are more likely to overshoot by a large margin.

4 Results

4.1 Estimated coefficients

Tables 12a - 16b report the coefficients for each of the food categories we consider (butter, margarine, butter and margarine, cheese and milk) and in each case for two models, the logit model where we interact observed household characteristics with product characteristics, but do not include any random coefficients, and the mixed logit model where we also include random coefficients on price and saturates.

We estimate the coefficients as described in the appendix, except for the "between product mean" effects. We estimate these by recovering the estimated brand fixed effects (the δ's) and running a separate regression of these on the product characteristics.[9]

The interaction terms can be interpreted as indicating the incremental effect a given product characteristic has for a household with a given household characteristic. So for example in all tables the interaction of price and household income greater than £30,000 is positive, suggesting that richer households tend to prefer more expensive products. The results broadly accord with intuition;

[9] In future work we will make assumptions on joint distribution of (ξ_j, x_{jk}) to esimate unobserved ξ; and potentially use the panel nature of the data to control for the unobserved characteristics - either by using non-linear panel data methods or using the residual from hedonic price regression to “control" for unmeasured product characteristics as suggested in Bajari and Benkard (2005) or Blow, Browning and Crawford (2007).

household income interacted with budget private good and organic good (where included) are negative and positive, respectfully and product size interacted with household size is always positive.

In Tables 17a - 21b we show the own and cross-price elasticities for five products (each table is for one food category and one model). These are for illustrative purposes. We have chosen the five products that have the largest market shares. In most cases the signs of the elasticities accord with economic theory - own price elasticities are negative and cross price elasticities tend to be positive. Table 20a, the logit results for milk, is a clear exception.

4.2 Direct demand impacts of tax

We start by considering the impact of a tax rate $\tau = 0.01$, i.e. we add 1 pence to price for each 100g of saturate fat intensity. We consider the short term impact when there is no change in prices or the products available.

Table 11 shows our results. The first two panels show the mean and standard deviation of price per unit (per kg for butter, margarine and cheese and per litre for milk) and the second panel shows the mean and standard deviation of saturates per 100g.

The rest of the table includes eight panels, the first four relate to results using the coefficient estimates from the logit model (without random coefficients) and the latter four relate to results using the coefficients from the random coefficient models. For each model we report the mean and standard deviation of four statistics - change in expenditure, change in the volume of satures purchased, change in intensity of saturates purchased and taxes paid. For each statistic we report the overall mean, and the mean by each of the different household characteristics.

5 Summary and Conclusions

[to be written]

6 Appendix A: Estimation

We estimated the random coefficient logit model given in (1). For ease of exposition we drop the subscript i and rewrite equation (1) as

$$\begin{aligned} u_j &= \sum_k \left(x_{jk}\overline{\beta}_k + \sum_r x_{jk} z_r \beta^O_{kr} + x_{jk}\beta^U_k \right) + \xi_j + \varepsilon_j \\ &= \delta_j + \sum_{k,r} x_{jk} z_r \beta^O_{kr} + \sum_{k=1}^{K_U} x_{jk}\beta^U_k + \varepsilon_j \end{aligned}$$

The variable u_j is the utility the household obtains from product j. We assume that $\beta^U \in \mathbf{R}_{K_U}$ with

$$\beta^U \sim N(0, \Sigma).$$

Define the change of variables $\beta^U = \sqrt{2}\Sigma^{0.5}\varepsilon$ where $\varepsilon \sim N(0, 0.5)$.

We estimate the model by maximum likelihood. Assume that for each household the data have been sorted so that option 1 is the option chosen. Let $P\left(\beta^U\right)$ be the probability that a household chooses option 1. Then

$$P\left(\beta^U\right) = \frac{1}{1 + \sum\limits_{j \neq 1} \exp\left(v_j\left(\beta^U\right) - v_1\left(\beta^U\right)\right)}$$

where we define

$$v_j\left(\beta^U\right) - v_1\left(\beta^U\right) = (\delta_j - \delta_1) + \sum_{k,r}(x_{jk}z_r - x_{1k}z_r)\,\beta^O_{kr} + \sum_k (x_{jk} - x_{1k})\,\beta^U_k.$$

The likelihood for a single household can be written as

$$\begin{aligned} L &= \log\left(\int P\left(\sqrt{2}\Sigma^{0.5}\varepsilon\right) \frac{e^{-\varepsilon'\varepsilon}}{\pi^{1.5}} d\varepsilon \right) \\ &= \log\left(\sum_i \frac{w_i}{\pi^{0.5K_U}} P\left(\sqrt{2}\Sigma^{0.5}\varepsilon_i\right) \right) \end{aligned}$$

where $\{(w_i, \varepsilon_i)\}_{i=1}^{N}$ are the weights and nodes for a K_U dimensional integration rule. When K_U is small $(K_U \leq 9)$, we use the K_U dimensional tensor product of one dimensional Gauss-Hermite quadrature rules with at most 5 points in each dimension (with $K_U = 2$, this implies $N \leq 25$ while with $K_U = 9$, this implies $N \leq 1,953,125$). Given our current computing resources, these are both feasible. When K_U is large $(K_U > 9)$, we use Monte Carlo integration with $w_i = \pi^{0.5K_u}$ and with $N \leq 2,000,000$.

We sum the household specific likelihood contributions across households and maximise the sum.

7 Appendix B: Considering retailers' response

In the medium term firms change prices, but there is no change in the menu of products on offer. Holding the menu of products constant, firms will respond to the tax by changing the prices. We assume that retailers set prices and pay the tax and compete in a Nash-Bertrand game. Profits for firm f which produces (sells) products $j \in F_f$ are given by

$$\Pi_f = \sum_{j \in F_f} (p_j - mc_j) M s_j (p + \tau f) - C_j \tag{9}$$

where p: price, mc: marginal cost, M: market size, $s(.)$: market share, C: fixed costs. The firm's first-order condition is given by

$$s_j (p + \tau f) + \sum_{j \in F_f} (p_j - mc_j) \frac{\partial s_j (p + \tau f)}{\partial p_j} = 0. \tag{10}$$

We observe p and s and we estimate $\frac{\partial s_j(p)}{\partial p_j}$ so we can recover mc_j.

Compute mc_j when $\tau = 0$. Compute the new optimal prices p when $\tau > 0$.

Compute new demand and welfare changes. Compute impact on profits.

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Table 1: Distribution of income across households

Household income	**Frequency**	**Percent**	**Cumulative**
£0 - £9,999	2,052	8.77	8.77
£10,000 - £19,999	4,457	19.05	27.82
£20,000 - £29,999	3,687	15.76	43.57
£30,000 - £39,999	2,427	10.37	53.94
£40,000 - £49,999	1,497	6.40	60.34
£50,000 - £59,999	825	3.53	63.87
£60,000 - £69,999	362	1.55	65.41
£70,000 +	484	2.07	67.48
Missing Observation	7,609	32.52	100.00
Total	23,400	100.00	

Notes: Income was only collected from a sub-sample of households in our sample, and the missing value represent those households that were not asked.

Table 2: Distribution of bmi group across main shoppers

BMI Group of Main Shopper	**Sex of Main Shopper**		
	Female	**Male**	**Total**
Underweight (under 18.5)	218	28	246
Normal (18.5 to 24.9)	4,027	842	4,869
Overweight (25 to 29.9)	3,030	987	4,017
Obese (30 to 34.9)	1,343	409	1,752
Clinically Obese (35 to 39.9)	511	106	617
Morbidly Obese (40 or higher)	307	51	358
Missing Observations	8,979	2,562	11,541
Total	18,415	4,985	23,400

Notes: BMI is weight (in kg) over height (in m) squared. Income was only collected from a sub-sample of households in our sample, and the missing value represent those households that were not asked.

Table 3: Comparison of the bmi of main shoppers with estimates for the population

BMI Group of Main Shopper	**Sex of Main Shopper**		**National Health Survey for England 2006 estimates**	
	Female	**Male**	**Female**	**Male**
Underweight (under 18.5)	2.3	1.2	2	1
Normal (18.5 to 24.9)	42.9	35.5	42	32
Overweight (25 to 29.9)	32.4	40.5	32	43
Obese (30 to 34.9)	14.1	16.7		
Clinically Obese (35 to 39.9)	5.1	4.2	21	23
Morbidly Obese (40 or higher)	3.1	1.9	3	1
Total	100.0	100.0	100	100

Notes: BMI is weight (in kg) over height (in m) squared.

Table 4: Cross tabulation of the main shopper bmi group with household income

BMI Group of Main Shopper	Household Income Band							
	£0 - £9999	**£10,000 - £19,999**	**£20,000 - £29,999**	**£30,000 - £39,999**	**£40,000 - £49,999**	**£50,000 - £59,999**	**£60,000 - £69,999**	**£70,000 +**
Underweight	1.7	1.9	1.8	2.1	1.9	3.6	1.9	3.0
Normal	37.6	38.6	41.2	43.9	48.4	44.5	46.3	53.2
Overweight	34.6	34.9	34.5	31.8	31.4	34.9	35.2	31.8
Obese	26.1	24.6	22.5	22.2	18.2	17.0	16.7	11.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes: BMI is weight (in kg) over height (in m) squared. Underweight is (under 18.5), normal is (18.5 to 24.9), overweight is (25 to 29.9) and obese is (30 or higher).

Table 5: Distribution of household type

Household type	Frequency	Percent	Cumulative
Single young	2,021	8.64	8.64
Single pensioner	1,931	8.25	16.89
Single parent	946	4.04	20.93
Childless couple	2,767	11.82	32.76
Pensioner couple	2,369	10.12	42.88
Couple with children	4,512	19.28	62.16
Others - no children	5,641	24.11	86.27
Others - with children	3,213	13.73	100.00
Total	23,400	100.00	8.64

Notes: Males are classed as pensioners if they are 65 or older and women if they are 60 or older. Couples are classed based on the head of household.

Table 6: Main food categories contributing to saturated fat intake

Food category	Mean % contribution to households' annual saturates intake	Mean % of households' annual expenditure on food	Average saturated fat for products in this food category
Total Dairy	*36.7%*	*11.6%*	*14.8*
Cheese (exc F.Frais)	**14.2%**	**4.0%**	**16.9**
Butter	**10.3%**	**1.1%**	**44.0**
Margarine	**7.0%**	**1.1%**	**15.4**
Milk	**6.8%**	**4.7%**	**1.2**
Ice Cream	3.4%	1.5%	6.0
Biscuits	8.4%	3.8%	9.9
Total Fresh Meat	*6.4%*	*7.1%*	*6.4*
Chocolate and Sugar Confectionary	6.0%	4.5%	11.2
Ambient Cakes Pastries	4.1%	2.2%	4.3

Note: For each household we define the % of their total saturated fat intake that is accounted for by each food group. The numbers in the Table are the mean of these percentages across household. The food categories in bold are the ones that we have focused on to date. In ongoing work we are looking at the other food categories.

Table 7: Product characteristics

Abbreviation	Description
budg	budget private label
carton	carton of milk
glass	glass bottle
grate	grated
nat	natural cheese
ocut	other cut
org	organic
otype	other type of milk (e.g. soya milk, buttermilk, modified milk)
prc	unit price (£/Kg); for purchases that we do not observe prc becomes the average price of the good in question in that month
sats	saturated fat per 100g
skimmed	skimmed milk (according to the British Nutrition Foundation this contains 0.2g of fat per 100ml)
slice	sliced
ssalt	slightly salted
stan	standard private label
sz3	butter and margarine: : packets over 500gm cheese: packets over 250g milk: (<1 ltr, 1-2 ltrs; >2ltrs)
UHT	long lasting milk (i.e. UHT and sterilised)
usalt	unsalted
whole	whole milk (according to the British Nutrition Foundation this contains 3.9g of fat per 100ml) (semi-skimmed, the omitted category contains 1.7g per 100ml)

Table 8: Household characteristics

Abbreviation	Description
bmi3	main shopper bmi indicate they are obese
bmiss	bmi not collected from this household
dec	product purchased in December (this is included in models of butter and margarine to capture increased demand during the festive season)
fkid	family with kids
fold	households where the head of household is a pensioner; males are classed as pensioners if they are 65 or older and women if they are 60 or older; couples are classed based on the head of household
hhsize	number of members of household
i30	income greater than £30000 p.a.
imiss	income not collected from this household
south	household is in south (household in the administrative regions – East of England, London, South East, South West)

Table 9: Daily saturates intake and GDA, by main shopper bmi

BMI group of main shopper	Implied daily saturates intake per household member Mean (s.d.)	Percentage of households whose intake exceed their GDA level	difference between daily intake and GDA for households whose intake exceeds their GDA Mean (s.d.)	Number of households
Underweight (under 18.5)	23.2 (14.0)	39.4	13.1 (12.9)	246
Normal (18.5 to 24.9)	25.1 (13.7)	46.8	11.9 (11.9)	4869
Overweight (25 to 29.9)	27.1 (14.8)	52.9	12.9 (12.8)	4017
Obese (30 to 34.9)	28.5 (15.5)	56.2	14.3 (13.1)	1752
Clinically Obese (35 to 39.9)	30.4 (19.8)	58.7	16.6 (19.7)	617
Morbidly Obese (40 or higher)	30.7 (19.3)	57.5	18.6 (17.6)	358
Missing observation	26.4 (15.7)	48.5	14.0 (13.8)	11541
Total	26.5 (15.3)	49.8	13.6 (13.5)	23400

Notes: Data include 23400 household who participated in the TNS World Panel in 2006. Implied daily saturates intake per household is the total amount of saturates that the household recorded purchasing in 2006, divided by the number of days the household participated in the survey in 2006 and by the number of members of the household who were over the age of four. Guideline Daily Allowance (GDA) of saturates per household member is 24.4 with a standard deviation of 2.6. This is imputed from the household composition and the publically available GDA values. Percentage of households whose intake exceed their GDA level reports the percentage of household for which their implied daily saturates intake per household was greater than their GDA amount. 11651 household reported purchases that implied daily saturates intake was greater than their GDA. The missing observations of BMI group of main shopper are due to some households not being asked to report a value.

Table 10: Daily saturates intake and GDA, by household income

Household income band	Implied daily saturates intake per household member Mean (sd)	Percentage of households whose intake exceed their GDA level	difference between daily intake and GDA for households whose intake exceeds their GDA Mean (sd)	Number of households
£0 - £9,999	32.3 (16.9)	68.3	16.4 (15.3)	2052
£10,000 - £19,999	30.8 (16.4)	61.8	15.3 (14.7)	4457
£20,000 - £29,999	28.4 (14.6)	56.2	13.2 (12.3)	3687
£30,000 - £39,999	26.3 (14.4)	49.9	11.9 (13.5)	2427
£40,000 - £49,999	25.0 (13.2)	44.8	11.3 (11.4)	1497
£50,000 - £59,999	24.5 (13.6)	40.8	11.8 (12.6)	825
£60,000 - £69,999	25.1 (13.4)	46.1	10.6 (12.2)	362
£70,000 +	24.1 (13.6)	40.1	11.3 (13.0)	484
Missing observation	22.3 (14.3)	37.3	12.6 (12.6)	7609
Total	26.5 (15.3)	49.8	13.6 (13.5)	23400

Notes: Data include 23400 household who participated in the TNS World Panel in 2006. Implied daily saturates intake per household is the total amount of saturates that the household recorded purchasing in 2006, divided by the number of days the household participated in the survey in 2006 and by the number of members of the household who were over the age of four. Guideline Daily Allowance (GDA) of saturates per household member is 24.4 with a standard deviation of 2.6. This is imputed from the household composition and the publically available GDA values. Percentage of households whose intake exceed their GDA level reports the percentage of household for which their implied daily saturates intake per household was greater than their GDA amount. 11651 household reported purchases that implied daily saturates intake was greater than their GDA. The missing observations of household income bands are due to some households not being asked to report a value.

Table 11: Results

	Butter	Margarine	Butter and Margarine	Cheese	Milk
Price per unit					
All	3.7399	2.1182	2.7621	6.7892	1.0732
	(0.6926)	(1.7929)	(1.6702)	(3.1398)	(1.2994)
Saturates per 100g					
All	45.053	14.115	26.231	14.463	1.3130
	(8.9221)	(5.1397)	(16.550)	(5.4837)	(0.7481)
Change in expenditure (logit model)					
All	0.1688	0.0979	0.1244	0.0712	0.0179
	(0.0152)	(0.0120)	(0.0093)	(0.0031)	(0.0021)
Inc <30k	0.1693	0.0964	0.1215	0.0714	0.0185
	(0.0147)	(0.0117)	(0.0089)	(0.0032)	(0.0021)
Inc >30k	0.1737	0.0987	0.1286	0.0708	0.0176
	(0.0155)	(0.0116)	(0.0080)	(0.0028)	(0.0019)
Inc miss	0.1644	0.0995	0.1250	0.0712	0.0174
	(0.0145)	(0.0124)	(0.0094)	(0.0030)	(0.0020)
Normal BMI	0.1621	0.0976	0.1210	0.0709	0.0184
	(0.0127)	(0.0119)	(0.0094)	(0.0030)	(0.0025)
Obese	0.1676	0.0960	0.1241	0.0710	0.0171
	(0.0150)	(0.0121)	(0.0092)	(0.0031)	(0.0018)
BMI missing	0.1724	0.0992	0.1260	0.0715	0.0182
	(0.0153)	(0.0119)	(0.0089)	(0.0030)	(0.0019)
no kids	0.1712	0.0946	0.1245	0.0713	0.0164
	(0.0141)	(0.0086)	(0.0085)	(0.0026)	(0.0012)
kids	0.1710	0.1073	0.1228	0.0698	0.0196
	(0.0161)	(0.0114)	(0.0105)	(0.0031)	(0.0016)
Old	0.1582	0.0872	0.1272	0.0740	0.0182
	(0.0108)	(0.0057)	(0.0074)	(0.0020)	(0.0020)
Change in saturates volume (logit model)					
All	-.6817	-1.160	-5.183	0.0038	0.0834
	(0.3401)	(0.5477)	(0.4376)	(0.0051)	(0.0532)
Inc <30k	-.8218	-1.243	-5.404	0.0042	0.0864
	(0.3348)	(0.5584)	(0.3629)	(0.0051)	(0.0552)
Inc >30k	-.5554	-.9698	-4.873	0.0009	0.0740
	(0.3145)	(0.4856)	(0.3792)	(0.0033)	(0.0508)
Inc miss	-.5869	-1.189	-5.115	0.0054	0.0863
	(0.2928)	(0.5426)	(0.4077)	(0.0053)	(0.0512)
Normal BMI	-.8115	-1.289	-5.440	0.0047	0.1510
	(0.3034)	(0.5539)	(0.4445)	(0.0048)	(0.0214)
Obese	-.5481	-1.039	-5.191	0.0017	0.0989
	(0.3130)	(0.5324)	(0.4124)	(0.0047)	(0.0287)
BMI missing	-.7022	-1.174	-5.065	0.0047	0.0443
	(0.3438)	(0.5390)	(0.3975)	(0.0050)	(0.0368)
no kids	-.8971	-.8951	-5.056	0.0036	0.0979
	(0.2413)	(0.2741)	(0.3977)	(0.0038)	(0.0376)
kids	-.3609	-1.748	-5.395	0.0062	0.0509
	(0.2383)	(0.3540)	(0.4295)	(0.0059)	(0.0603)
Old	-.8060	-.6188	-5.064	-.0003	0.1138
	(0.1957)	(0.1887)	(0.3769)	(0.0028)	(0.0326)

Table 11: Results continued

	Butter	Margarine	Butter and Margarine	Cheese	Milk
Change in saturate intensity (logit model)					
All	-.9318	-.1655	-2.439	-.0392	0.0058
	(0.2615)	(0.0687)	(0.2425)	(0.0329)	(0.0039)
Inc <30k	-1.028	-.1799	-2.556	-.0482	0.0060
	(0.2432)	(0.0674)	(0.1974)	(0.0329)	(0.0040)
Inc >30k	-.9729	-.1339	-2.336	-.0111	0.0051
	(0.2406)	(0.0618)	(0.2578)	(0.0200)	(0.0036)
Inc miss	-.7718	-.1695	-2.360	-.0477	0.0061
	(0.2215)	(0.0677)	(0.2178)	(0.0286)	(0.0039)
Normal BMI	-.8918	-.1873	-2.589	-.0476	0.0113
	(0.2416)	(0.0687)	(0.2428)	(0.0307)	(0.0016)
Obese	-.8313	-.1479	-2.437	-.0176	0.0067
	(0.2415)	(0.0662)	(0.2299)	(0.0303)	(0.0019)
BMI missing	-1.008	-.1662	-2.375	-.0480	0.0029
	(0.2574)	(0.0673)	(0.2193)	(0.0294)	(0.0023)
no kids	-1.070	-.1323	-2.342	-.0505	0.0067
	(0.2367)	(0.0386)	(0.2262)	(0.0296)	(0.0030)
kids	-.8212	-.2385	-2.592	-.0447	0.0035
	(0.2266)	(0.0407)	(0.1970)	(0.0278)	(0.0041)
Old	-.8182	-.0991	-2.367	-.0004	0.0083
	(0.2201)	(0.0305)	(0.2064)	(0.0184)	(0.0029)
Taxes paid (logit model)					
All	0.1378	0.0965	0.1104	0.0729	0.0174
	(0.0059)	(0.0128)	(0.0066)	(0.0024)	(0.0022)
Inc <30k	0.1356	0.0948	0.1083	0.0735	0.0180
	(0.0049)	(0.0126)	(0.0062)	(0.0022)	(0.0021)
Inc >30k	0.1400	0.0970	0.1119	0.0713	0.0171
	(0.0057)	(0.0124)	(0.0059)	(0.0026)	(0.0021)
Inc miss	0.1391	0.0982	0.1121	0.0733	0.0167
	(0.0062)	(0.0132)	(0.0067)	(0.0022)	(0.0022)
Normal BMI	0.1351	0.0964	0.1085	0.0731	0.0172
	(0.0046)	(0.0125)	(0.0059)	(0.0022)	(0.0027)
Obese	0.1393	0.0945	0.1102	0.0718	0.0165
	(0.0061)	(0.0129)	(0.0064)	(0.0026)	(0.0018)
BMI missing	0.1382	0.0976	0.1114	0.0735	0.0179
	(0.0059)	(0.0127)	(0.0067)	(0.0022)	(0.0020)
no kids	0.1365	0.0926	0.1089	0.0736	0.0156
	(0.0048)	(0.0088)	(0.0056)	(0.0020)	(0.0012)
kids	0.1414	0.1072	0.1139	0.0716	0.0194
	(0.0061)	(0.0112)	(0.0072)	(0.0026)	(0.0015)
Old	0.1339	0.0842	0.1071	0.0740	0.0174
	(0.0037)	(0.0056)	(0.0034)	(0.0019)	(0.0017)

Table 11: Results continued

	Butter	Margarine	Butter and Margarine	Cheese	Milk
Change in expenditure (random coefficients model)					
All	0.1884	0.0917	0.1240	0.0487	0.0100
	(0.0241)	(0.0149)	(0.0175)	(0.0228)	(0.0048)
Inc <30k	0.1870	0.0901	0.1239	0.0490	0.0104
	(0.0235)	(0.0146)	(0.0169)	(0.0225)	(0.0051)
Inc >30k	0.1922	0.0923	0.1251	0.0488	0.0099
	(0.0247)	(0.0139)	(0.0172)	(0.0222)	(0.0043)
Inc miss	0.1874	0.0933	0.1233	0.0483	0.0095
	(0.0243)	(0.0156)	(0.0183)	(0.0236)	(0.0046)
Normal BMI	0.1808	0.0917	0.1225	0.0480	0.0124
	(0.0211)	(0.0153)	(0.0176)	(0.0210)	(0.0042)
Obese	0.1895	0.0897	0.1232	0.0482	0.0093
	(0.0240)	(0.0147)	(0.0177)	(0.0262)	(0.0043)
BMI missing	0.1911	0.0928	0.1251	0.0493	0.0094
	(0.0248)	(0.0147)	(0.0172)	(0.0214)	(0.0049)
no kids	0.1884	0.0880	0.1212	0.0464	0.0089
	(0.0231)	(0.0118)	(0.0166)	(0.0220)	(0.0039)
kids	0.1938	0.1010	0.1293	0.0521	0.0103
	(0.0251)	(0.0150)	(0.0182)	(0.0236)	(0.0058)
Old	0.1775	0.0817	0.1201	0.0476	0.0122
	(0.0207)	(0.0101)	(0.0150)	(0.0221)	(0.0032)
Change in saturates volume (random coefficients model)					
All	0.2801	-4.617	-8.498	-.0053	-.8156
	(0.7911)	(1.3738)	(1.7855)	(0.0172)	(0.3919)
Inc <30k	0.0830	-4.703	-8.908	-.0055	-.8643
	(0.7503)	(1.3975)	(1.7017)	(0.0155)	(0.4176)
Inc >30k	0.5366	-4.378	-8.000	-.0052	-.7754
	(0.7902)	(1.2776)	(1.7505)	(0.0171)	(0.3578)
Inc miss	0.3556	-4.678	-8.313	-.0050	-.7799
	(0.7777)	(1.3897)	(1.7970)	(0.0195)	(0.3725)
Normal BMI	-.0289	-4.715	-8.908	-.0042	-.7911
	(0.7354)	(1.4024)	(1.8344)	(0.0190)	(0.3906)
Obese	0.3750	-4.445	-8.517	-.0056	-.7266
	(0.7819)	(1.3562)	(1.7912)	(0.0168)	(0.3567)
BMI missing	0.3617	-4.675	-8.304	-.0056	-.8785
	(0.7859)	(1.3622)	(1.7279)	(0.0166)	(0.4007)
no kids	0.1261	-4.267	-8.246	-.0044	-.6702
	(0.7466)	(1.1348)	(1.7884)	(0.0176)	(0.2552)
kids	0.5872	-5.456	-8.874	-.0076	-1.115
	(0.7968)	(1.3613)	(1.5999)	(0.0152)	(0.4021)
Old	0.0345	-3.774	-8.348	-.0029	-.5640
	(0.6821)	(0.9916)	(1.9922)	(0.0195)	(0.2365)

Table 11: Results continued

	Butter	Margarine	Butter and Margarine	Cheese	Milk
Change in saturate intensity (random coefficients model)					
All	-1.174	-.6937	-3.780	-.7664	-.0453
	(0.5120)	(0.1745)	(0.7587)	(0.3036)	(0.0192)
Inc <30k	-1.262	-.7147	-3.961	-.7666	-.0473
	(0.5039)	(0.1749)	(0.7445)	(0.3051)	(0.0198)
Inc >30k	-1.144	-.6389	-3.676	-.7552	-.0426
	(0.4944)	(0.1620)	(0.7629)	(0.2950)	(0.0175)
Inc miss	-1.079	-.7058	-3.614	-.7744	-.0447
	(0.5161)	(0.1743)	(0.7209)	(0.3074)	(0.0193)
Normal BMI	-1.161	-.7205	-4.002	-.7622	-.0439
	(0.4908)	(0.1775)	(0.7752)	(0.3082)	(0.0189)
Obese	-1.141	-.6716	-3.802	-.7784	-.0414
	(0.5110)	(0.1720)	(0.7613)	(0.3015)	(0.0183)
BMI missing	-1.199	-.6947	-3.669	-.7613	-.0483
	(0.5204)	(0.1728)	(0.7264)	(0.3025)	(0.0193)
no kids	-1.236	-.6587	-3.710	-.7904	-.0369
	(0.5168)	(0.1634)	(0.7648)	(0.3061)	(0.0119)
kids	-1.150	-.7643	-3.757	-.7473	-.0620
	(0.5078)	(0.1682)	(0.6431)	(0.3086)	(0.0175)
Old	-1.071	-.6361	-3.996	-.7469	-.0322
	(0.4878)	(0.1660)	(0.9052)	(0.2822)	(0.0115)
Taxes paid (random coefficients model)					
All	0.1397	0.0921	0.1048	0.0714	0.0169
	(0.0068)	(0.0134)	(0.0090)	(0.0074)	(0.0025)
Inc <30k	0.1372	0.0903	0.1029	0.0715	0.0176
	(0.0058)	(0.0133)	(0.0087)	(0.0075)	(0.0026)
Inc >30k	0.1425	0.0932	0.1064	0.0708	0.0164
	(0.0066)	(0.0124)	(0.0085)	(0.0072)	(0.0024)
Inc miss	0.1409	0.0938	0.1061	0.0716	0.0162
	(0.0070)	(0.0138)	(0.0094)	(0.0075)	(0.0024)
Normal BMI	0.1370	0.0918	0.1031	0.0713	0.0181
	(0.0057)	(0.0135)	(0.0088)	(0.0076)	(0.0027)
Obese	0.1410	0.0904	0.1043	0.0708	0.0157
	(0.0070)	(0.0132)	(0.0089)	(0.0075)	(0.0021)
BMI missing	0.1401	0.0933	0.1058	0.0717	0.0170
	(0.0068)	(0.0133)	(0.0091)	(0.0073)	(0.0024)
no kids	0.1383	0.0886	0.1032	0.0709	0.0153
	(0.0059)	(0.0101)	(0.0083)	(0.0074)	(0.0016)
kids	0.1434	0.1017	0.1082	0.0719	0.0189
	(0.0069)	(0.0128)	(0.0096)	(0.0077)	(0.0024)
Old	0.1357	0.0813	0.1016	0.0715	0.0164
	(0.0049)	(0.0077)	(0.0071)	(0.0068)	(0.0018)

Table 12a: Butter and Margarine coefficients from logit

	between product mean	**within product mean**	**_bmi3**	**_bmim**	**_dec**	**_fkid**	**_fold**	**_hhsize**	**_i30**	**_imiss**	**_south**
budg	-3.3725		0.0331	0.0811	-0.2050	-0.0259	0.0312	-0.0385	-0.2769	-0.3116	-0.0418
	(0.4113)		(0.1271)	(0.1157)	(0.1255)	(0.1231)	(0.1288)	(0.0516)	(0.1142)	(0.0980)	(0.0850)
org	0.1184		-0.5016	-0.4220	0.1654	1.0231	-0.3615	-0.2150	0.0920	-0.3679	0.6459
	(0.6830)		(0.5953)	(0.4364)	(0.5675)	(0.7100)	(0.7665)	(0.2263)	(0.5750)	(0.6382)	(0.4327)
prc	0.2573	-1.1237	0.0328	0.0553	-0.0049	-0.0877	0.0639	-0.0770	0.1934	0.1079	-0.0038
	(0.1063)	(0.0654)	(0.0328)	(0.0290)	(0.0345)	(0.0374)	(0.0286)	(0.0146)	(0.0293)	(0.0263)	(0.0209)
sats	0.2706	-0.2993	-0.0014	-0.0028	0.0068	-0.0060	0.0070	0.0037	0.0046	0.0034	0.0012
	(0.0108)	(0.0211)	(0.0022)	(0.0020)	(0.0025)	(0.0024)	(0.0022)	(0.0009)	(0.0021)	(0.0018)	(0.0016)
stan	-3.3410		-0.0418	-0.0599	-0.0785	0.2072	-0.0271	-0.0778	0.1326	-0.0539	0.2702
	(0.2924)		(0.1056)	(0.0955)	(0.1016)	(0.0957)	(0.1136)	(0.0432)	(0.0918)	(0.0820)	(0.0686)
sz3	-1.5897	-1.3984	0.1702	0.2026	-0.1183	0.0179	-0.2296	0.2402	-0.1031	0.0221	0.0064
	(0.4706)	(0.1294)	(0.0933)	(0.0828)	(0.0953)	(0.0851)	(0.1070)	(0.0327)	(0.0833)	(0.0722)	(0.0635)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics.

Table 12b: Butter and Margarine coefficients from mixed logit with random coefficients

	between product mean	**within product mean**	**__variance**	**_bmi3**	**_bmim**	**_dec**	**_fkid**	**_fold**	**_hhsize**	**_i30**	**_imiss**	**_south**
budg	-3.9765			0.0702	0.1231	-0.3158	0.0273	-0.0319	-0.0536	-0.2966	-0.3160	-0.0606
	(0.5052)			(0.1211)	(0.1098)	(0.1264)	(0.1252)	(0.1198)	(0.0472)	(0.1149)	(0.0995)	(0.0840)
org	0.4747			-0.5574	-0.4566	0.3675	0.9407	-0.3460	-0.1822	0.0749	-0.4165	0.6650
	(0.4670)			(0.3449)	(0.2909)	(0.3304)	(0.3772)	(0.3909)	(0.1485)	(0.3126)	(0.3324)	(0.2597)
prc	-0.4361	-1.5185	1.4988	0.0600	0.1157	-0.0343	-0.2052	0.1549	-0.1468	0.3932	0.2536	0.0096
	(0.1202)	(0.0752)	(0.0588)	(0.0373)	(0.0365)	(0.0413)	(0.0562)	(0.0368)	(0.0170)	(0.0443)	(0.0330)	(0.0296)
sats	0.3100	-0.2691	0.0001	-0.0027	-0.0048	0.0086	-0.0074	0.0088	0.0045	0.0045	0.0033	0.0017
	(0.0110)	(0.0223)	(0.0058)	(0.0028)	(0.0026)	(0.0027)	(0.0031)	(0.0026)	(0.0012)	(0.0025)	(0.0025)	(0.0019)
stan	-3.1253			-0.0233	-0.0339	-0.0795	0.2365	-0.0580	-0.0963	0.1357	-0.0686	0.2649
	(0.3426)			(0.0933)	(0.0842)	(0.0994)	(0.0945)	(0.1016)	(0.0365)	(0.0868)	(0.0785)	(0.0665)
sz3	-1.8857	-1.4826		0.1793	0.2106	-0.2403	-0.0048	-0.2344	0.2440	-0.0923	0.0427	0.0020
	(0.6281)	(0.1237)		(0.0924)	(0.0825)	(0.0976)	(0.0871)	(0.1065)	(0.0327)	(0.0839)	(0.0734)	(0.0638)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics.

Table 13a: Butter coefficients from logit

	between product mean	within product mean	_bmi3	_bmim	_fkid	_fold	_hhsize	_i30	_imiss	_south
budg	-0.43016		0.1674	-0.1082	0.2796	-0.2158	0.0214	-0.2541	-0.0260	0.1625
	(0.4508)		(0.3230)	(0.2646)	(0.2605)	(0.2597)	(0.0933)	(0.2301)	(0.1958)	(0.1511)
org	-0.9364		-0.1121	0.0570	-0.6517	-0.4440	0.2706	0.1800	-0.2310	0.4744
	(0.4301)		(0.5174)	(0.4707)	(0.7664)	(0.6261)	(0.2259)	(0.4764)	(0.5834)	(0.3848)
prc	-0.7834	-0.2494	0.1383	-0.0379	0.3507	0.0987	-0.0958	0.0481	0.2732	0.2247
	(0.2162)	(0.2297)	(0.2427)	(0.1959)	(0.2176)	(0.2005)	(0.0769)	(0.1813)	(0.1531)	(0.1233)
sats	0.05625	-0.0175	-0.0010	-0.0128	0.0029	0.0206	0.0037	0.0070	0.0089	0.0054
	(0.0142)	(0.0496)	(0.0085)	(0.0075)	(0.0087)	(0.0084)	(0.0032)	(0.0079)	(0.0067)	(0.0062)
ssalt	0.0597	0.3885	-0.1435	-0.2886	-0.0275	0.0675	-0.0743	0.1487	0.2211	-0.9443
	(0.2833)	(0.3225)	(0.1694)	(0.1448)	(0.1537)	(0.1518)	(0.0590)	(0.1375)	(0.1206)	(0.1036)
stan	-1.1363		0.0634	-0.0055	0.5533	0.1239	-0.1231	0.3070	0.0933	0.1409
	(0.3223)		(0.2612)	(0.2191)	(0.2475)	(0.2281)	(0.0941)	(0.1942)	(0.1800)	(0.1395)
sz2	.7547	-0.2816	0.0246	0.0502	0.0036	-0.1713	0.1593	0.2141	0.0350	-0.0188
	(0.4486)	(0.1887)	(0.1494)	(0.1298)	(0.1522)	(0.1395)	(0.0543)	(0.1328)	(0.1142)	(0.0993)
sz3	7.3685	-3.0116	0.7639	0.6328	0.3209	0.0668	0.2324	0.3392	0.2255	-0.6898
	(1.3860)	(0.6596)	(0.5324)	(0.4909)	(0.4942)	(0.5080)	(0.1733)	(0.4364)	(0.3518)	(0.3517)
usalt	1.37355	-1.0323	-0.5280	-0.3142	0.3372	0.0011	-0.0589	0.3410	-0.1130	0.0636
	(0.5365)	(0.4672)	(0.4342)	(0.3314)	(0.2911)	(0.3403)	(0.1189)	(0.2993)	(0.2650)	(0.1800)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics

Table 13b: Butter coefficients from mixed logit with random coefficients

	between product mean	**within product mean**	**__variance**	**_bmi3**	**_bmim**	**_fkid**	**_fold**	**_hhsize**	**_i30**	**_imiss**	**_south**
budg	-1.6604			0.1622	-0.0781	0.1572	-0.2541	0.0530	-0.2574	-0.0636	0.1527
	(0.6142)			(0.2190)	(0.1967)	(0.2247)	(0.2076)	(0.0836)	(0.2053)	(0.1829)	(0.1507)
org	-1.2712			-0.0660	0.0305	-0.5028	-0.3908	0.2407	0.1103	-0.2100	0.5354
	(0.9576)			(0.4649)	(0.4090)	(0.4909)	(0.4668)	(0.1686)	(0.4142)	(0.3992)	(0.3261)
prc	-1.0333	-1.1075	2.6822	0.1269	0.0748	0.4260	0.0028	-0.2072	0.3656	0.5575	-0.0368
	(0.2773)	(0.2553)	(0.1787)	(0.1854)	(0.1664)	(0.1843)	(0.1710)	(0.0713)	(0.1762)	(0.1480)	(0.1191)
sats	0.0938	-0.0846	0.0745	-0.0030	-0.0163	0.0012	0.0250	0.0055	0.0100	0.0080	0.0116
	(0.0194)	(0.0511)	(0.0183)	(0.0092)	(0.0085)	(0.0096)	(0.0091)	(0.0038)	(0.0088)	(0.0076)	(0.0074)
ssalt	.15238	0.6420		-0.1227	-0.3189	0.0083	0.0521	-0.0771	0.1297	0.2452	-0.9323
	(0.5182)	(0.3031)		(0.1393)	(0.1256)	(0.1424)	(0.1336)	(0.0550)	(0.1286)	(0.1131)	(0.0991)
stan	-0.9490			0.0552	0.0315	0.5061	0.0856	-0.1174	0.3595	0.0963	0.1664
	(0.5318)			(0.1985)	(0.1765)	(0.2035)	(0.1914)	(0.0810)	(0.1807)	(0.1667)	(0.1402)
sz2	1.3210	-0.1928		0.0161	0.0404	0.0243	-0.1458	0.1481	0.2665	0.0707	-0.0650
	(0.5574)	(0.1918)		(0.1406)	(0.1258)	(0.1407)	(0.1349)	(0.0548)	(0.1275)	(0.1133)	(0.0970)
sz3	8.0413	-2.7738		0.7658	0.6434	0.3235	0.0594	0.2216	0.4101	0.2565	-0.7296
	(1.5874)	(0.5160)		(0.3726)	(0.3506)	(0.3053)	(0.3246)	(0.1196)	(0.2924)	(0.2610)	(0.2638)
usalt	1.6713	-0.6328		-0.5106	-0.3322	0.4296	0.0281	-0.0811	0.3411	-0.1104	0.0613
	(0.7842)	(0.4030)		(0.2429)	(0.2102)	(0.2511)	(0.2421)	(0.0996)	(0.2229)	(0.2069)	(0.1708)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics

Table 14a: Margarine coefficients from logit

	between product mean	within product mean	_bmi3	_bmim	_dec	_fkid	_fold	_hhsize	_i30	_imiss	_south
budg	-2.0931		0.2565	0.1907	-0.0306	-0.2796	-0.1816	-0.0224	-0.1926	-0.1716	-0.2977
	(0.2396)		(0.2428)	(0.2212)	(0.2749)	(0.2510)	(0.2623)	(0.0877)	(0.2248)	(0.1800)	(0.1565)
org	0.3137		-0.8184	-0.8713	0.0977	-0.5185	-0.0816	-0.1126	0.0480	-1.1385	-0.1238
	(0.3787)		(0.8048)	(0.7277)	(1.0031)	(0.9940)	(0.7891)	(0.3630)	(0.8901)	(0.9181)	(0.6779)
prc	1.1427	-1.5266	0.0776	0.0646	-0.0204	-0.2069	0.1053	-0.0436	0.1876	0.0783	0.0767
	(0.0519)	(0.0789)	(0.0385)	(0.0378)	(0.0436)	(0.0490)	(0.0320)	(0.0172)	(0.0336)	(0.0296)	(0.0250)
sats	-0.0327	-0.0139	-0.0030	-0.0023	0.0010	-0.0091	0.0043	0.0051	0.0014	0.0082	0.0104
	(0.0121)	(0.0260)	(0.0072)	(0.0066)	(0.0076)	(0.0068)	(0.0075)	(0.0026)	(0.0065)	(0.0056)	(0.0049)
stan	-1.8242		0.0018	-0.1077	0.0435	0.0994	-0.3559	-0.0953	0.1585	-0.0481	0.3021
	(0.1966)		(0.1369)	(0.1248)	(0.1237)	(0.1130)	(0.1522)	(0.0549)	(0.1101)	(0.1034)	(0.0816)
sz2	0.5770	-1.2748	0.0861	0.0680	0.0856	0.0236	-0.1607	0.2613	-0.0335	-0.0168	0.0610
	(0.3576)	(0.1377)	(0.0983)	(0.0869)	(0.1073)	(0.0948)	(0.1201)	(0.0358)	(0.0901)	(0.0794)	(0.0698)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics

Table 14b: Margarine coefficients from mixed logit with random coefficients

	between product mean	within product mean	__variance	_bmi3	_bmim	_dec	_fkid	_fold	_hhsize	_i30	_imiss	_south
budg	-3.1828			0.2303	0.1697	-0.0878	-0.2047	-0.2246	-0.0307	-0.1795	-0.1413	-0.2687
	(0.4027)			(0.2025)	(0.1841)	(0.2221)	(0.2050)	(0.2141)	(0.0756)	(0.1954)	(0.1624)	(0.1490)
org	1.6361			-0.8039	-0.8251	0.0481	-0.6150	0.0412	-0.1212	0.1154	-1.1148	-0.1193
	(0.4587)			(0.6502)	(0.5561)	(0.7651)	(0.9056)	(0.6318)	(0.2993)	(0.6321)	(0.8738)	(0.5191)
prc	0.5110	-2.3168	1.3370	0.1166	0.1125	-0.0765	-0.2365	0.2021	-0.0759	0.2858	0.1259	0.1045
	(0.1457)	(0.1005)	(0.0754)	(0.0409)	(0.0386)	(0.0494)	(0.0499)	(0.0403)	(0.0196)	(0.0394)	(0.0364)	(0.0287)
sats	0.0480	-0.0532	0.0001	-0.0030	-0.0034	0.0004	-0.0076	0.0039	0.0055	0.0010	0.0098	0.0110
	(0.0200)	(0.0257)	(0.0087)	(0.0079)	(0.0071)	(0.0091)	(0.0079)	(0.0083)	(0.0030)	(0.0075)	(0.0065)	(0.0058)
stan	-1.8797			-0.0152	-0.1096	0.0770	0.1448	-0.3888	-0.1137	0.1701	-0.0457	0.3195
	(0.3060)			(0.1098)	(0.0992)	(0.1201)	(0.1099)	(0.1302)	(0.0423)	(0.1013)	(0.0917)	(0.0787)
sz2	-0.2762	-1.3734		0.0837	0.0735	-0.0045	0.0265	-0.1569	0.2646	-0.0326	-0.0029	0.0660
	(0.5329)	(0.1311)		(0.0964)	(0.0857)	(0.1031)	(0.0934)	(0.1149)	(0.0351)	(0.0885)	(0.0783)	(0.0682)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics

Table 15a: Cheese coefficients from logit

	between product mean	within product mean	_bmi3	_bmim	_fkid	_fold	_hhsize	_i30	_imiss	_south
big			0.1496	0.0251	-0.0145	0.1627	0.1051	0.1870	0.1250	0.2190
			(0.1416)	(0.1242)	(0.1334)	(0.1531)	(0.0522)	(0.1207)	(0.1147)	(0.0912)
grate			-0.5155	-0.4559	0.0295	-1.8080	-0.0641	0.0410	0.6601	-0.1199
			(0.5748)	(0.5060)	(0.7427)	(0.7670)	(0.2364)	(0.6430)	(0.5950)	(0.4976)
nat			-0.2570	-0.1262	-0.4292	0.6316	-0.2538	0.6160	0.1914	0.2863
			(0.1996)	(0.1797)	(0.1902)	(0.2425)	(0.0746)	(0.1695)	(0.1549)	(0.1260)
ocut			-0.6141	-0.2364	0.0126	0.1810	-0.0224	0.3944	0.4633	0.4157
			(0.2297)	(0.1944)	(0.2334)	(0.2491)	(0.0817)	(0.2011)	(0.1933)	(0.1483)
prc		-0.0959	0.0941	0.0119	0.0518	0.1541	-0.0251	0.1531	0.0200	0.0513
		(0.0464)	(0.0288)	(0.0262)	(0.0314)	(0.0351)	(0.0120)	(0.0265)	(0.0246)	(0.0205)
sats			-0.0415	-0.0091	0.0021	-0.0064	0.0052	-0.0141	0.0168	0.0271
			(0.0136)	(0.0123)	(0.0149)	(0.0153)	(0.0055)	(0.0120)	(0.0116)	(0.0101)
slice			-0.1453	0.0501	-0.2859	1.0085	-0.0664	0.7145	0.2295	0.1095
			(0.4273)	(0.3828)	(0.3935)	(0.4618)	(0.1313)	(0.3557)	(0.3325)	(0.2399)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics

Table 15b: Cheese coefficients from mixed logit with random coefficients

	between product mean	within product mean	__variance	_bmi3	_bmim	_fkid	_fold	_hhsize	_i30	_imiss	_south
big				0.1282	0.0279	-0.1674	0.0603	0.1139	0.1075	0.1352	0.2714
				(0.1503)	(0.1329)	(0.1599)	(0.1736)	(0.0585)	(0.1295)	(0.1224)	(0.0985)
grate				-0.1302	-0.3506	0.0494	-1.6825	0.0022	0.2259	0.3906	-0.1432
				(0.5999)	(0.5212)	(0.6812)	(0.9376)	(0.2333)	(0.5550)	(0.5465)	(0.4416)
nat				-0.3248	-0.1445	-0.4441	0.3367	-0.2441	0.3914	0.1587	0.2224
				(0.2242)	(0.1906)	(0.2537)	(0.2654)	(0.0826)	(0.1815)	(0.1740)	(0.1354)
ocut				-0.4965	-0.2664	0.0528	0.2848	-0.0223	0.4614	0.4953	0.3632
				(0.2442)	(0.2109)	(0.2898)	(0.2639)	(0.0947)	(0.2017)	(0.1939)	(0.1517)
prc		-1.5454	2.0319	0.0226	0.0140	0.1086	0.0919	-0.0384	0.1090	-0.0099	0.0107
		(0.0541)	(0.0384)	(0.0331)	(0.0279)	(0.0362)	(0.0418)	(0.0130)	(0.0343)	(0.0273)	(0.0256)
sats			0.0022	-0.0287	-0.0128	0.0140	0.0127	0.0054	0.0025	0.0239	0.0285
			(0.0004)	(0.0155)	(0.0136)	(0.0161)	(0.0171)	(0.0059)	(0.0132)	(0.0124)	(0.0104)
slice				-0.2261	-0.0404	-0.3064	0.8572	-0.1212	0.6136	0.2655	-0.0786
				(0.5217)	(0.4391)	(0.6163)	(0.5392)	(0.1800)	(0.3741)	(0.3671)	(0.2798)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics

Table 16a: Milk coefficients from logit

	between product mean	within product mean	_bmi3	_bmim	_fkid	_fold	_hhsize	_i30	_imiss	_south
UHT			0.3962	0.0667	0.1585	-0.0666	0.0963	-0.3720	0.3204	-0.6882
			(0.3923)	(0.3572)	(0.5228)	(0.3935)	(0.1662)	(0.4352)	(0.3821)	(0.2488)
carton			-0.6162	-0.2619	-0.1879	0.6834	0.0694	0.1586	-0.2992	0.1753
			(0.3568)	(0.3241)	(0.4904)	(0.3786)	(0.1525)	(0.4090)	(0.3693)	(0.2317)
glass			4.6412	7.8352	4.1339	-0.0371	-0.0770	-0.6338	-0.8854	-0.1392
			(1.0423)	(1.0141)	(1.1810)	(1.0477)	(0.5353)	(1.1045)	(1.0171)	(0.9799)
onel			0.0241	0.0325	0.0883	0.1792	0.1066	0.1208	0.2125	0.1187
			(0.1710)	(0.1585)	(0.1809)	(0.1757)	(0.0727)	(0.1621)	(0.1410)	(0.1197)
org			-0.3460	-0.1409	0.7149	-0.1468	-0.1606	0.7656	0.2848	0.4119
			(0.2375)	(0.2017)	(0.2669)	(0.2953)	(0.1017)	(0.2312)	(0.2382)	(0.1760)
otype			0.5114	0.5793	0.4266	-0.0517	0.3587	0.0206	0.4395	0.4919
			(0.3779)	(0.3383)	(0.5053)	(0.4033)	(0.1539)	(0.4213)	(0.3656)	(0.2363)
prc		-0.1393	-0.9542	-1.7663	-1.1841	0.2589	0.0617	0.0966	0.2770	0.0464
		(0.2924)	(0.2026)	(0.2049)	(0.2699)	(0.1995)	(0.1091)	(0.2304)	(0.1949)	(0.1952)
sats			0.0816	0.2699	0.3289	0.9832	0.1221	0.2650	-0.2468	-0.1364
			(0.3797)	(0.3332)	(0.4864)	(0.4475)	(0.1533)	(0.4394)	(0.3794)	(0.2608)
skim			0.0875	0.2028	0.0545	0.4933	0.1426	0.4020	-0.2282	-0.1243
			(0.3062)	(0.2758)	(0.3874)	(0.3595)	(0.1265)	(0.3456)	(0.3007)	(0.2126)
stan			-0.1377	-0.1683	0.1165	0.1790	-0.0699	0.1789	0.1102	0.1029
			(0.1654)	(0.1477)	(0.1708)	(0.1768)	(0.0666)	(0.1595)	(0.1410)	(0.1116)
twol			-0.1335	-0.1785	-0.0060	-0.1365	0.4410	-0.1006	0.0857	0.2045
			(0.1652)	(0.1517)	(0.1745)	(0.1690)	(0.0694)	(0.1546)	(0.1365)	(0.1179)
whole			-0.4505	-0.5202	0.2681	-0.9165	-0.0269	-0.6416	0.1231	0.0389
			(0.5054)	(0.4420)	(0.6344)	(0.5941)	(0.1999)	(0.5734)	(0.4963)	(0.3401)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics

Table 16b: Milk coefficients from mixed logit with random coefficients

	between product mean	**within product mean**	**__variance**	**_bmi3**	**_bmim**	**_fkid**	**_fold**	**_hhsize**	**_i30**	**_imiss**	**_south**
UHT				0.5152	0.2555	0.4550	0.1457	-0.1063	-0.2292	0.4589	-0.7049
				(0.3257)	(0.2987)	(0.3742)	(0.3394)	(0.1278)	(0.3359)	(0.2829)	(0.2439)
carton				-0.6444	-0.3488	-0.3442	0.5677	0.1669	0.1145	-0.3638	0.1911
				(0.3011)	(0.2674)	(0.3419)	(0.3042)	(0.1198)	(0.2993)	(0.2662)	(0.2270)
glass				2.4743	4.8329	0.9392	-6.4216	3.7993	-6.0515	-5.3050	-0.2788
				(1.8321)	(1.4384)	(2.7626)	(1.7429)	(0.8396)	(3.0045)	(1.4115)	(1.1637)
onel				0.1127	0.1967	0.2240	0.2101	0.0254	0.1797	0.2067	0.1262
				(0.1637)	(0.1488)	(0.1827)	(0.1710)	(0.0726)	(0.1623)	(0.1411)	(0.1192)
org				-0.4836	-0.3253	0.5642	-0.1440	-0.0769	0.6624	0.2417	0.3909
				(0.2487)	(0.2056)	(0.2663)	(0.2894)	(0.0981)	(0.2377)	(0.2301)	(0.1746)
otype				0.4160	0.5233	0.2926	-0.3619	0.4827	-0.2137	0.1953	0.4718
				(0.3263)	(0.2947)	(0.3569)	(0.3620)	(0.1223)	(0.3314)	(0.2783)	(0.2290)
prc		-12.2052	7.3891	-0.6228	-1.3030	-0.4523	1.7474	-0.8293	1.2688	1.3142	0.1998
		(0.5303)	(0.4006)	(0.3884)	(0.3005)	(0.6348)	(0.3954)	(0.1880)	(0.6327)	(0.2881)	(0.2430)
sats			0.0001	0.1661	0.3109	0.2786	0.7327	0.1453	0.2526	-0.2889	-0.0874
			(0.0001)	(0.3553)	(0.3133)	(0.3595)	(0.3757)	(0.1221)	(0.3300)	(0.2877)	(0.2443)
skim				0.1898	0.2848	0.0368	0.3624	0.1486	0.4226	-0.2371	-0.0840
				(0.2903)	(0.2600)	(0.2941)	(0.3118)	(0.1032)	(0.2671)	(0.2392)	(0.2014)
stan				-0.0294	0.0150	0.1947	0.1838	-0.1188	0.2322	0.0978	0.1023
				(0.1597)	(0.1452)	(0.1622)	(0.1599)	(0.0627)	(0.1452)	(0.1252)	(0.1092)
twol				0.0023	-0.0186	0.1772	-0.0480	0.3286	0.0054	0.1798	0.2131
				(0.1672)	(0.1500)	(0.1875)	(0.1787)	(0.0731)	(0.1699)	(0.1409)	(0.1201)
whole				-0.5717	-0.5696	0.3305	-0.5799	-0.0612	-0.6240	0.1792	-0.0205
				(0.4677)	(0.4109)	(0.4700)	(0.4947)	(0.1608)	(0.4319)	(0.3752)	(0.3197)

Note: Numbers reported are coefficients with standard errors in (). Variables are defined in Tables 7 and 8. Columns headed _xxx are interactions of household characteristics with the relevant product characteristics

Table 17a: Butter and margarine price elasticities, logit

product code	74639	85053	109291	122017	278577
74639	-2.2237	0.0618	0.0618	0.0618	0.0618
85053	0.0612	-1.8082	0.0612	0.0612	0.0612
109291	0.0443	0.0443	-1.5320	0.0443	0.0443
122017	0.0398	0.0398	0.0398	-1.4900	0.0398
278577	0.0767	0.0767	0.0767	0.0767	-2.0160

Table 17b: Butter and margarine price elasticities, random coefficients

product code	74639	85053	109291	122017	278577
74639	-4.6096	0.1639	0.1725	0.1715	0.1571
85053	0.1688	-4.5651	0.2257	0.2287	0.1884
109291	0.1006	0.1360	-4.3160	0.1662	0.1166
122017	0.1177	0.1574	0.1874	-4.2512	0.1357
278577	0.1956	0.2220	0.2313	0.2335	-4.6359

product code	Product description
74639	CLOVER DAIRY SPREAD 500GM
85053	FLORA LIGHT LW FT SPREAD 500GM
109291	I.C.B.I.N.B DAIRY SPREAD 500GM
122017	ST IVEL UTRLY BTRLY D/SPD500GM
278577	TESCO VALUE BLENDED 250GM

Table 18a: Butter price elasticities, logit

product code	64831	64836	251603	278577	406225
64831	-2.8674	0.0737	0.0737	0.0737	0.0737
64836	0.0585	-2.5946	0.0585	0.0585	0.0585
251603	0.1745	0.1745	-3.2560	0.1745	0.1745
278577	0.1499	0.1499	0.1499	-1.8234	0.1499
406225	0.1627	0.1627	0.1627	0.1627	-3.2486

Table 18a’: Butter price elasticities, logit including outside option

product code	64836	251603	278577	406225
64836	-2.6394	0.0053	0.0053	0.0053
251603	0.0203	-3.3993	0.0203	0.0203
278577	0.0182	0.0182	-1.9489	0.0182
406225	0.0175	0.0175	0.0175	-3.3831

Table 18b: Butter price elasticities, random coefficients

product code	64831	64836	251603	278577	406225
64831	-6.5237	0.2237	0.1128	0.2055	0.1194
64836	0.1875	-7.6877	0.0819	0.2814	0.0706
251603	0.2600	0.2329	-2.9186	0.1578	0.1754
278577	0.5143	0.8744	0.1571	-7.8025	0.1696
406225	0.2561	0.1848	0.1721	0.1555	-3.5035

product code	Product description
64831	ANCHR NEW ZEALAND 250GM
64836	CTY.L STANDARD 250GM
251603	LRPAK S/S SPRDBL DANISH 500GM
278577	TESCO VALUE BLENDED 250GM
406225	LRPAK LGTR S/S SPRDB DAN 500GM

Table 19a: Margarine price elasticities, logit

product code	74639	85053	98239	122017
74639	-0.9138	0.0374	0.0374	0.0374
85053	0.0393	-0.7426	0.0393	0.0393
98239	0.0248	0.0248	-0.5515	0.0248
122017	0.0254	0.0254	0.0254	-0.6137

Table 19b: Margarine price elasticities, random coefficients

product code	74639	85053	98239	122017
74639	-2.8140	0.1305	0.1387	0.1357
85053	0.1435	-2.9681	0.1902	0.1858
98239	0.0787	0.1022	-2.8659	0.1271
122017	0.0974	0.1248	0.1575	-2.9394

product code	Product description
74639	CLOVER DAIRY SPREAD 500GM
85053	FLORA LIGHT LW FT SPREAD 500GM
98239	I.C.B.I.N.B DAIRY SPREAD 1KG
122017	ST IVEL UTRLY BTRLY D/SPD500GM

Table 20a: Milk price elasticities, logit

product code	21	30	32	98	106
21	0.5456	-0.0847	-0.0847	-0.0847	-0.0847
30	-0.0302	0.7251	-0.0302	-0.0302	-0.0302
32	-0.0951	-0.0951	0.6297	-0.0951	-0.0951
98	-0.0262	-0.0262	-0.0262	0.6029	-0.0262
106	-0.0276	-0.0276	-0.0276	-0.0276	0.6959

Table 20b: Milk price elasticities, random coefficients

product code	21	30	32	98	106
21	-4.4206	0.8443	0.9288	1.2381	0.9320
30	0.2767	-4.7851	0.2407	0.2773	0.2412
32	0.9170	0.7204	-4.4113	0.9194	0.7863
98	0.4636	0.3192	0.3509	-5.1992	0.3521
106	0.3227	0.2557	0.2779	0.3235	-4.9276

product code	Product description
21	Semi_Large_Plastic_Fresh_Non_Standard
30	Semi_Medium_Plastic_Fresh_Non_Branded
32	Semi_Medium_Plastic_Fresh_Non_Standard
98	Whole_Large_Plastic_Fresh_Non_Standard
106	Whole_Medium_Plastic_Fresh_Non_Standard

Table 21a: Cheese price elasticities, logit

product code	18	19	34	35	153
18	-0.3913	0.1391	0.1391	0.1391	0.1391
19	0.0282	-0.5792	0.0282	0.0282	0.0282
20	0.0643	0.0643	-0.6947	0.0643	0.0643
145	0.0657	0.0657	0.0657	-1.1111	0.0657
149	0.0227	0.0227	0.0227	0.0227	-0.5492

Table 21b: Cheese price elasticities, random coefficients

product code	18	19	34	35	153
18	-8.1316	3.0883	1.0888	0.1747	3.6649
19	0.7777	-9.8126	0.4086	0.0881	0.7858
20	0.4635	0.6409	-5.0968	0.0894	0.5696
145	-0.0022	-0.0057	-0.1049	0.9692	-0.0018
149	0.5463	0.4521	0.2019	0.0385	-11.1144

product code	Product description
18	Cheddar_fullf_big
19	Cheddar_fullf_big_weak
20	Cheddar_fullf_small
145	Processedsnack_fullf_small
149	Processedspread_fullf_small

Figure 1: Distribution of percentage saturates contribution by cheese

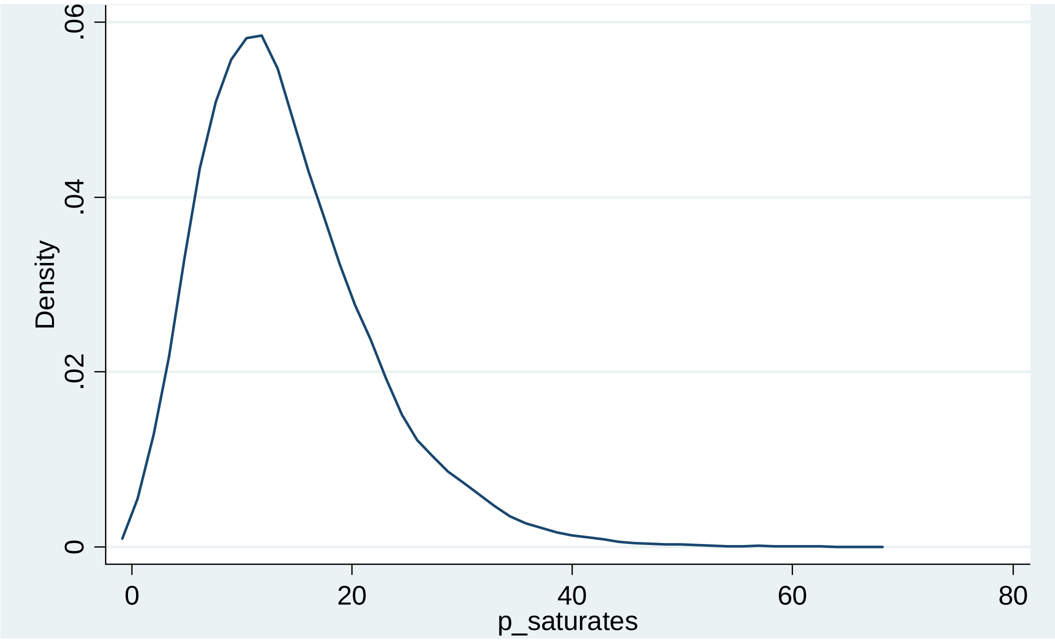

Figure 2: Distribution of percentage saturates contribution by cheese by obesity status

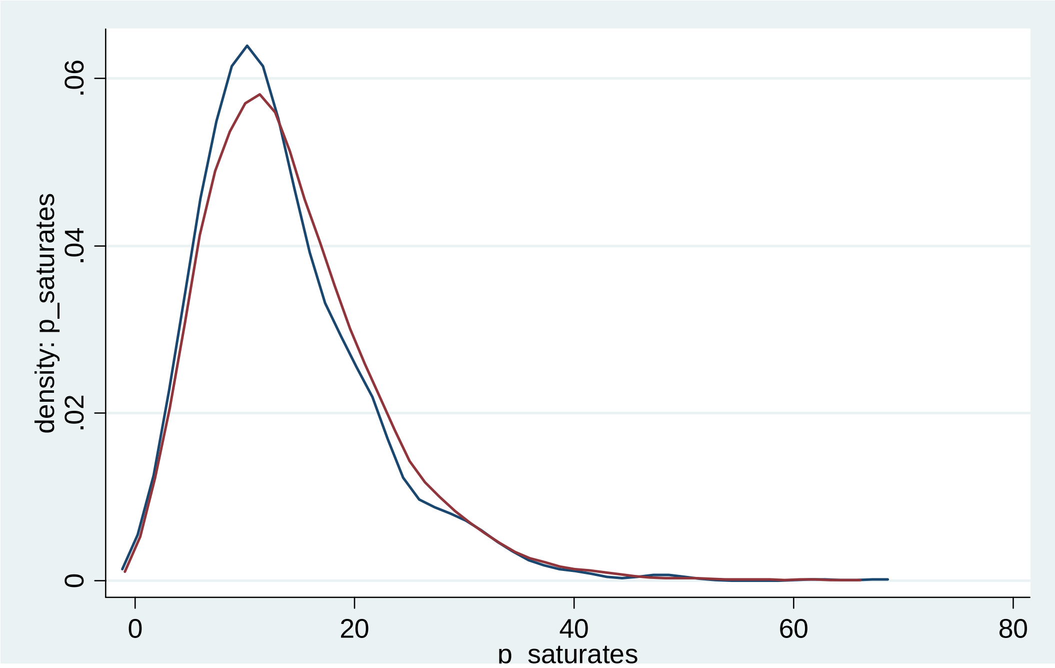

Figure 3: Saturated fat for different butter products