

Estimating Food and Drink Demand Elasticities using the Family Food Module of the LCF data

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Background to this research

- How is food consumption in the UK related to food prices and household expenditure?
- Price elasticity = $\frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}$
- Expenditure elasticity = $\frac{\% \text{ change in quantity demanded}}{\% \text{ change in expenditure}}$
- Nutrient elasticity = $\frac{\% \text{ change in nutrient intake}}{\% \text{ change in price (or expenditure)}}$
- Differences between households vs changes over time

AIDS model and data

- $$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log \left(\frac{x}{P^*} \right)$$

w_i budget share

x food expenditure

P^* Stone Price Index

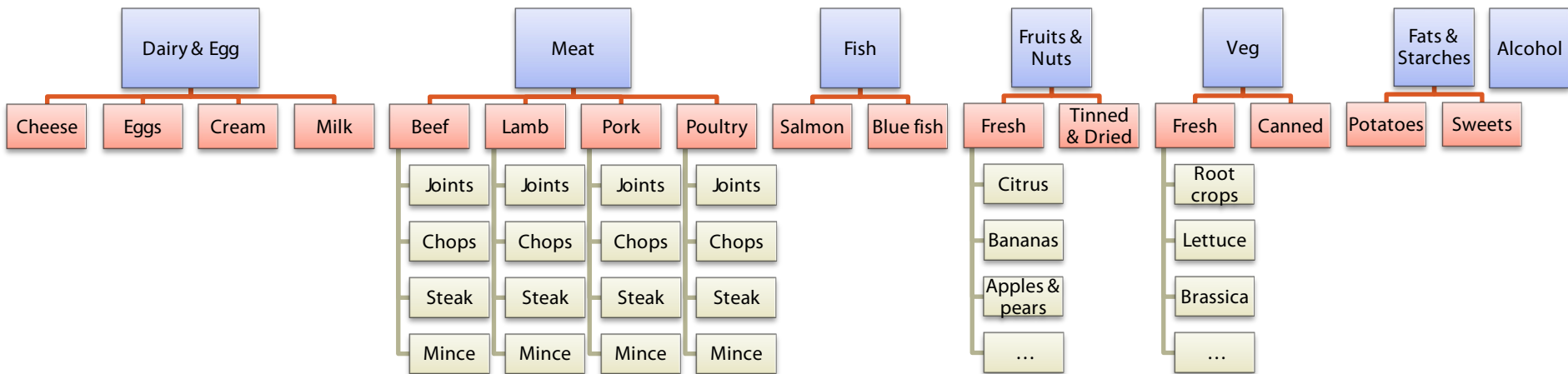
- Adding up, Homogeneity, Symmetry
- Family Food module of the LCFS data 2001/2-2009

Food Groups

Level 1

Level 2

Level 3



Two types of models

- AIDS
 - Data at the individual household level
 - measures how cross sectional variations in food prices and expenditure explain differences in food consumption
 - Censoring
- Dynamic AIDS
 - Aggregated time series data
 - measures how variations in food prices and expenditure over time explain changes in food consumption
 - Habit persistence, inventory adjustment behaviour, imperfect information and incorrect expectations
 - Cointegration

Results AIDS

Uncompensated Price and Expenditure Elasticities 2009								
	Dairy & Eggs	Meat	Fish	Fruits & Nuts	Veg	Fats & Starches	Alcohol	Expend.
Dairy & Eggs	-0.505*	-0.008*	-0.048	-0.045*	-0.072*	-0.321*	0.103	0.896*
Meat	-0.030	-0.804*	-0.011	0.060	-0.016	-0.230*	-0.090	1.121*
Fish	-0.101	0.039	-0.441*	0.047	-0.042	-0.035*	-0.143*	0.675*
Fruits & Nuts	-0.066*	0.220	0.019	-0.698*	-0.018	-0.117	-0.213*	0.872*
Vegetables	-0.105*	-0.001*	-0.034	-0.021	-0.633*	0.032*	-0.173	0.935*
Fats & Starches	-0.119*	-0.122*	-0.021	-0.039	-0.005	-0.847*	0.075	1.078*
Alcohol	0.110	-0.123	-0.065	-0.147*	-0.124	0.332	-0.856*	0.873*

Compensated Price Elasticities 2009							
	Dairy & Eggs	Meat	Fish	Fruits & Nuts	Veg	Fats & Starches	Alcohol
Dairy & Eggs	-0.403*	0.181*	-0.009	0.022	0.000	0.010	0.200*
Meat	0.097*	-0.568*	0.037*	0.144*	0.075*	0.184*	0.031*
Fish	-0.025	0.181*	-0.412*	0.098*	0.013*	0.215	-0.070
Fruits & Nuts	0.033	0.404*	0.057*	-0.632*	0.053*	0.205*	-0.118
Vegetables	0.001	0.195*	0.007	0.049	-0.557	0.377*	-0.071
Fats & Starches	0.003	0.105*	0.025	0.042	0.082*	-0.449*	0.192*
Alcohol	0.209*	0.060*	-0.028	-0.082	-0.053	0.655*	-0.762*

Results AIDS (cont.)

Selected Nutrient Elasticities 2009								
Nutrient	Dairy & Eggs	Meat	Fish	Fruits & Nuts	Veg	Fats & Starches	Alcohol	Expend.
Animal Protein	-0.437	-0.088	-0.049	-0.034	-0.063	-0.331	0.080	0.922
Fat	-0.345	-0.084	-0.039	-0.051	-0.052	-0.466	0.073	0.963
Saturates	-0.334	-0.093	-0.037	-0.045	-0.047	-0.491	0.075	0.971
Mono-unsaturates	-0.344	-0.088	-0.038	-0.053	-0.050	-0.460	0.071	0.962
Poly-unsaturates	-0.318	-0.074	-0.038	-0.065	-0.058	-0.474	0.061	0.966
Carbohydrate	-0.133	-0.105	-0.022	-0.074	-0.028	-0.738	0.047	1.052
Energy - Kcal	-0.294	-0.091	-0.036	-0.056	-0.049	-0.502	0.051	0.979
Energy - MJ	-0.293	-0.091	-0.036	-0.056	-0.049	-0.504	0.051	0.979
Calcium	-0.380	-0.045	-0.042	-0.051	-0.064	-0.443	0.079	0.945

Results Dynamic AIDS

	Dairy & Egg	Meat	Fish	Fruit & Nuts	Veg.	Fats & Starches	Alcohol	Expend.
Dairy & Egg	-0.999*	-0.014	0.04	0.204*	0.048	-0.133	0.008	0.846*
Meat	-0.087	-0.582*	0.041	-0.026	0.084	-0.482*	-0.088	1.140*
Fish	0.558*	0.292	-0.701*	-0.434*	-0.01	-0.256	-0.086	0.638*
Fruit & Nuts	0.375*	0.013	-0.061*	-1.381*	-0.012	0.382	-0.073	0.757*
Veg.	0.117	0.115	-0.003	-0.009	-0.652*	-0.323*	0.033	0.722*
Fats & Starches	-0.089	-0.085*	-0.014	0.065	-0.098*	-0.833*	0.039	1.015*
Alcohol	-0.269	-0.284	-0.054	-0.351	-0.099	-0.277	-1.122*	2.456*

Short-run elasticities 2001/2-2009

	Dairy & Egg	Meat	Fish	Fruit & Nuts	Veg.	Fats & Starches	Alcohol	Expend.
Dairy & Egg	-0.568*	0.009	0.006	-0.001	-0.030	-0.216*	-0.090*	0.889*
Meat	-0.015	-0.760*	0.060	0.067	0.095	-0.428	-0.088*	1.069*
Fish	0.089	0.382	-0.780*	-0.053	-0.001	-0.411	-0.065	0.839*
Fruit & Nuts	-0.006	0.069	-0.008	-0.883*	-0.049	0.063	-0.098	0.913*
Vegetables	-0.045	0.110	0.000	-0.045	-0.745*	-0.153	0.055	0.823*
Fats & Starches	-0.118	-0.081*	-0.016*	0.003	-0.053	-0.766*	0.008	1.023*
Alcohol	-0.519	-0.225*	-0.034	-0.313	0.024	-0.232	-0.416*	1.714*

Selected findings

- Households with more food expenditure at their disposal tend to not spend it on fruit & veg but on other food groups.
- Higher prices for fresh fruits leads to consumers substituting them with canned fruits and juice.
- Meat consumption of low income households is less affected by differences in meat prices than is meat consumption by general population.
- Scottish household facing higher meat prices have considerably lower dairy consumption than English households do.
- Higher prices for dairy & egg products reduce calorie intake but also reduce intake of calcium, iron, vitamin D and zinc
- Consumers respond to changes in the prices of fruits & nut products, alcohol and dairy & egg products only in the long-run.

Full Report:

Estimating Food and Drink Elasticities; Richard Tiffin, Kelvin Balcombe, Matthew Salois, Ariane Kehlbacher and Jim Holding (Defra)

www.defra.gov.uk/statistics/foodfarm/food/