

# Household food purchasing behaviour

## Incomes, Prices and Nutrition

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# Motivation

- There is a well established relationship between health outcomes and socioeconomic status
  - Many of these health outcomes are related to diet
- Tackling diet related health problems is a priority of government
- One strategy is income transfers to low income households
- Whether income transfers lead to improved diet depends on relationship between income and food purchasing behaviour

# Motivation

- The recent recession led to large declines in household income
  - Employment rates declined
  - Real wages stagnated
  - Asset prices fell
- Recession was contemporaneous with large price level shock and changes in relative food prices
  - Depreciation of sterling led to increase in price of imported goods
  - World commodity prices rose
  - RPI food basket increased by 10% between Oct. 2007 and Oct. 2008 and price increase persisted
  - Price of prepared foods rose by much less than other foods
  - Price of vegetables rose by less (partly because of less imports than other foods - e.g. fruit)

# What we do in this paper

- Use income variation from recent recession to identify impact of changes in income on food purchasing behaviour
- Use QUAIDS demand system to control for impact of contemporaneous changes in relative prices
  - Estimate model using panel data on purchases of very disaggregate food products
  - Allowing for household specific prices
  - And heterogeneity in household preferences
- Use model to describe the relationship between income (or total food expenditure) and diet
- And decompose changes in diet over recession into income effect and relative price effect

# Expenditure shares

- Assume preferences for food are weakly separable
- Household  $h$  (from demographic group  $D$ ) in period  $t$  chooses between  $J$  food types
  - Share of period  $t$  food budget allocated to good  $j$  is given by:

$$w_{htj} = \alpha_{htj} + \sum_k \gamma_{jk}^D \ln p_{htk} + \beta_j^D \ln \left( \frac{x_{ht}}{\Gamma^D(\rho_{ht})} \right) + \frac{\lambda_j^D}{\Pi^D(\rho_{ht})} \left[ \ln \left( \frac{x_{ht}}{\Gamma^D(\rho_{ht})} \right) \right]^2 + \epsilon_{htj}$$

- where:

- $\alpha_{htj} = \alpha_{1j}^D + \alpha_{2j}^D d_h + \alpha_{3j}^D \tau_t$
- $w_{htj}$  is household  $h$ 's period  $t$  food expenditure share on  $j$
- $p_{htj}$  is household  $h$ 's period  $t$  price index for  $j$
- $x_{ht}$  is household  $h$ 's period  $t$  total food expenditure
- $d_h$  is household  $h$ 's vector of demographics
- $\tau_t$  are year and month dummies

# Household specific prices

- Food type  $j$  comprises  $N_j$  more disaggregate sub food types
- We follow Lewbel (1989) by assuming:
  - Preferences over food types are weakly homothetically separable
  - Within food type utility function is Cobb-Douglas
- Implies household  $h$  in period  $t$  faces price index for food type  $j$  given by:

$$p_{htj} = \frac{1}{k_j} \prod_{i=1}^{N_j} \left( \frac{p_{tij}}{w_{hij}} \right)^{w_{hij}}$$

- where:
  - $k_j$  is a scaling factor
  - $w_{hij}$  is household  $h$ 's (mean) food type  $j$  expenditure share on  $i$
  - $p_{tij}$  the period  $t$  price of product  $i$  belonging to food type  $j$

# Engel curves

- We trace out the relationship between expenditure shares and total food expenditure by holding the constant and prices at their mean levels and varying total expenditure:

$$\hat{w}_{htj}(\bar{d}, \bar{\tau}, \bar{p}, x_{ht} / \Gamma^D(p_{ht})) = \hat{\alpha}_{1j}^D + \hat{\alpha}_{2j}^D \bar{d} + \hat{\alpha}_{3j}^D \bar{\tau} + \sum_k \hat{\gamma}_{jk}^D \ln \bar{p}_k + \hat{\beta}_j^D \ln \left( \frac{x_{ht}}{\hat{\Gamma}^D(p_{ht})} \right) + \frac{\hat{\lambda}_j^D}{\hat{\Gamma}(\bar{p})} \left[ \ln \left( \frac{x_{ht}}{\hat{\Gamma}(p_{ht})} \right) \right]^2$$

- Denote the associated quantity  $\hat{q}_{htj}(\bar{d}, \bar{\tau}, \bar{p}, x_{ht} / \Gamma^D(p_{ht}))$
- And the quantity of nutrient  $n$  in household  $h$ 's period  $t$  bundle of food type  $j$ ,  $n_{htj}$
- The Engel curve for nutrient  $n$  is then:

$$n_{ht} = \sum_j \hat{q}_{htj}(\bar{d}, \bar{\tau}, \bar{p}, x_{ht} / \Gamma^D(p_{ht})) n_{htj}$$

# Decomposing 2008-09 income and price shocks

- We decompose the 2008-09 recession's impact on diet into the effect of falling real expenditure and of changes in relative prices
- Let  $T = \{0, 1\}$  denote pre 2008 and post 2008, then the change in households  $h$ 's expenditure share on food type  $j$  is given by:

$$\delta_{hj} = w_{hj}^1 - w_{hj}^0 = (\delta_{hj}^{Price} + \delta_{hj}^{Income} + \delta_{hj}^{Res})$$

- where:

$$\begin{aligned} \delta_{hj}^{Price} &= \left( \sum_k \hat{\gamma}_{jk}^D \ln p_{hk}^1 - \sum_k \hat{\gamma}_{jk}^D \ln p_{hk}^0 \right) \\ &+ \left( \frac{\hat{\lambda}_j^D}{\Pi^D(p_h^1)} \left[ \ln \left( \frac{x_h^0}{\Gamma^D(p_h^0)} \right) \right]^2 - \frac{\hat{\lambda}_j^D}{\Pi^D(p_h^0)} \left[ \ln \left( \frac{x_h^0}{\Gamma^D(p_h^0)} \right) \right]^2 \right) \\ \delta_{hj}^{Income} &= \left( \hat{\beta}_j^D \ln \left( \frac{x_h^1}{\Gamma^D(p_h^1)} \right) - \hat{\beta}_j^D \ln \left( \frac{x_h^0}{\Gamma^D(p_h^0)} \right) \right) \\ &+ \left( \frac{\hat{\lambda}_j^D}{\Pi^D(p_h^0)} \left[ \ln \left( \frac{x_h^1}{\Gamma^D(p_h^1)} \right) \right]^2 - \frac{\hat{\lambda}_j^D}{\Pi^D(p_h^0)} \left[ \ln \left( \frac{x_h^0}{\Gamma^D(p_h^0)} \right) \right]^2 \right) \end{aligned}$$



# Data

- Panel of households; includes all food purchased and brought into the home
- Data records individual transactions; includes prices, quantities and nutritional characteristics
- Our sample includes 3,050 UK households over the period 2006-2009; data are longitudinal and we observe all households during every month of 2007-2008
- Consider how a household allocates its total monthly food expenditure
- Currently use a household's mean monthly transaction price

[▶ Price graph](#)[▶ Real expenditure distribution](#)

# Demographic groups

	Number of household-months	Number of households	Percentage of households
<b>All households</b>	140,338	3,050	100.0%
<b>Family type</b>			
No kids	58,028	1,256	41.2%
Pensioners	47,228	1,031	33.8%
With kids	35,082	763	25.0%
<b>Social class</b>			
A and B	12,855	280	9.2%
C1 and C2	77,861	1,695	55.6%
D and E	49,622	1,075	35.2%
<b>BMI of main shopper</b>			
Normal (less than 25)	37,631	806	26.4%
Overweight (25 to 30)	31,773	681	22.3%
Obese (greater than 30)	15,551	335	11.0%
Not recorded	55,383	1,228	40.3%

# Food types

see Table 3.2

Food type	Calories per 100g	Share of	
		Expenditure	Calories
Fruits	60.4	9.0%	5.6%
Vegetable	52.9	11.1%	6.3%
Grains	261.9	8.8%	19.9%
Dairy	97.3	13.4%	13.3%
Meats	210.5	18.6%	12.4%
Oils	583.3	2.4%	7.8%
Sweeteners	377.1	1.5%	6.4%
Drinks	37.9	5.7%	1.9%
Prepared	214.3	31.5%	30.4%

▶ Nutritional Information

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## All households

VARIABLES	(1) w_Fruit	(2) w_Veg	(3) w_Grains	(4) w_Dairy
Logged real expenditure	0.0206*** (0.00337)	0.0600*** (0.00305)	-0.0317*** (0.00218)	-0.0568*** (0.00352)
Square of logged real expenditure	-0.00214*** (0.000407)	-0.00672*** (0.000368)	0.00179*** (0.000264)	0.00445*** (0.000424)
Constant	0.0950*** (0.00701)	0.0221*** (0.00634)	0.195*** (0.00455)	0.295*** (0.00731)
Demographics	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Relative prices	Yes	Yes	Yes	Yes

VARIABLES	(5) w_Meat	(6) w_Oils	(7) w_Sweeteners	(8) w_Drinks
Logged real expenditure	0.104*** (0.00498)	-0.00601*** (0.000988)	-0.00344*** (0.000750)	-0.0144*** (0.00254)
Square of logged real expenditure	-0.00890*** (0.000601)	0.000160 (0.000119)	0.000134 (9.07e-05)	0.00268*** (0.000307)
Constant	-0.145*** (0.0103)	0.0338*** (0.00206)	0.0184*** (0.00156)	0.0703*** (0.00526)
Demographics	Yes	Yes	Yes	Yes
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# Price elasticities

- Price elasticities for the model estimated across all households:

	Fruit	Veg	Grains	Dairy	Meats	Oils	Sweeteners	Drinks	Prepared
Fruit	<b>-0.80</b>	0.07	-0.09	-0.04	-0.00	-0.03	0.09	0.04	-0.05
Veg	0.08	<b>-0.68</b>	-0.11	-0.06	-0.01	-0.21	-0.06	-0.05	-0.05
Grains	-0.09	-0.09	<b>-0.50</b>	0.00	-0.10	-0.17	0.06	0.01	-0.01
Dairy	-0.05	-0.07	0.01	<b>-0.82</b>	-0.10	0.09	0.12	0.09	-0.00
Meats	-0.01	-0.01	-0.20	-0.12	<b>-0.52</b>	-0.16	-0.06	-0.16	-0.13
Oils	-0.01	-0.04	-0.05	0.00	-0.01	<b>-0.34</b>	-0.07	0.01	-0.01
Sweeteners	0.01	-0.01	-0.01	-0.00	0.01	-0.05	<b>-1.08</b>	0.03	-0.00
Drinks	0.02	-0.02	-0.00	0.03	-0.04	-0.02	0.04	<b>-0.89</b>	-0.01
Prepared	-0.18	-0.15	0.14	0.12	-0.35	0.10	0.14	-0.26	<b>-0.75</b>

*Notes: expenditure weighted mean elasticities.*

# Income elasticities

- Income elasticities for the model estimated across all households:

Food type	Income elasticity
Fruit	1.01
Veg	0.99
Grains	0.82
Dairy	0.87
Meats	1.13
Oils	0.79
Sweeteners	0.82
Drinks	1.18
Prepared	1.01

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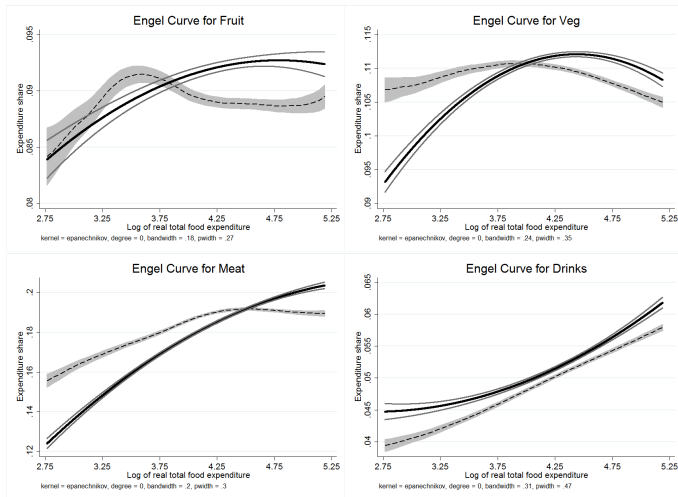
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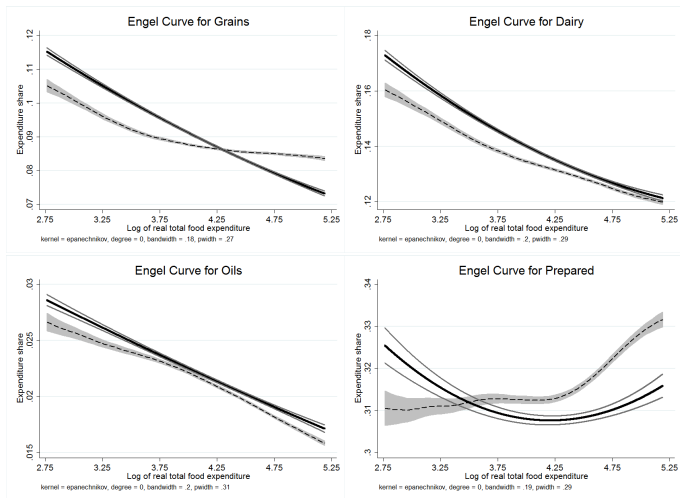
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# Food types: Luxuries



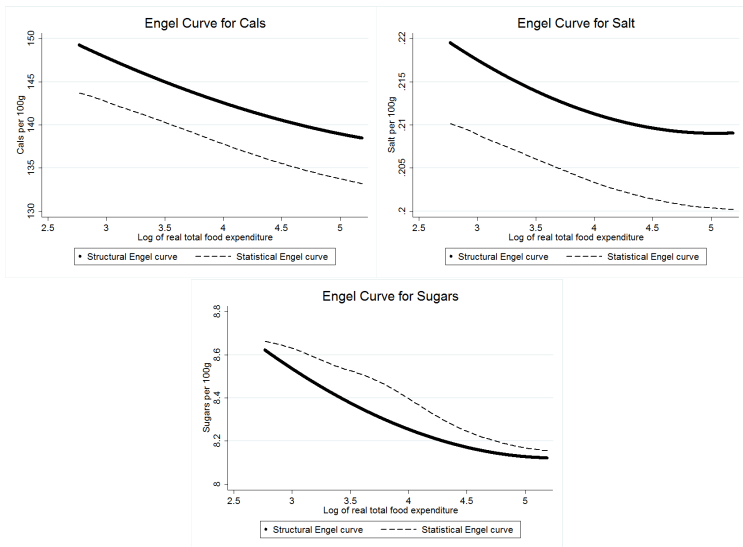
► Real expenditure distribution

# Food types: Necessities





# Calories, salt and sugar





# By demographic group

- For different food types:

▶ Graphs

- The Engel curves for households with kids are flatter than the other two family types; while those for pensioner are steeper.
- At all levels of income social classes A and B have higher expenditure shares on fruit and veg, and spend relatively less on prepared food

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[▶ Graphs](#)

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- At all levels of income social classes A and B have higher expenditure shares on fruit and veg, and spend relatively less on prepared food

- For the other nutrients:

[▶ Graphs](#)

- Households with kids purchase a much lower share of the total calories as protein
- Expenditure on salt falls with social class, as does the share of calories from fat

# Changes over the recession: real expenditure

Household type	Average % change in real expenditure on food
<b>All</b>	-2.06%
<b>Family type</b>	
Households without children	-2.22%
Pensioners	-3.12%
Households with children	-0.35%
<b>Social class</b>	
A and B	-1.11%
C1 and C2	-1.86%
D and E	-2.60%
<b>BMI of main shopper</b>	
Normal (less than 25)	-1.63%
Overweight (25-30)	-3.45%
Obese (30+)	-2.80%

► Price graph

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# Changes over the recession: relative prices

Food type	Average price in in 2006-2007	Average price in in 2008-9	Average % change
Fruit	1.37	1.57	16.44%
Veg	1.44	1.49	5.59%
Grains	1.55	1.79	16.94%
Dairy	1.26	1.58	27.90%
Meats	4.31	4.89	14.58%
Oils	2.33	2.74	20.93%
Sweeteners	1.37	1.88	38.84%
Drinks	1.70	2.00	32.26%
Prepared	3.13	3.37	9.10%

*Notes: Prices are £ per kg.*



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# Expenditure shares

	(1)	(2)	=	(3)	+	(4)	+	(5)
Food type	Expenditure share in 2006-7	Percentage point change to 2008-9		Change in share due to Price		Income		Residual
Fruit	9.37%	-0.84		0.02		-0.01		-0.86
Veg	10.83%	0.18		-0.20		-0.01		0.40
Grains	8.63%	0.39		0.09		0.06		0.24
Dairy	13.04%	0.62		0.17		0.07		0.38
Meats	18.58%	-0.20		0.17		-0.10		-0.27
Oils	2.02%	0.18		0.11		0.02		0.06
Sweeteners	0.86%	-0.01		0.01		0.01		-0.02
Drinks	4.84%	0.22		0.08		-0.03		0.16
Prepared	31.83%	-0.53		-0.45		0.01		-0.09

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Oils	2.02%	0.18		0.11		0.02		0.06
Sweeteners	0.86%	-0.01		0.01		0.01		-0.02
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Dairy	13.04%	0.62		0.17	<b>0.07</b>	0.38		
Meats	18.58%	-0.20		0.17	<b>-0.10</b>	-0.27		
Oils	2.02%	0.18		0.11	<b>0.02</b>	0.06		
Sweeteners	0.86%	-0.01		0.01	<b>0.01</b>	-0.02		
Drinks	4.84%	0.22		0.08	<b>-0.03</b>	0.16		
Prepared	31.83%	-0.53		-0.45	<b>0.01</b>	-0.09		

# Expenditure shares

	(1)	(2)	=	(3)	+	(4)	+	(5)
Food type	Expenditure share in 2006-7	Percentage point change to 2008-9		Price		Income		Residual
Fruit	9.37%	-0.84		0.02		<b>-0.01</b>		-0.86
Veg	10.83%	0.18		-0.20		<b>-0.01</b>		0.40
Grains	8.63%	0.39		0.09		<b>0.06</b>		0.24
Dairy	13.04%	0.62		0.17		<b>0.07</b>		0.38
Meats	18.58%	-0.20		0.17		<b>-0.10</b>		-0.27
Oils	2.02%	0.18		0.11		<b>0.02</b>		0.06
Sweeteners	0.86%	-0.01		0.01		<b>0.01</b>		-0.02
Drinks	4.84%	0.22		0.08		<b>-0.03</b>		0.16
Prepared	31.83%	-0.53		-0.45		<b>0.01</b>		-0.09

# Calorie allocation across food types

	(1)	(2)	(3)	(2) = (4)	+	(5)	+	(6)
Food type	Calories in 2006-7	Change to 2008-9	Fixed fall	Allowing reallocation due to Price	Income	Residual		
Fruit	129.2	-17.5	-3.9	-8.7	-10.9	2.2		
Veg	127.3	7.1	-3.7	10.2	-1.2	-1.9		
Grains	423.3	-4.7	-11.6	2.7	-1.4	-6.0		
Dairy	305.4	-16.5	-8.9	-7.4	2.7	-11.8		
Meats	282.2	-15.8	-8.7	1.5	-7.3	-9.9		
Oils	157.8	-0.5	-4.4	3.7	0.0	-4.2		
Sweeteners	76.1	-9.9	-1.8	-9.2	-3.4	2.7		
Drinks	38.6	-0.9	-1.3	-0.1	-0.7	-0.2		
Prepared	663.0	-11.5	-19.9	12.5	-20.2	-3.8		
Total	2202.1	-70.1	-64.3	5.3	-42.3	-33.1		

# Calorie allocation across food types

	(1)	(2)	(3)	(2) = (4)	+	(5)	+	(6)
Food type	Calories in 2006-7	Change to 2008-9	Fixed fall	Allowing reallocation due to Price	Income	Residual		
Fruit	129.2	-17.5	-3.9	-8.7	-10.9	2.2		
Veg	127.3	7.1	-3.7	10.2	-1.2	-1.9		
Grains	423.3	-4.7	-11.6	2.7	-1.4	-6.0		
Dairy	305.4	-16.5	-8.9	-7.4	2.7	-11.8		
Meats	282.2	-15.8	-8.7	1.5	-7.3	-9.9		
Oils	157.8	-0.5	-4.4	3.7	0.0	-4.2		
Sweeteners	76.1	-9.9	-1.8	-9.2	-3.4	2.7		
Drinks	38.6	-0.9	-1.3	-0.1	-0.7	-0.2		
Prepared	663.0	-11.5	-19.9	12.5	-20.2	-3.8		
<b>Total</b>	<b>2202.1</b>	<b>-70.1</b>	<b>-64.3</b>	<b>5.3</b>	<b>-42.3</b>	<b>-33.1</b>		



# Calorie allocation across food types

	(1)	(2)	(3)	(2) = (4)	+	(5)	+	(6)
Food type	Calories in 2006-7	Change to 2008-9	<b>Fixed fall</b>	<b>Allowing reallocation due to</b>				
				Price	<b>Income</b>	Residual		
Fruit	129.2	-17.5	<b>-3.9</b>	-8.7	<b>-10.9</b>	2.2		
Veg	127.3	7.1	<b>-3.7</b>	10.2	<b>-1.2</b>	-1.9		
Grains	423.3	-4.7	<b>-11.6</b>	2.7	<b>-1.4</b>	-6.0		
Dairy	305.4	-16.5	<b>-8.9</b>	-7.4	<b>2.7</b>	-11.8		
Meats	282.2	-15.8	<b>-8.7</b>	1.5	<b>-7.3</b>	-9.9		
Oils	157.8	-0.5	<b>-4.4</b>	3.7	<b>0.0</b>	-4.2		
Sweeteners	76.1	-9.9	<b>-1.8</b>	-9.2	<b>-3.4</b>	2.7		
Drinks	38.6	-0.9	<b>-1.3</b>	-0.1	<b>-0.7</b>	-0.2		
Prepared	663.0	-11.5	<b>-19.9</b>	12.5	<b>-20.2</b>	-3.8		
<b>Total</b>	<b>2202.1</b>	<b>-70.1</b>	<b>-64.3</b>	<b>5.3</b>	<b>-42.3</b>	<b>-33.1</b>		

# Calorie allocation across food types

	(1)	(2)	(3)	(2) = (4)	+	(5)	+	(6)	(7)
Food type	Calories in 2006-7	Change to 2008-9	<b>Fixed fall</b>	<b>Allowing reallocation due to</b>				<b>(5)-(3) Diff</b>	
				Price	<b>Income</b>	Residual			
Fruit	129.2	-17.5	<b>-3.9</b>	-8.7	<b>-10.9</b>	2.2		<b>7.0</b>	
Veg	127.3	7.1	<b>-3.7</b>	10.2	<b>-1.2</b>	-1.9		<b>2.5</b>	
Grains	423.3	-4.7	<b>-11.6</b>	2.7	<b>-1.4</b>	-6.0		<b>10.2</b>	
Dairy	305.4	-16.5	<b>-8.9</b>	-7.4	<b>2.7</b>	-11.8		<b>11.6</b>	
Meats	282.2	-15.8	<b>-8.7</b>	1.5	<b>-7.3</b>	-9.9		<b>1.4</b>	
Oils	157.8	-0.5	<b>-4.4</b>	3.7	<b>0.0</b>	-4.2		<b>-4.4</b>	
Sweeteners	76.1	-9.9	<b>-1.8</b>	-9.2	<b>-3.4</b>	2.7		<b>-1.6</b>	
Drinks	38.6	-0.9	<b>-1.3</b>	-0.1	<b>-0.7</b>	-0.2		<b>0.6</b>	
Prepared	663.0	-11.5	<b>-19.9</b>	12.5	<b>-20.2</b>	-3.8		<b>-0.3</b>	
<b>Total</b>	<b>2202.1</b>	<b>-70.1</b>	<b>-64.3</b>	<b>5.3</b>	<b>-42.3</b>	<b>-33.1</b>		<b>22.0</b>	

# Purchase of calories by demographic group

	(1)	(2)	(3)	(2) = (4)	+	(5)	+	(6)
Food type	Calories in 2006-7	Change to 2008-9	Fixed fall	Allowing Price	reallocation	due to Income	Residual	
<b>All</b>	2202.1	-70.1	-64.3	5.3	-42.3	-33.1		
<b>Family type</b>								
No kids	2144.1	-67.0	-66.4	5.6	-46.7	-25.9		
Pensioners	2338.9	-108.1	-91.0	5.8	-63.6	-50.3		
With kids	2112.8	-23.8	-24.8	-2.8	-8.3	-12.6		
<b>Social class</b>								
A and B	2102.9	-39.8	-40.1	6.9	-16.4	-30.3		
C1 and C2	2180.6	-62.7	-60.0	5.9	-36.8	-31.8		
D and E	2261.9	-89.5	-77.4	3.5	-58.0	-35.0		
<b>BMI group</b>								
Normal	2138.8	-54.2	-50.7	8.1	-27.8	-34.6		
Overweight	2199.5	-99.7	-93.5	2.3	-67.3	-34.6		
Obese	2314.1	-94.7	-87.3	1.0	-69.4	-26.3		

# Purchase of calories by demographic group

	(1)	(2)	(3)	(2) = (4)	+	(5)	+	(6)
Food type	Calories in 2006-7	Change to 2008-9	<b>Fixed fall</b>	<b>Allowing reallocation due to Price</b>	<b>Income</b>	Residual		
<b>All</b>	2202.1	-70.1	<b>-64.3</b>	5.3	<b>-42.3</b>	-33.1		
<b>Family type</b>								
No kids	2144.1	-67.0	<b>-66.4</b>	5.6	<b>-46.7</b>	-25.9		
Pensioners	2338.9	-108.1	<b>-91.0</b>	5.8	<b>-63.6</b>	-50.3		
With kids	2112.8	-23.8	<b>-24.8</b>	-2.8	<b>-8.3</b>	-12.6		
<b>Social class</b>								
A and B	2102.9	-39.8	<b>-40.1</b>	6.9	<b>-16.4</b>	-30.3		
C1 and C2	2180.6	-62.7	<b>-60.0</b>	5.9	<b>-36.8</b>	-31.8		
D and E	2261.9	-89.5	<b>-77.4</b>	3.5	<b>-58.0</b>	-35.0		
<b>BMI group</b>								
Normal	2138.8	-54.2	<b>-50.7</b>	8.1	<b>-27.8</b>	-34.6		
Overweight	2199.5	-99.7	<b>-93.5</b>	2.3	<b>-67.3</b>	-34.6		
Obese	2314.1	-94.7	<b>-87.3</b>	1.0	<b>-69.4</b>	-26.3		

# Purchase of calories by demographic group

	(1)	(2)	(3)	(2) = (4)	+	(5)	+	(6)	(7)
Food type	Calories in 2006-7	Change to 2008-9	<b>Fixed fall</b>	<b>Allowing</b>	<b>Price</b>	<b>Income</b>	<b>Residual</b>	<b>(5)-(3)</b>	<b>Diff</b>
<b>All</b>	2202.1	-70.1	<b>-64.3</b>	5.3	<b>-42.3</b>	-33.1		<b>22.0</b>	
<b>Family type</b>									
No kids	2144.1	-67.0	<b>-66.4</b>	5.6	<b>-46.7</b>	-25.9		<b>19.7</b>	
Pensioners	2338.9	-108.1	<b>-91.0</b>	5.8	<b>-63.6</b>	-50.3		<b>27.4</b>	
With kids	2112.8	-23.8	<b>-24.8</b>	-2.8	<b>-8.3</b>	-12.6		<b>16.5</b>	
<b>Social class</b>									
A and B	2102.9	-39.8	<b>-40.1</b>	6.9	<b>-16.4</b>	-30.3		<b>23.7</b>	
C1 and C2	2180.6	-62.7	<b>-60.0</b>	5.9	<b>-36.8</b>	-31.8		<b>23.2</b>	
D and E	2261.9	-89.5	<b>-77.4</b>	3.5	<b>-58.0</b>	-35.0		<b>19.4</b>	
<b>BMI group</b>									
Normal	2138.8	-54.2	<b>-50.7</b>	8.1	<b>-27.8</b>	-34.6		<b>22.9</b>	
Overweight	2199.5	-99.7	<b>-93.5</b>	2.3	<b>-67.3</b>	-34.6		<b>26.2</b>	
Obese	2314.1	-94.7	<b>-87.3</b>	1.0	<b>-69.4</b>	-26.3		<b>17.9</b>	

# Purchase of nutrients for all households

	(1)	(2)	(3)	(4)	(3) = (5)	+	(6)	+	(7)
Nutrient type	per adult per day in 2006-7	per adult per day in 2008-9	% change	Fixed fall	Allowing reallocation due to Price	Income	Residual		
Calories	2202.1	2132.1	-3.2%	-2.9%	0.2%	-1.9%	-1.5%		
Salt (g)	3.2	3.1	-2.7%	-2.9%	2.4%	-0.0%	-5.1%		
Sugar (g)	134.9	127.5	-5.5%	-2.9%	-2.5%	-4.0%	0.9%		
Fibre (g)	20.5	20.1	-1.6%	-2.9%	1.7%	-2.1%	-1.2%		
Protein (g)	85.1	82.3	-3.3%	-2.9%	-0.1%	-2.2%	-1.0%		
Fats (g)	90.8	88.2	-3.0%	-2.9%	1.4%	-1.0%	-3.4%		
Carbs (g)	278.5	269.2	-3.3%	-2.9%	-0.5%	-2.6%	-0.2%		

▶ Nutritional Information

# Purchase of nutrients for all households

	(1)	(2)	(3)	(4)	(3) = (5)	+	(6)	+	(7)
Nutrient type	per adult per day in 2006-7	per adult per day in 2008-9	% change	Fixed fall	Allowing reallocation due to Price		Income		Residual
Calories	2202.1	2132.1	-3.2%	-2.9%	0.2%		-1.9%		-1.5%
Salt (g)	3.2	3.1	-2.7%	-2.9%	2.4%		-0.0%		-5.1%
Sugar (g)	134.9	127.5	-5.5%	-2.9%	-2.5%		-4.0%		0.9%
Fibre (g)	20.5	20.1	-1.6%	-2.9%	1.7%		-2.1%		-1.2%
Protein (g)	85.1	82.3	-3.3%	-2.9%	-0.1%		-2.2%		-1.0%
Fats (g)	90.8	88.2	-3.0%	-2.9%	1.4%		-1.0%		-3.4%
Carbs (g)	278.5	269.2	-3.3%	-2.9%	-0.5%		-2.6%		-0.2%

▶ Nutritional Information

# Purchase of nutrients for all households

	(1)	(2)	(3)	(4)	(3) = (5)	+	(6)	+	(7)
Nutrient type	per adult per day in 2006-7	per adult per day in 2008-9	% change	Fixed fall	Allowing reallocation due to Price	Income	Residual		
Calories	2202.1	2132.1	-3.2%	-2.9%	0.2%	-1.9%	-1.5%		
Salt (g)	3.2	3.1	-2.7%	-2.9%	2.4%	-0.0%	-5.1%		
Sugar (g)	134.9	127.5	<b>-5.5%</b>	-2.9%	<b>-2.5%</b>	<b>-4.0%</b>	0.9%		
Fibre (g)	20.5	20.1	-1.6%	-2.9%	1.7%	-2.1%	-1.2%		
Protein (g)	85.1	82.3	-3.3%	-2.9%	-0.1%	-2.2%	-1.0%		
Fats (g)	90.8	88.2	-3.0%	-2.9%	1.4%	-1.0%	-3.4%		
Carbs (g)	278.5	269.2	-3.3%	-2.9%	-0.5%	-2.6%	-0.2%		

▶ Nutritional Information



# Purchase of nutrients for all households

	(1)	(2)	(3)	(4)	(3) = (5)	+	(6)	+	(7)
Nutrient type	per adult per day in 2006-7	per adult per day in 2008-9	% change	Fixed fall	Allowing reallocation due to Price	Income	Residual		
Calories	2202.1	2132.1	-3.2%	-2.9%	0.2%	-1.9%	-1.5%		
Salt (g)	3.2	3.1	-2.7%	-2.9%	2.4%	-0.0%	-5.1%		
Sugar (g)	134.9	127.5	-5.5%	-2.9%	-2.5%	-4.0%	0.9%		
Fibre (g)	20.5	20.1	-1.6%	-2.9%	1.7%	-2.1%	-1.2%		
Protein (g)	85.1	82.3	-3.3%	-2.9%	-0.1%	-2.2%	-1.0%		
Fats (g)	90.8	88.2	-3.0%	-2.9%	1.4%	-1.0%	-3.4%		
Carbs (g)	278.5	269.2	-3.3%	-2.9%	-0.5%	-2.6%	-0.2%		

▶ Nutritional Information

# Purchase of nutrients for all households

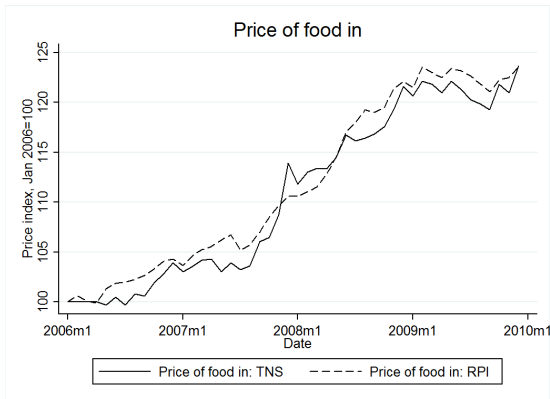
	(1)	(2)	(3)	(4)	(3) = (5)	+	(6)	+	(7)
Nutrient type	per adult per day in 2006-7	per adult per day in 2008-9	% change	Fixed fall	Allowing reallocation due to Price		Income		Residual
Calories	2202.1	2132.1	-3.2%	-2.9%	0.2%		-1.9%		-1.5%
Salt (g)	3.2	3.1	-2.7%	-2.9%	2.4%		-0.0%		-5.1%
Sugar (g)	134.9	127.5	-5.5%	-2.9%	-2.5%		-4.0%		0.9%
Fibre (g)	20.5	20.1	-1.6%	-2.9%	1.7%		-2.1%		-1.2%
Protein (g)	85.1	82.3	-3.3%	-2.9%	-0.1%		-2.2%		-1.0%
Fats (g)	90.8	88.2	-3.0%	-2.9%	1.4%		-1.0%		-3.4%
Carbs (g)	278.5	269.2	-3.3%	-2.9%	-0.5%		-2.6%		-0.2%

▶ Nutritional Information

# What next?

- Use model to conduct ex ante policy evaluation
  - What would be the effect of a policy which increases/decreases the food expenditure of some groups by a given amount
- Currently assume within food type preferences are homothetic
  - But we have estimated Engel curves for different types of meats and they show evidence that preferences with meat are not homothetic
  - We could allow for more than 9 food types, but then we would have many more zeros in data
- Instrument for total food expenditure?
  - We control for demographics and demographic specific time effects
  - Possibly could include household fixed effects
- Combining data with EFS to allow for incorporation of food in vs. food out choice in model

# Price of food

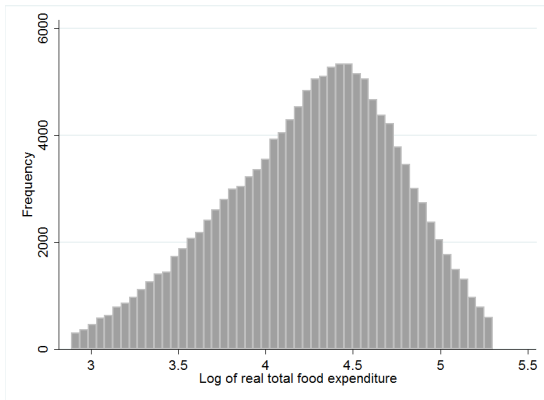


Notes: Price of food consumed in the home from the RPI.

◀ Back: Data

◀ Back: Changes over recession

# Distribution of logged real expenditure

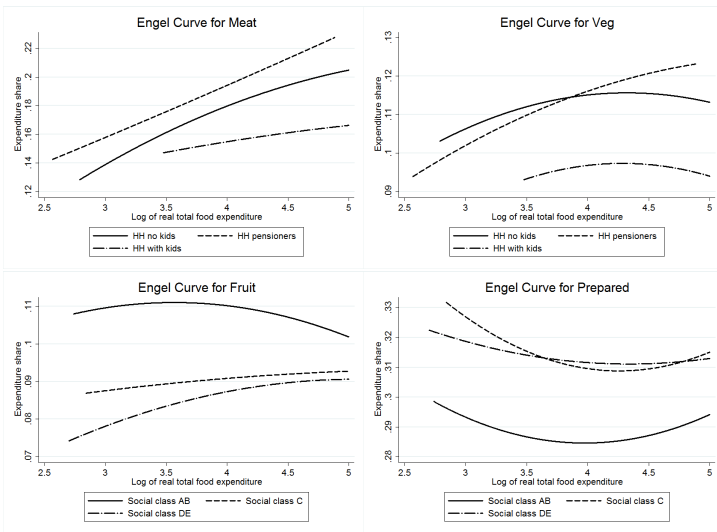


*Notes: Distribution of household-months. Truncated at the 1<sup>st</sup> and 99<sup>th</sup> percentiles.*

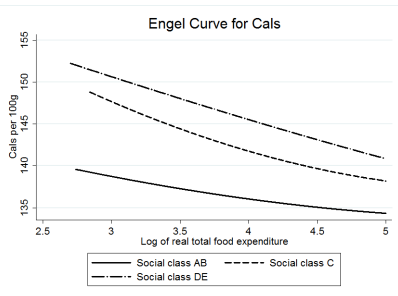
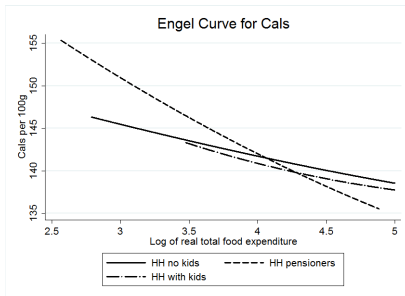
◀ Back: Data

◀ Back: Engel curves

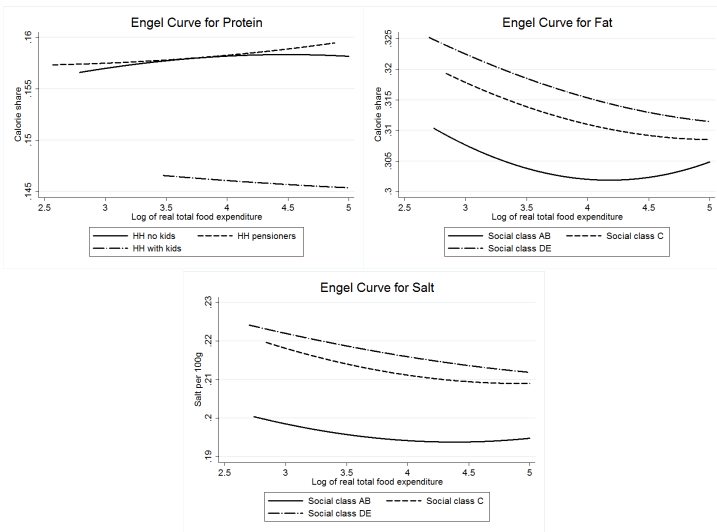
# Engel curves for different food types



# Engel curves for calories


[← Back](#)

# Engel curves for other nutrients





# Nutritional content

see Table 3.2

Food type	Calories	per 100g			Calorie share		
		Salt	Sugar	Fibre	Protein	Fat	Carbs
Fruits	60.4	0.02	13.14	1.14	6%	5%	90%
Vegetables	52.9	0.04	2.95	1.85	17%	14%	69%
Grains	261.9	0.39	6.18	4.14	14%	11%	74%
Dairy	97.3	0.13	5.88	0.13	24%	48%	28%
Meats	210.5	0.39	0.85	0.62	38%	56%	6%
Oils	583.3	0.53	0.54	0.08	0%	99%	1%
Sweeteners	377.1	0.14	71.51	0.09	1%	0%	99%
Drinks	37.9	0.05	6.28	0.30	8%	6%	86%
Prepared	214.3	0.40	13.61	1.53	12%	41%	47%

[← Back: Food types](#)

[← Back: Decomposition](#)