

# Microeconomic Analysis of Prices, Food and Nutrition

Rachel Griffith, Martin O'Connell and Kate Smith

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- Large and long-term research project
- Motivated by the rise in diet related disease in developed countries
- How might food markets fail to deliver optimal outcome?
- What impact of policy interventions targeted at changing eating habits?

# What role for policy intervention

- *information and cognitive failures*: individual may not have complete information, or may fail to process information
- *externalities*: some costs may accrue to others, not to individual taking the consumption decision
- *liquidity/poverty*: some households may not be able to afford a nutritious diet
- *market power of firms*: incentives and behaviour in pricing and advertising

# Broad research agenda

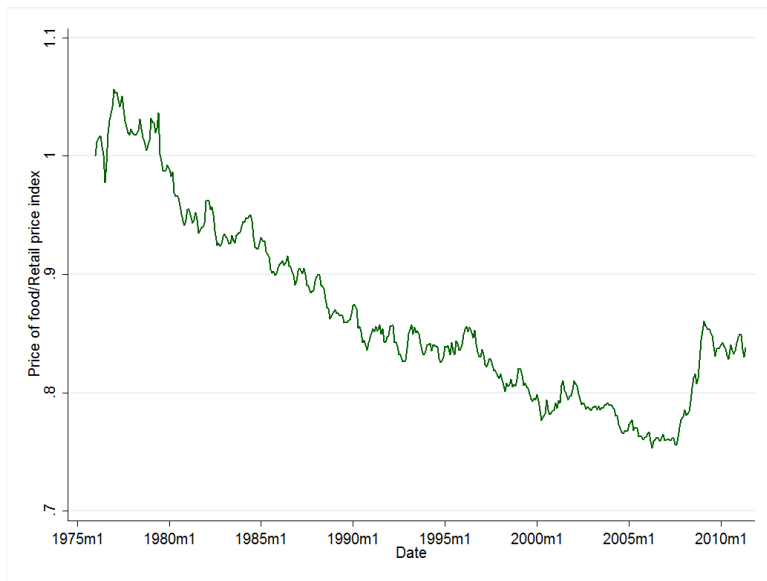
- the impact on nutritional quality of foods purchased of:
  - food prices
  - advertising
  - innovation in the food market
- how the prices of complementary goods (time, food preparation technology) affect nutritional outcomes
- the relative important of food consumption versus activity and burning calories
- what will be effect of specific policies?
  - information campaigns, taxes, regulation
  - income transfers, social welfare programmes
  - do they target market failures?
  - will they effect health outcomes, what other welfare considerations?
  - how might firms respond?

# Specific current projects

- Evaluate the impact of the 5-a-day campaign, allowing for firm pricing and advertising response
- Simulate the impact of nutrition based taxes in specific markets (saturated fat in butter/margarine, sugar in soda)
- Describe and model variation in food purchasing behaviour in UK, US and France
- Describe and model long term trends in food purchasing and activity levels in the UK
- Estimate the impact of income transfers on nutritional quality of foods purchased
- Estimate trade offs between time and income and the impact on nutrition in households with children
- Methodological advances in specifying and estimating models of demand for foods and nutrition

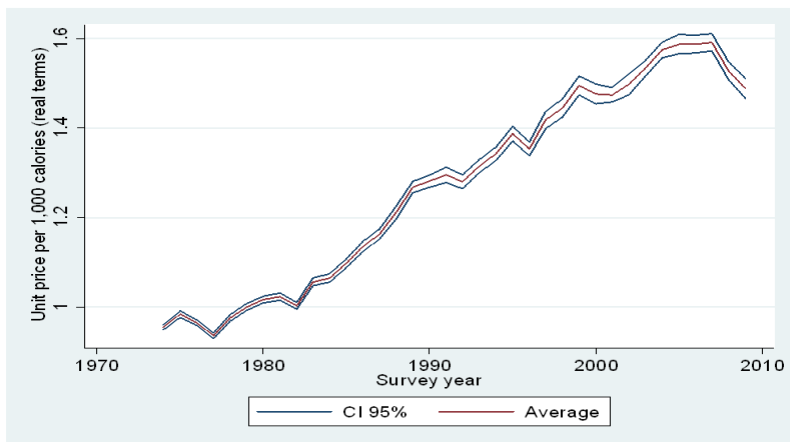
- When evaluating taxes, information, regulation, income transfers
- Need to consider impact in presence of oligopolistic behaviour
  - by supermarkets
  - by food manufacturers
  - vertical relations between retails and manufacturers
- and in presence of consumer behaviour
  - what impact on different types of consumers
  - how well target market failures

# Long run trends in food prices



# Changes in composition of foods purchased

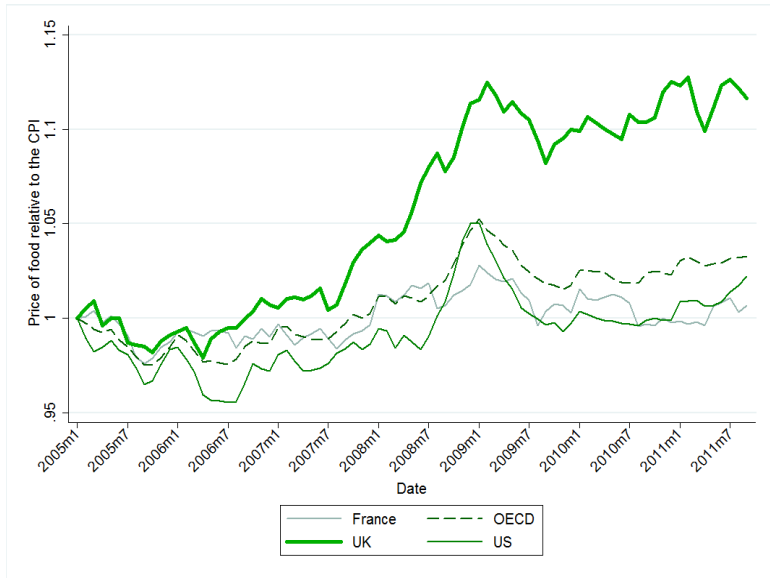
“Unit price” of 1000 calories in real £



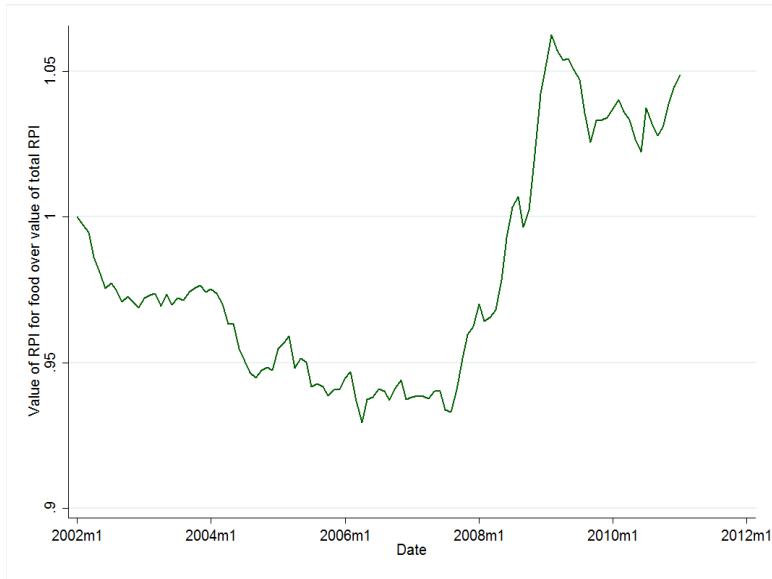
Source: Griffith, Lluberas and Luhrmann (2011), using data from the National Food Survey (NFS), 1974-2000, Expenditure and Food Survey (EFS), 2001-2008 and Living Costs and Food Survey 2009.



# International comparison of food prices



# Large increase in UK food prices from 2007 to 2009



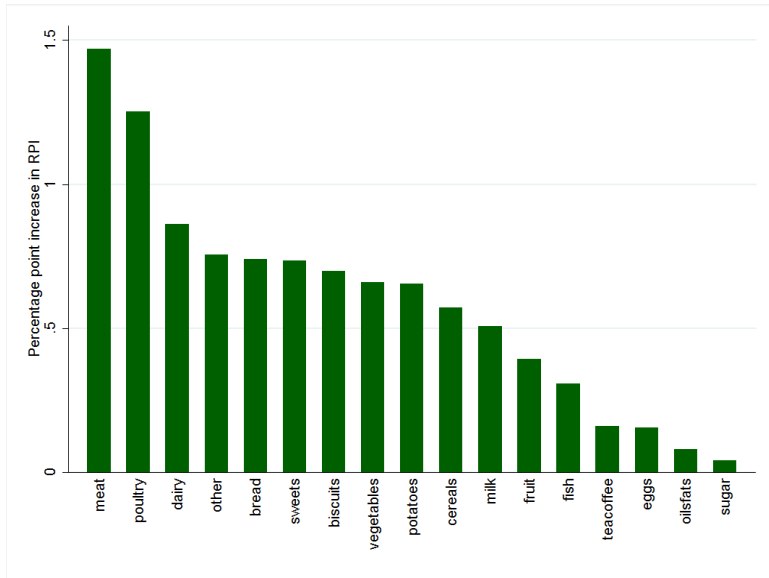
# Contribution to 2007-08 price increase by food category

Food category	% price increase	RPI weight	% point contribution
Meat	18.1	8.1	1.47
Poultry			
Dairy			
Other			
Bread			
Sweets			
Biscuits			
Vegetables			
Potatoes			
Cereals			
Milk			
Fruit			
Fish			
Tea/coffee			
Eggs			
Oils/fats			
Sugar			
Total			

# Contribution to 2007-08 price increase by food category

Food category	% price increase	RPI weight	% point contribution
Meat	18.1	8.1	1.47
Poultry	12.6	9.9	1.25
Dairy	11.9	7.2	0.86
Other	3.8	19.8	0.76
Bread	16.5	4.5	0.74
Sweets	8.4	9.0	0.73
Biscuits	12.9	5.4	0.70
Vegetables	8.1	8.1	0.66
Potatoes	14.5	4.5	0.65
Cereals	15.8	3.6	0.57
Milk	11.3	4.5	0.51
Fruit	5.5	7.2	0.39
Fish	8.5	3.6	0.31
Tea/coffee	9.0	1.8	0.16
Eggs	17.1	0.9	0.15
Oils/fats	8.7	0.9	0.08
Sugar	4.7	0.9	0.04
<b>Total</b>		<b>100.0</b>	<b>10.04</b>

# % point contribution to food price increase



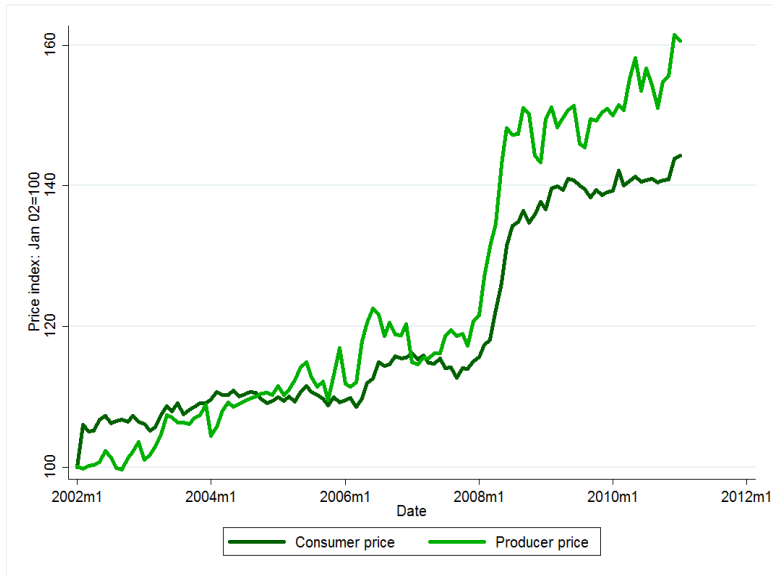
# Producer prices and consumer prices

- Producer price of food category will be significant cost input to corresponding good sold in supermarket
- Competition Commission (2001) states supermarket costs comprise
  - 83% cost of resale
  - 17% operating costs, made up of
    - 9% staff costs
    - 5% other operating costs
    - 3% capital costs
- We are interested in the factors driving consumer prices

# Bread

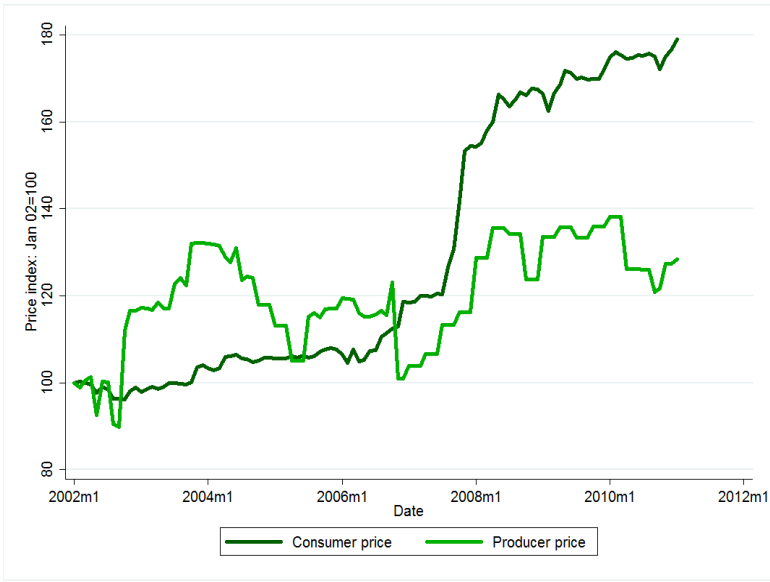


# Meat





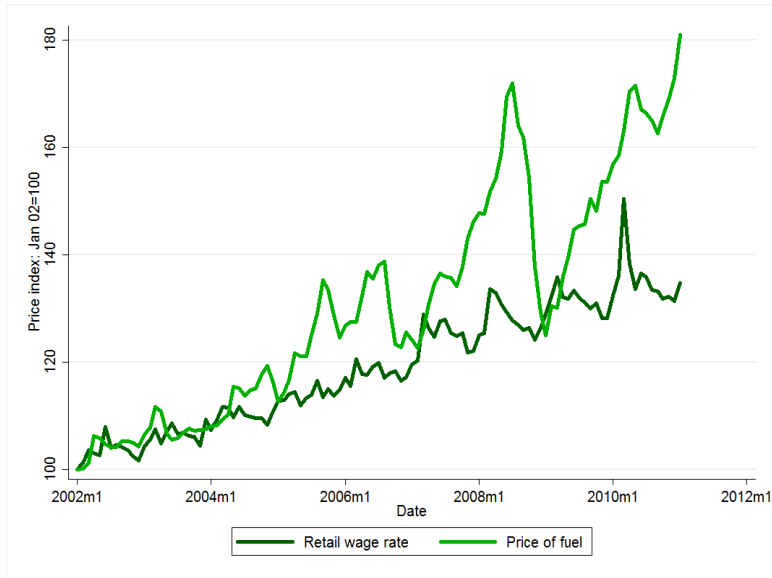
# Eggs



# Price regressions

- To quantify the relationship between consumer and producer prices, for each food category we estimate the regression
- $\Delta(\ln p_t^c) = \beta_0 + \sum_{k=0}^3 \beta_{k+1} \Delta(\ln p_{t-k}^p) + \gamma_1 \Delta(\ln w_t) + \gamma_2 \Delta(\ln f_t) + \sum_{q=1}^3 \delta_q D_q + \epsilon_t$
- where:
  - $p_t^c$  = consumer price at time t
  - $p_t^p$  = producer price at time t
  - $w_t$  = retail wage rate at time t
  - $f_t$  = fuel price at time t
  - $D_q = 1$  for quarter q
- $\sum_{k=0}^3 \beta_{k+1}$  = overall % change in consumer prices from 1% increase in producer prices

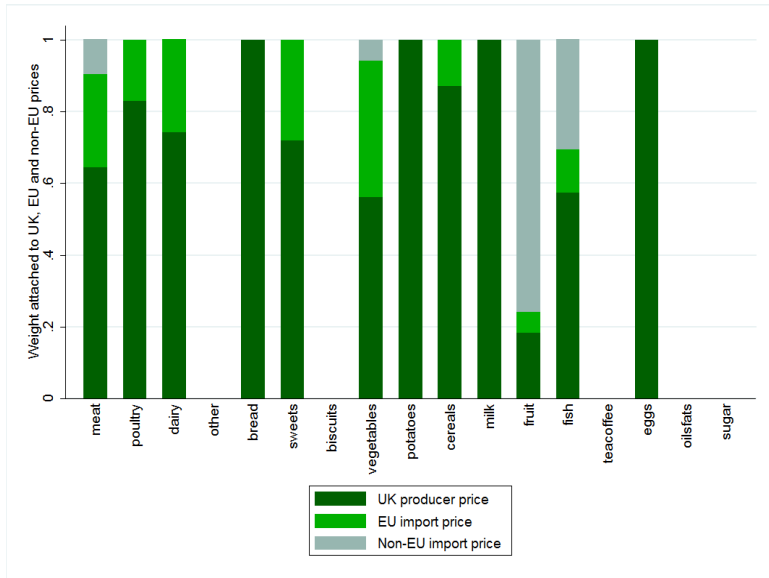
# Changes in retail wages and fuel costs



# Producer price index

- We use a producer price index that incorporates domestic and imported producer prices
- Share of imports varies by category

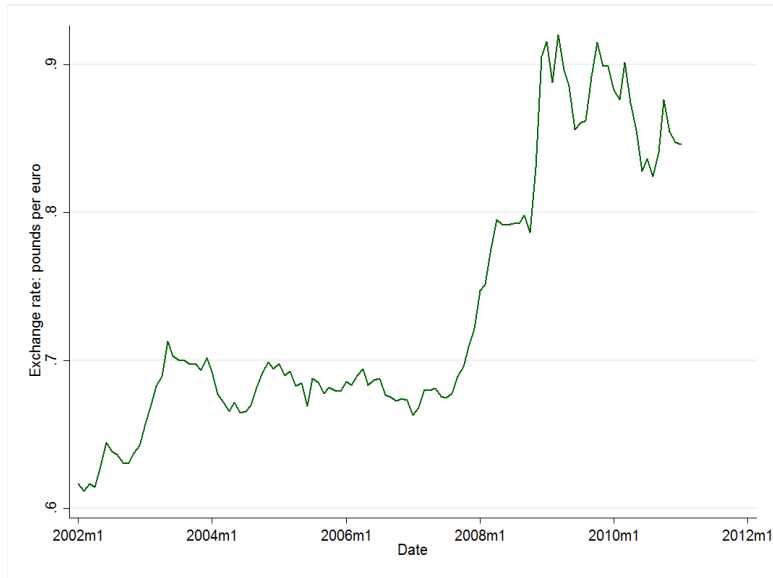
# Share of imports



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- Exchange rate fluctuations will affect producer price index through
  - Changes in imported producer price
  - Changes in domestic producer price through imported intermediaries and competition effects

# Large depreciation in value of £ in 2008



# Producer price index

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- Share of imports varies by category
- Exchange rate fluctuations will affect producer price index through
  - Changes in imported producer price
  - Changes in domestic producer price through imported intermediaries and competition effects
- Producer prices will also incorporate recent commodity price increases



# Some regression results

VARIABLES	(1) Bread	(2) Meat	(3) Eggs
$\Delta(\ln p_t^p)$	0.617*** (0.167)	0.180*** (0.0476)	0.0408 (0.0394)
$\Delta(\ln p_{t-1}^p)$	0.292* (0.168)	0.156*** (0.0473)	0.0133 (0.0394)
$\Delta(\ln p_{t-2}^p)$	-0.0723 (0.172)	0.168*** (0.0472)	0.0458 (0.0402)
$\Delta(\ln p_{t-3}^p)$	0.234 (0.173)	0.0713 (0.0473)	0.0146 (0.0391)
$\Delta(\ln w_t)$	-0.0148 (0.0493)	-0.0608 (0.0445)	0.0330 (0.0850)
$\Delta(\ln f_t)$	0.0526 (0.0389)	-0.0267 (0.0339)	0.0601 (0.0659)
Quarter dummies	Yes	Yes	Yes
Constant	0.00418* (0.00212)	0.000710 (0.00170)	0.0125*** (0.00325)
Producer price elasticity	1.0709*** (0.2493)	0.5742*** (0.0968)	0.1145 (0.0918)
Observations	105	105	105
R-squared	0.266	0.347	0.104

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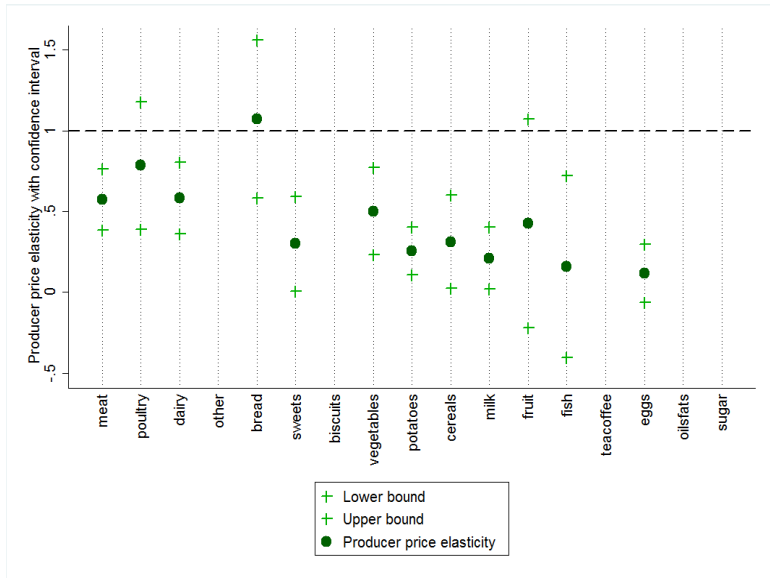
# Regression result for all categories

Food category	Producer price elasticity	R-squared	p-value Elasticity=0	p-value Elasticity=1
Meat	0.574	0.347	0.000***	0.000***
Poultry				
Dairy				
Other				
Bread				
Sweets				
Biscuits				
Vegetables				
Potatoes				
Cereals				
Milk				
Fruit				
Fish				
Tea/coffee				
Eggs				
Oils/fats				
Sugar				

# Regression result for all categories

Food category	Producer price elasticity	R-squared	p-value Elasticity=0	p-value Elasticity=1
Meat	0.574	0.347	0.000***	0.000***
Poultry	0.784	0.310	0.000***	0.284
Dairy	0.584	0.300	0.000***	0.000***
Other	.	.	.	.
Bread	1.071	0.266	0.000***	0.777
Sweets	0.300	0.138	0.048**	0.000***
Biscuits	.	.	.	.
Vegetables	0.501	0.297	0.000***	0.000***
Potatoes	0.255	0.313	0.001***	0.000***
Cereals	0.312	0.097	0.036**	0.000***
Milk	0.211	0.088	0.033**	0.000***
Fruit	0.425	0.308	0.201	0.085*
Fish	0.158	0.087	0.586	0.004***
Tea/coffee	.	.	.	.
Eggs	0.115	0.104	0.215	0.000***
Oils/fats	.	.	.	.
Sugar	.	.	.	.

# Producer price elasticity



# How much of consumer price spike is attributable to producer price increases?

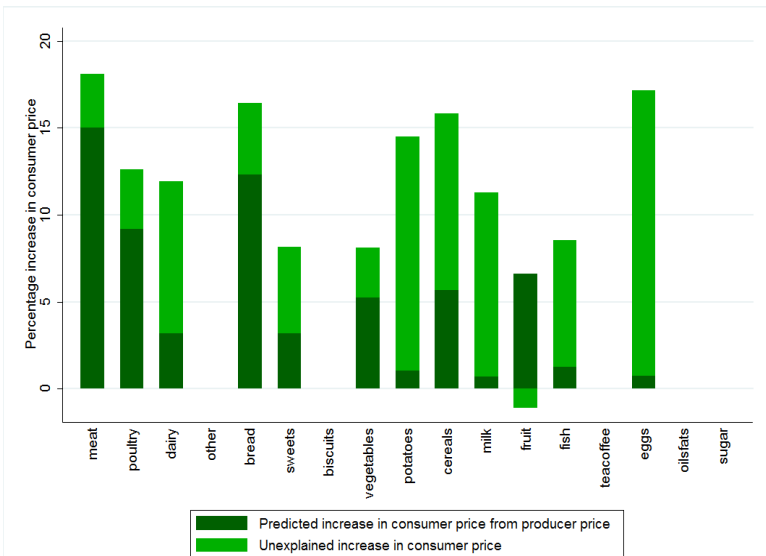
Food category	% producer price increase	Producer price elasticity	Predicted % consumer price increase	Actual % consumer price increase
Meat	26.1	0.574	15.0	18.1
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Poultry	11.7	0.784	9.2	12.6
Dairy	5.4	0.584	3.2	11.9
Other	.	.	.	.
Bread	11.5	1.071	12.3	16.5
Sweets	10.5	0.300	3.2	8.4
Biscuits	.	.	.	.
Vegetables	10.5	0.501	5.3	8.1
Potatoes	4.0	0.255	1.0	14.5
Cereals	18.1	0.312	5.7	15.8
Milk	3.2	0.211	0.7	11.3
Fruit	15.6	0.425	6.6	5.5
Fish	7.9	0.158	1.2	8.5
Tea/coffee	.	.	.	.
Eggs	6.5	0.115	0.7	17.1
Oils/fats	.	.	.	.
Sugar	.	.	.	.



# How much of consumer price spike is attributable to producer price increases



# Summary of work on food price rise

- Very preliminary descriptive look at data
- Suggests increase in producer prices (which reflect exchange rate and commodity price movements) only tells part of food price spike story
- A lot left unexplained and variation across industries
- May reflect:
  - Differences in vertical relations
  - Differences in downstream competition
  - Unmeasured changes in other costs, etc.
- We are exploring whether and how more disaggregate data might be useful to look at these issues

- Our objectives are to better understand how interventions in food markets are likely to affect nutrition outcomes, and what other consequences they might have
- In order to do this we need to model behaviour of firms and consumers in food markets
- Understanding the determinants of food prices is part of the puzzle