Empirical predictions from theory

The retailer's decision depending on five parameters:

1. a_{riv}, the strength of the rivalrous capture effect of adverting
2. a_{ind}, the strength of the industry expansion effect of advertising
3. s, retailer size
4. V, the consumers' willingness-to-pay for the product (relative to production costs)
5. a_{ret}, and the strength of rivalrous capture at inter-store level, i.e. the degree to which having heavily advertised brands on offer attracts consumers into the store at the expense of competitors with a less favourable product selection

Data

Brand shares, supermarket size

- Kantar Worldpanel; all purchases of "fast moving consumer goods" brought into the home
- rolling panel of around 25,000 households; daily 2002-2010
- products identified as: Branded, Standard Own-brand, Budget Own-brand
  - Large supermarkets: Asda, Morrisons, Sainsburys, Tesco
  - Small supermarkets: Budgens, Coop, Iceland, Netto, Somerfield Waitrose
  - Specialty stores: Aldi, Lidl, Marks + Spencer

Advertising expenditure

- A.C. Nielsen Digest of Advertising;
- all advertising expenditure in the UK
- includes ads on TV, radio, in the press, on billboards and online
- monthly 2002-2010; by brand

Share of own-brand sales

- Main variation is across products
- and with different types of stores following different strategies
- Very constant over time
- And broadly similar across similar types of stores

Quantity share for some market sectors

		Own-brand		Expend
	Branded	Standard	Budget	(£m)
Fruit and Vegetables	0.008	0.848	0.145	4.2
Bakery Products - Chilled	0.038	0.912	0.050	0.3
Meat+Poultry+Fish	0.150	0.493	0.356	4.9
Dairy Products	0.273	0.524	0.204	6.4
Household and Cleaning	0.395	0.354	0.251	2.9
Bread	0.424	0.481	0.095	1.9
Drinks - Fizzy	0.473	0.357	0.170	2.1
Toiletries - Healthcare	0.482	0.494	0.025	0.7
Pickles/Sauces and Ketchup	0.581	0.286	0.134	0.5
Biscuits	0.599	0.206	0.194	1.5
Toiletries - Oralcare	0.677	0.277	0.046	0.5
Washing powder	0.715	0.196	0.089	0.6
Drinks - Hot	0.778	0.153	0.069	1.1
Alcohol	0.784	0.157	0.059	4.7
Crisps	0.816	0.134	0.051	1.0
Toiletries - Haircare	0.822	0.150	0.028	0.5
Confectionery	0.835	0.105	0.060	1.7

Quantity share by fascia

		Own-brand		Expend
	Branded	Standard	Budget	(£m)
Large supermarkets				
Asda	0.372	0.465	0.163	10.0
Morrisons	0.431	0.475	0.094	7.1
Sainsbury	0.398	0.503	0.100	7.7
Tesco	0.375	0.450	0.175	14.5
Small supermarket, like large				
Somerfield	0.514	0.404	0.082	0.8
Small supermarkets, high V				
Budgen	0.623	0.372	0.005	0.1
Coop	0.528	0.447	0.025	0.0
Marks + Spencer	0.008	0.991	0.001	0.8
Waitrose	0.440	0.559	0.001	1.0
Small supermarkets, low r_{ret}				
Aldi	0.111	0.017	0.872	1.1
Lidl	0.141	0.007	0.852	1.2
Netto	0.585	0.005	0.410	0.5
Other	0.670	0.300	0.029	9.1

Estimating impact of advertising

Advertising is rivalrous if,

$$\frac{\partial shr_{it}}{\partial a_{jt}} < 0$$

it is expansionary if

$$\frac{\partial Q_t}{\partial a_{jt}} > 0$$

q_{it}: quantity of product i
Q_t: market size
a_{it}: advertising
$shr_{it} = \frac{q_{it}}{Q_t}$

We estimate

1. $$q_{it} = \beta_1 p_{it} + \beta_2 \bar{p}_{jt} + \gamma_1 a_{it}^{1/2} + \gamma_2 \bar{a}_{jt}^{1/2} + \eta_i + \tau_t + e_{it}$$

2. $$s_{it} = \beta_1^s p_{it} + \beta_2^s \bar{p}_{jt} + \gamma_1^s a_{it}^{1/2} + \gamma_2^s \bar{a}_{jt}^{1/2} + \eta_i^s + \tau_t^s + e_{it}^s$$

3. $$Q_t = \beta^v \bar{P}_t + \gamma^v \bar{a}_t^{1/2} + \tau_t^V + e_{it}^V$$

p_{it}: price
a_{it}: advertising
shr_{it}: quantity share
Q_t: market size
$\bar{p}_{jt}$: mean rival price
$a_{jt}^{1/2}$: sum of square root of rival advertising
η_i: are product effects
τ_t: time trend + month effects

Advertising cross-elasticity has predatory and expansionary effect

$$\epsilon_{ij}^{a} = \frac{a_j}{q_i}\frac{\partial q_i}{\partial a_j} = a_j \frac{\sum q_i}{q_i}\frac{\partial}{\partial a_j}\left(\frac{q_i}{\sum q_i}\right) + \frac{a_j}{\sum q_i}\frac{\partial}{\partial a_j}\left(\sum q_i\right)$$
$$= \epsilon_{ij}^{ap} + \epsilon_{j}^{ag}$$

ϵ_{ij}^{ap} is the predatory effect of advertising by j on product i

ϵ_{j}^{ag} is the expansionary effect of advertising by j

$$\epsilon_{ij}^{ap} = \frac{a_j}{s_i}\frac{\partial s_i}{\partial a_j}$$

$$\epsilon^{ag} = \frac{a_t}{Q_t}\frac{\partial Q_t}{\partial a_t}$$

Example: Confectionery products

Firm; Brand	Selected	Market share	Months of zero adv	Adv exp.	Rival's adv exp.	Price
Asda Stores Ltd; Asda	0	0.038	0.528	57025		3.82
Cadburys; Cadburys Creme Egg	0	0.013	0.581	214776		6.99
Cadburys; Cadburys Dairy Milk	1	0.093	0.179	512331	629349	6.11
Cadburys; Cadburys Roses	0	0.018	0.792	39032		6.46
Dunhills P L C; Haribo	1	0.039	0.104	210930	930750	3.98
J Sainsburys; Sainsbury	0	0.023	0.566	63693		4.20
Lidl UK GMBH; Lidl	0	0.011	0.953	261		3.64
Marks and Spencer; M+S	0	0.011	0.868	14109		9.58
Mars; Galaxy	0	0.031	0.047	417558		6.50
Mars; Maltesers	0	0.024	0.594	166792		8.05
Mars; Mars Bar	1	0.041	0.132	282051	859629	4.21
Mars; Mars Celebrations	0	0.017	0.604	131394		6.89
Mars; Milky Way	0	0.010	0.651	44267		6.25
Mars; Snickers	0	0.013	0.623	71995		4.57
Morrisons Ltd; Morrisons	0	0.014	0.660	41739		3.56
Nestle Confectionery; Aero	0	0.014	0.500	182632		7.74
Nestle Confectionery; Kit Kat	0	0.017	0.104	617380		6.01
Nestle Confectionery; Quality Street	1	0.024	0.509	86822	1054858	6.37
Nestle Confectionery; Rowntrees	0	0.019	0.500	116861		6.10
Nestle Confectionery; Smarties	0	0.012	0.387	109674		7.00
Swizzels Matlow; Swizzels	1	0.013	0.604	1333	1140347	4.95
Tesco Food Stores Ltd; Tesco	0	0.048	0.623	40637		4.00
Trebor Bassett Ltd; Bassetts	1	0.023	0.811	48212	1093468	4.60
Trebor Bassett Ltd; Maynards	0	0.010	0.708	87043		5.97
Trebor Bassett Ltd; Trebor	0	0.011	0.538	139948		5.90

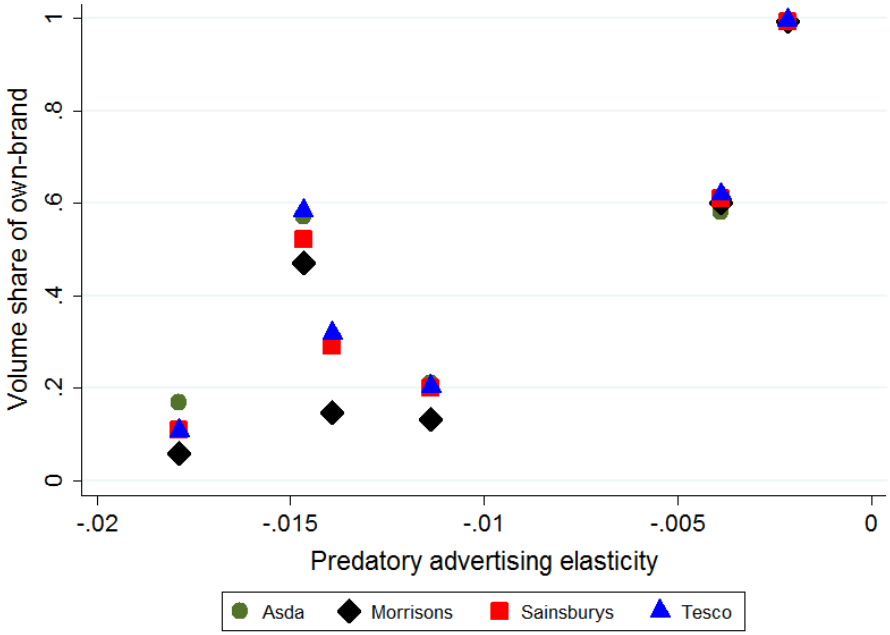
Confectionery estimates

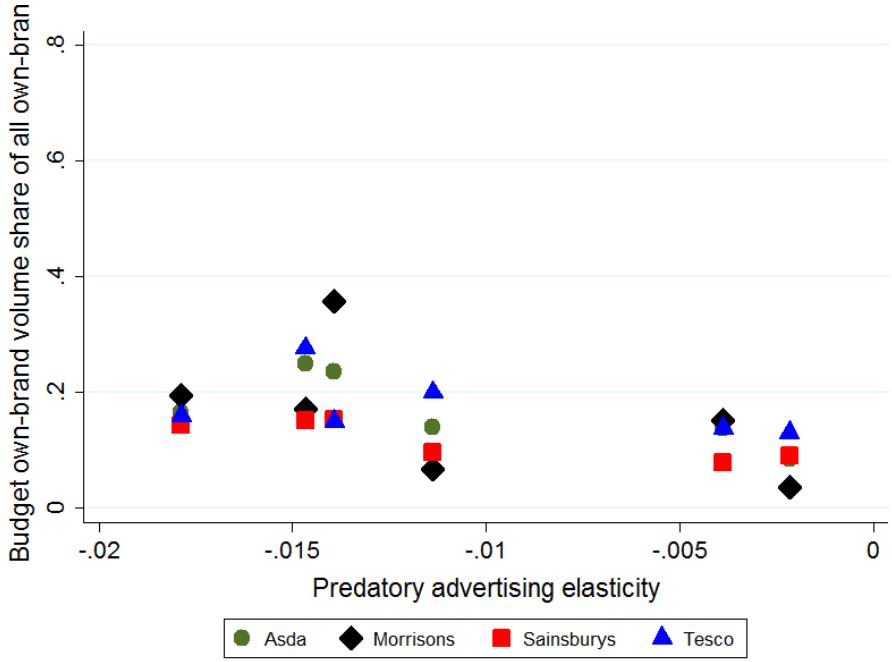
Own-price elasticity	-1.635	
Cross-price elasticity	0.780	
Own-advertising elasticity	0.323	ϵ_{ii}^{a}
Cross-advertising elasticity	-0.046	ϵ_{ij}^{a}
Predatory advertising elasticity	-0.018	ϵ_{ij}^{ap}
Expansionary advertising elasticity	0.027	ϵ_{j}^{ag}
Number of brands	6	

Summary

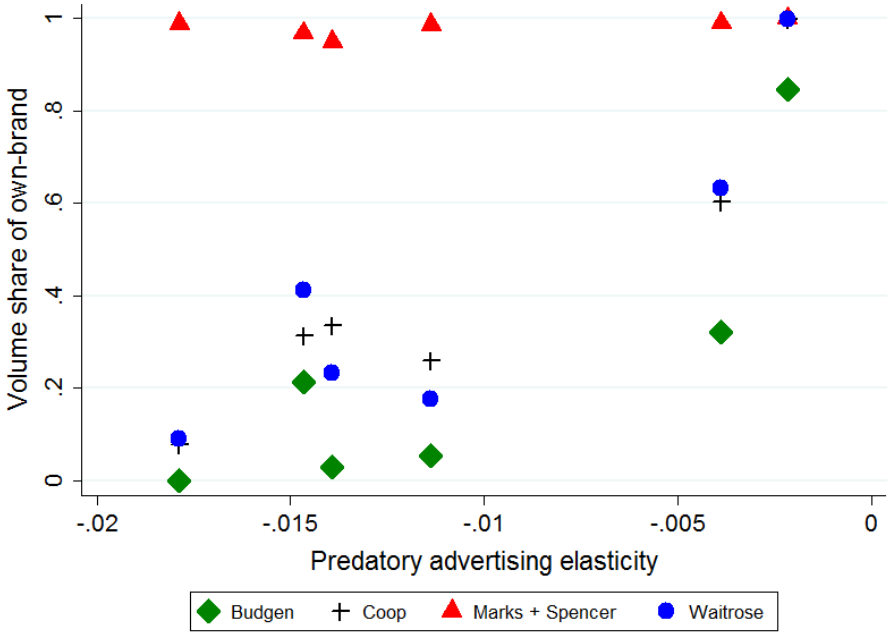
	Price Elasticity		Advertising Elasticity				Number
	Own	Cross	Own	Cross	Pred	Exp	of Brands
Fruit and Vegetables	-0.041	0.072	0.075	-0.001	-0.002	0.025	11
Bakery Products - Chilled							
Meat+Poultry+Fish							
Chilled Convenience							
Dairy Products							
Pet Care							
Savoury Snacks							
Drinks - Chilled							
Household and Cleaning							
Frozen Prepared Foods							
Bread	-0.350	-0.166	0.005	-0.005	-0.004	0.012	5
Bakery Products - Ambient							
Canned Goods							
Drinks - Fizzy	-0.819	0.768	0.042	0.005	-0.015	0.044	4
Toiletries - Healthcare							
Packet and Other Foods							
Home Cooking							
Pickles/Sauces and Ketchup							
Biscuits							
Toiletries - Other							
Toiletries - Bathroom							
Toiletries - Oralcare							
Pet Foods							
Washing powder	-1.412	0.606	0.076	0.009	-0.014	0.077	5
Drinks - Hot							
Alcohol							
Crisps	-2.812	0.215	0.077	-0.018	-0.011	-0.034	9
Toiletries - Haircare							
Confectionery	-1.635	0.780	0.323	-0.046	-0.018	0.027	6

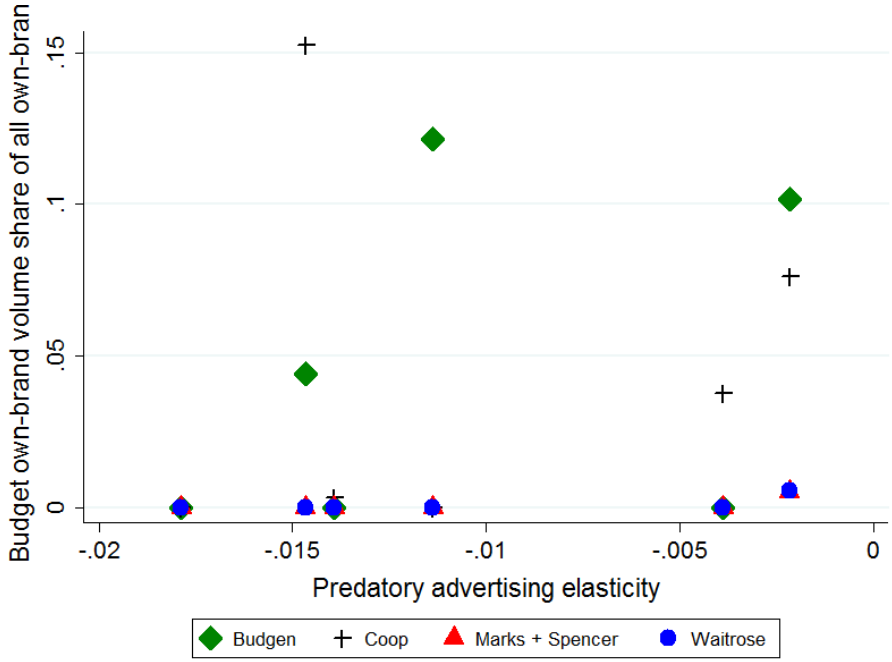
Large supermarkets



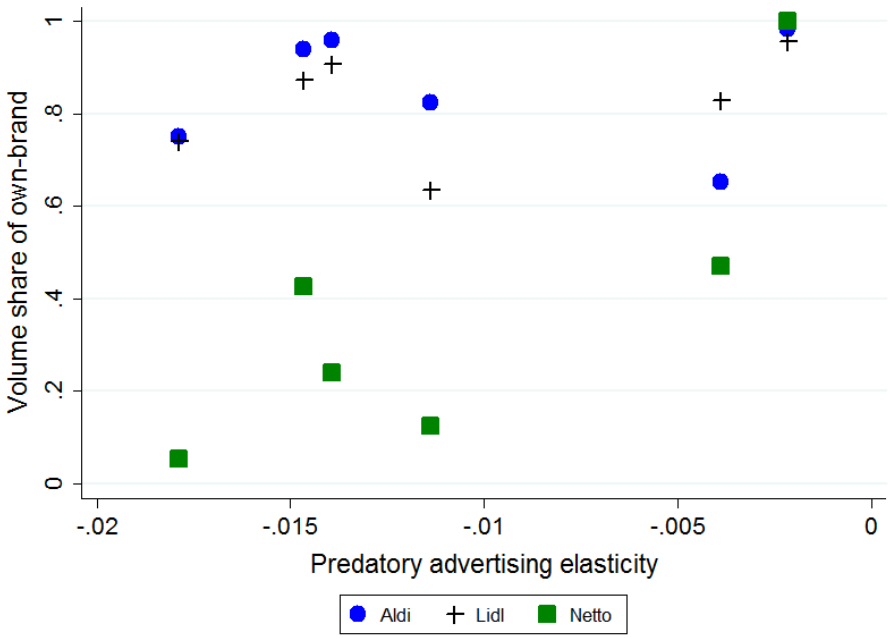


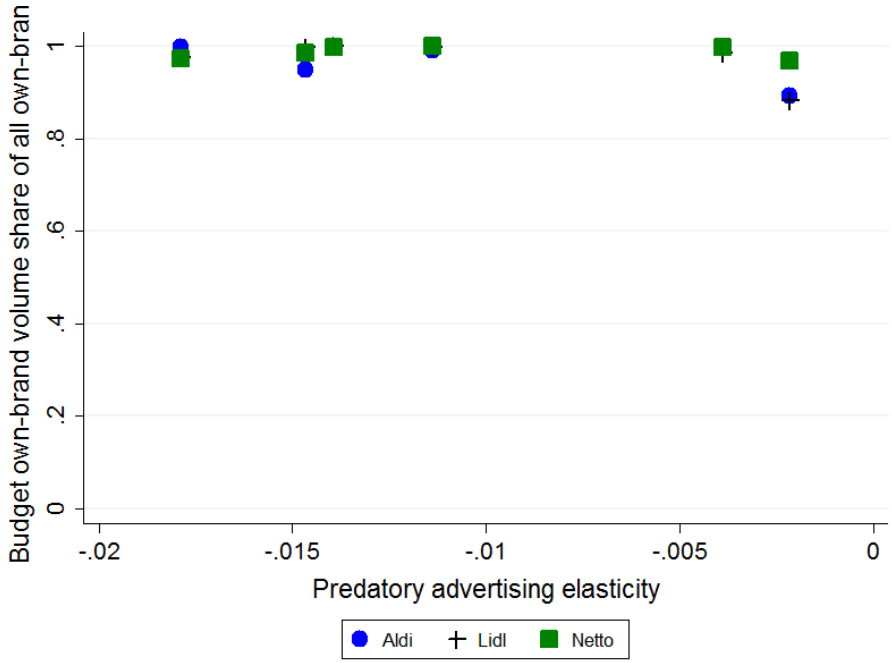
Small supermarkets, high V





Small supermarkets, low a_{ret}





Summary and further work

- document patterns in product offering across large range of products and stores
- main variation is across products and across types of stores
- develop a model that seeks to explain this variation by primatives of industry, nature of demand and nature of advertising
- Further work
  - theory
  - link between theory and empirics
  - estimate demand parameters for more products
  - deal with some econometric issues
  - ...