

Variation in own brand penetration: the role of advertising

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- Interested in retailers' provision of own brand products: own brand makes up around 60% of total sales in large supermarket chains
- The share of own brand is stable over time, but varies considerably across product category
- Develop a model that relates retailers' and manufacturers' incentives to advertise their products with how advertising affects consumer choices
- Explore how we can take the theory to data

- Consider how advertising can affect demand:
 1. Predatory effect of advertising: the extent to which advertising a product captures market share from its rivals
 2. Expansionary effect of advertising: the extent to which total advertising increases demand for all products in a category
- Show that a bigger predatory effect of advertising is associated with lower own brand penetration

- Hotelling framework; two goods, each produced by a different manufacturer
- A monopolistic retailer who is responsible for advertising good 2 as an own brand, with good 1 advertised by its manufacturer as a national brand
- Timing:
 1. The retailer and national brand manufacturer simultaneously exert advertising efforts, e_i , at a cost, e_i^2
 2. The manufacturers set wholesale prices
 3. The retailer sets retail prices, p_1^r and p_2^r
- Assume the market is covered, and some of each good is bought

- Unit mass of consumers, with valuation, V_i of each good i :

$$V_i = V_0 + a_p(e_i - e_{-i}) + a_c(e_1 + e_2)$$

- where V_0 is the baseline attractiveness of the category, and a_p , a_c represent the predatory and expansionary effects:

$$V_1 - V_2 = 2a_p(e_1 - e_2)$$

$$V_1 + V_2 = 2V_0 + 2a_c(e_1 + e_2)$$

- How do the incentives to advertise depend on V_1 and V_2 ?

- Solve for the equilibrium profit of the retailer and the manufacturer, and the market share of i :

Retailer's profit:
$$\Pi^R = \frac{(V_1 + V_2)}{2} + \frac{(V_1 - V_2)^2}{72} - \frac{5}{2}$$

Manufacturer i 's profit:
$$\Pi_i^M = \frac{(6 + V_i - V_{-i})^2}{36}$$

Market share of i :
$$s_i = \frac{1}{2} + \frac{(V_i - V_{-i})}{12}$$

How does advertising affect the equilibrium?

- Advertising of product 1 (undertaken before the two pricing stages) affects the values of V_1 and V_2 :
 1. by increasing $V_1 - V_2$: i.e. the relative attractiveness of 1
 2. by increasing $V_1 + V_2$: i.e. the overall attractiveness of the product category

How does advertising affect the equilibrium?

- Equilibrium profits:

$$\Pi^R = \frac{(V_1 + V_2)}{2} + \frac{(V_1 - V_2)^2}{72} - \frac{5}{2}$$
$$\Pi_1^M = \frac{(6 + (V_1 - V_2))^2}{36}$$

1. by increasing $V_1 - V_2$:

- manufacturer 1 benefits from an increase of $V_1 - V_2$
- the retailer is interested in $|V_1 - V_2|$ - having one brand more attractive than the other allows for more efficient price discrimination
- If this effect is strong, then the NB advertiser will want to advertise a lot, making its brand very attractive

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2. by increasing $V_1 + V_2$:

- An increase in this is beneficial to the retailer, but not the manufacturers, who still compete in wholesale prices with equal intensity
- This would suggest retailers have stronger incentives to advertise than manufacturers: OB penetration is likely to be substantial

Predictions from the theory

- Key prediction:
OB penetration should be smallest when the predatory effect of advertising is large
- How can we look at this in the data?

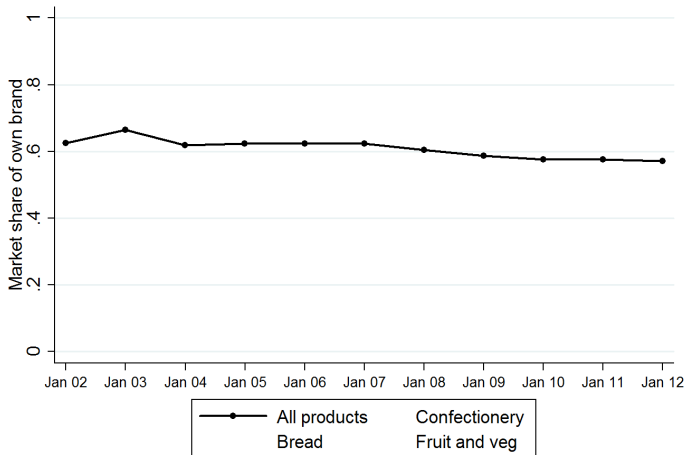
1. Brand shares:

- Kantar Worldpanel: records data on grocery purchases in the UK e.g. food in the home, alcohol, toiletries, household products
- Collected for a rolling panel of around 25,000 households; daily 2002-2012
- Products identified as branded, standard own brand and budget own brand (aggregate the own brand types)

2. Advertising expenditure:

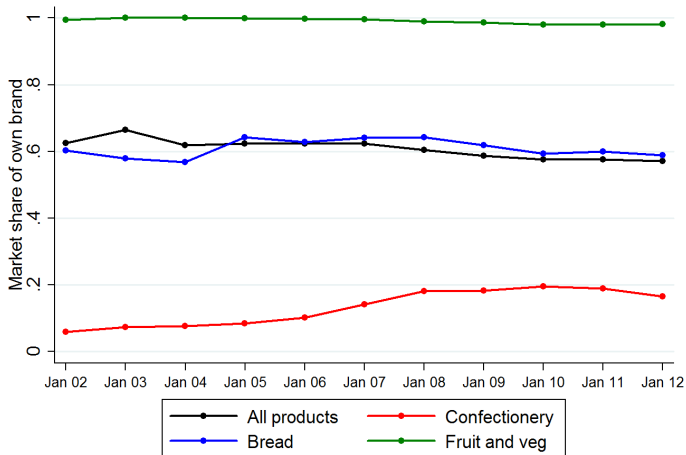
- A.C. Nielsen Digest of Advertising
- all advertising expenditure in the UK
- includes adverts on TV, radio, in the press, on billboards and online
- monthly 2002-2012; by brand

Own brand penetration across category



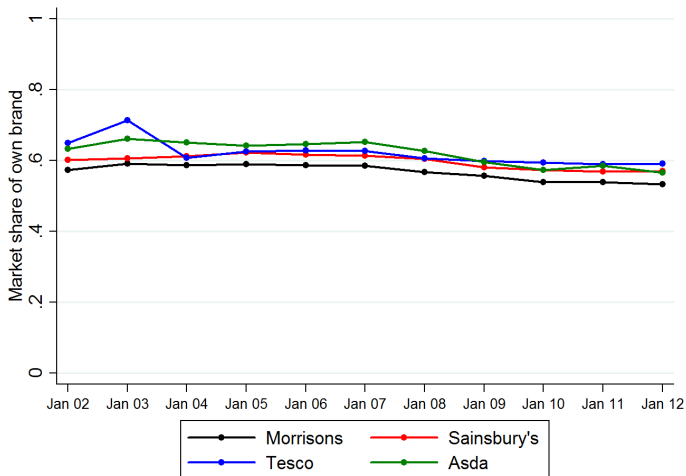
Notes: quantity share across the big four supermarkets (Tesco, Sainsbury's, Asda and Morrisons)

Own brand penetration across category



Notes: quantity share across the big four supermarkets (Tesco, Sainsbury's, Asda and Morrisons)

Own brand penetration across supermarket



Empirical approach

- Interested in the a_p parameter: the extent to which advertising by a rival affects own market share
- Estimate:

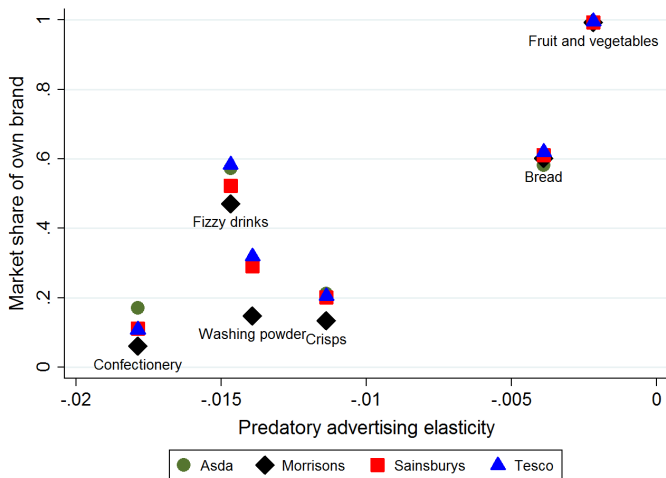
$$s_{it} = \beta_1^s p_{it} + \beta_2^s \bar{p}_{jt} + \gamma_1^s a_{it}^{1/2} + \gamma_2^s \bar{a}_{jt}^{1/2} + \eta_i^s + \tau_t^s + e_{it}^s$$

from share and advertising data for different product categories

- Calculate the following elasticity:

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

Preliminary results



Extensions

- The primary variation in own brand penetration is across product lines, but also observe different types of retailers following different strategies

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	Branded	Standard Own-Brand	Budget Own-Brand
Large supermarkets			
Asda	0.372	0.465	0.163
Morrisons	0.431	0.475	0.094
Sainsbury	0.398	0.503	0.100
Tesco	0.375	0.450	0.175
Small supermarkets			
Marks + Spencer	0.008	0.991	0.001
Aldi	0.111	0.017	0.872
Lidl	0.141	0.007	0.852

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Extensions

- Some own brand products are designed to look very similar to their national brand equivalents?



- How can we think about this in the context of the model?

- Extend the model to incorporate variation in other parameters of interest
- In a more general form of the model, relax the assumption of having only one monopolistic retailer:
 - Advertising allows retailers to 'capture' consumers from other stores
 - Allow retailer size to enter the model
 - The baseline attractiveness of a category, V_0 , is allowed to vary across stores
- Consider the difference between standard versus budget own brand

- Develop a model that seeks to explain variation in own brand penetration by the nature of advertising
- Find that a bigger predatory effect of advertising is associated with lower own brand penetration
- Further work:
 - theory
 - link between theory and empirics: what to estimate, do for more categories, econometrics issues