



Multi-category demand and supermarket pricing[☆]

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ABSTRACT

When a supermarket cuts its price for one product category it may increase the demand for another by drawing more consumers into the store. We call this a multi-category effect. We contrast the prominent role that the multi-category nature of supermarket shopping has enjoyed in competition policy discussion – and in the theoretical literature on supermarket pricing – with its lack of prominence in the empirical IO literature on pricing incentives for products sold in supermarkets. Using a data set of store-category choices from the UK we document empirical features of supermarket shopping and find that these are consistent with the multi-store multi-category framework of many theoretical models of retail pricing. We report on a project in progress that empirically models consumer demand allowing for multiple demand categories and two store shopping, and describe how the model can be used to measure the empirical importance of multi-category effects in supermarket pricing.

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1. Introduction

The supermarket industry's sales represent about 5.5% of disposable income in the US (\$562bn in 2010, Food Marketing Institute), 8% of GDP in the UK (£150bn in 2010, Competition Commission (2008)), and similar shares in other EU countries. Given its importance it is not surprising that competition authorities regularly examine grocery retailing. In recent years competition authorities in the US and EU have considered a range of issues in supermarket competition, notably merger control, market power and below-cost selling.

A distinctive feature of supermarket competition is that shoppers use a small number of stores for their weekly shopping and buy a large number of grocery categories—dairy products, alcoholic beverages, meat, bread, fruit, vegetables etc.¹ Supermarkets allow shoppers to avoid the costs of visiting separate specialized stores for each category (butcher, baker, and so on). Shoppers will choose a supermarket on the basis of which is best for an entire bundle of products, and this

means that the price (and quality) set by a supermarket for one product has an effect on the demand for unrelated products in the same store. We refer to these as “multi-category” or “cross-category” effects.² A supermarket firm will internalize cross-category effects, unlike specialized stores that sell only one category, with potential consequences for equilibrium prices.

We have three objectives in this paper. The first is to highlight an imbalance in the literature on supermarket competition between competition policy and theoretical IO – where the multi-category nature of shopping has had a prominent role – and the empirical IO literature on supermarket pricing where most empirical studies have considered a single product category in isolation. Our second objective is to document some empirical features of shopping that are relevant when considering multi-category effects, using a survey of UK consumer shopping decisions that contains information on the number of stores visited and the number of categories bought. The findings point to the relevance of a multi-category and multi-store-shopping framework for supermarket pricing, as used in several theory models. Our third objective is to report on a project in progress that empirically measures multi-category effects in supermarket competition, using a model of store choice and consumer demand for a range of grocery categories. We sketch some basic elements of the model and contrast it with previous work on pricing of products sold in supermarkets.

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¹ The term “category” refers to a group of similar products. We are interested in pricing incentives that the supermarket format generates between largely unrelated products, rather than between close substitutes. Existing single-category empirical studies, discussed in Section 5, such as Villas-Boas (2007) for the yogurt category, have considered within-category pricing incentives, but not cross-category pricing incentives. This distinction is not used in the theory literature we review, where we refer mainly to products.

² The importance of cross category effects in the context of shopping malls has been established indirectly by looking at the retail rents set by shopping malls to alternative stores. Gould et al. (2005) show that shopping malls internalize cross-category effects by setting lower rental rates for stores that are likely to draw consumers to the mall.

The paper is organized as follows. In Section 2 we discuss policy issues that motivate our interest in a multi-category multi-store model of demand. In Section 3 we highlight relevant theoretical models of retail competition. In Section 4 we look at the patterns in the data. Section 5 discusses existing empirical models of pricing for grocery products in which multi-category effects are absent, and reports on a new modeling project that aims to incorporate these effects into the analysis. Section 6 concludes with avenues for future work.

2. Policy issues in supermarket competition

2.1. Supermarket industry: Shoppers and store formats

Following concerns about the dominance of its main firms, the UK supermarket industry was investigated by the UK's Competition Commission (CC) in 2000 and 2008. The UK's Director General of Fair Trading (DGFT) – who referred the industry for investigation – emphasized the importance of multi-category shopping.

“The DGFT in making the reference to us identified the one-stop form of grocery shopping as potentially important to the analysis of competitive influences on the multiples' behavior. This is a form of shopping in which consumers purchase all or a substantial part of a household's weekly grocery requirements together in one place and during one shopping trip, rather than purchase such items from a number of different outlets.” (CC, 2000, paragraph 4.3, page 12).

In their 2000 report the CC found that this type of shopping, which they called primary shopping, was the main source of sales in the market. They noted that smaller shopping missions were also common. They also pointed to a wide variety of store formats, which vary in their product range. The traditional supermarket and superstore format is a “full-line” store offering a comprehensive range of products. Other formats are more specialized. Premium fresh food format stores emphasize high-quality perishables (e.g. Whole Foods in the US and Marks and Spencer in the UK). Discounters or limited assortment format stores (e.g. Aldi in the US and EU) offer a limited assortment of low-priced grocery items. Freezer format emphasizes frozen products. Convenience stores offer a small range of staples.

Competition policy, in the UK and other countries, has focused on two main issues in supermarket retailing: whether firms have monopoly power over the price of a bundle of categories, and whether they set prices below cost on specific product categories. We discuss these in turn.

2.2. Market power over the price of a bundle of categories

The CC investigations (2000, 2008) found that only full-line format stores are attractive to consumers on a primary shopping trip. As most consumers were found to have few full line stores in their choice set, the natural question was whether full-line stores could exercise market power by raising the price of a bundle of categories. The CC concluded that full-line stores are constrained only by other full-line stores, and not by stores of other formats (which are more numerous in most consumer choice sets).³ The practical consequence of this conclusion was that firms operating full-line stores were prevented from merging with each other, but could acquire firms operating alternative formats.⁴

A similar verdict came up in a recent US case: the merger in 2007 of Whole Foods and Wild Oats, both in the premium fresh food format.⁵

Here the question was whether full-line format stores would constrain the prices of these specialized stores if they were to merge. The FTC blocked the merger but this decision was overturned on appeal by the US District Court which claimed there was no evidence that the premium fresh food format constituted a separate market, given that they sell a subset of the product categories that are available in the full line stores, and that many shoppers visiting the premium fresh food format split their shopping between specialized and full-line stores.

2.3. Pricing of individual categories—below cost selling

Competition authorities have also been concerned about below cost selling of individual grocery categories. In CC (2000, paragraph 7.165) one retailer claimed this was a persistent feature of the market: “... in recent years some of our competitors have continually priced certain key lines at or below cost. For example, white bread and “cheapest-on-display” cans of tomatoes and beans.”

The CC concluded that most large retailers in the UK engage in below cost selling on categories that comprise up to 6% of a retailer's sales—typically of staples such as alcohol, bread and bakery products that consumers purchase repeatedly. These represent the core categories sold by discounter format stores, which suggests that full line stores adjust prices to discourage consumers from visiting discounter format stores. The CC (2000), however, did not propose any remedy but other countries have taken a stronger position, notably in France and Ireland where below cost selling was made illegal under the French Loi Galland of 1996 and the Irish Restrictive Practices Order of 1987. See Rey and Zhijun (2010) for a discussion.

3. Theory of pricing with multi-category stores

The theory literature on retail competition has considered the same issues as the competition authorities: market power on the price of a bundle of categories and below cost selling on specific products. The models have emphasized multiple category demand. They can be divided into those that impose one-stop shopping and those where consumers can visit more than one store.

3.1. One stop shopping models

Bliss (1998) considers the pricing problem of a retailer. Consumer i compares the stores j in choice set J . The consumer chooses the store offering the highest utility – given his budget y_i and the store's price vector p_j for the multiple products on offer – using the indirect utility function:

$$v(y_i, p_j) = \max_{q_i} u(q_i) \quad \text{subject to } y_i \geq p_j q_i \quad (1)$$

where $u(q_i)$ is the consumer's direct utility and q_i the (endogenously chosen) vector of quantities for each product. The consumer's store choice problem is thus

$$\max_{j \in J} [v(y_i, p_j) - \varepsilon_{ij}] \quad (2)$$

where ε_{ij} is i 's fixed costs of shopping in store j (e.g. transport costs). Assuming one-stop shopping Bliss shows that the firm's problem can be decomposed into two more tractable problems: the profit maximizing level of utility $v(y_i, p_j)$ to offer consumers and (subject to offering this level of utility) the profit maximizing price vector p_j . The firm offers Ramsey prices, in which prices are related to their own- and cross-price elasticities, which can result in below cost selling on some products.

A point not emphasized in competition policy analysis is the competition-intensifying consequence for an entire bundle of categories of internalizing cross-category pricing effects. A number of papers

³ See paragraphs 4.84–4.86 of CC (2008).

⁴ Two examples stand out. First, ASDA – the British subsidiary of Wal-Mart which operates full-line stores – was allowed to merge with the “discounter” chain Netto in 2010. Second, Tesco and Sainsbury (two other full-line retailers) were allowed to expand into the market for convenience stores.

⁵ See <http://www.ftc.gov/os/adjpro/d9324/index.shtml>

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