



Price dispersion and seller heterogeneity in retail food markets



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ARTICLE INFO

Article history:

Received 1 December 2011

Received in revised form 26 August 2013

Accepted 3 December 2013

Keywords:

Price dispersion

Retail pricing

Food markets

ABSTRACT

Price dispersion, i.e. a homogeneous product being sold at different prices by different sellers, is among the most replicated findings in empirical economics. The paper assesses the extent and determinants of spatial price dispersion for 14 perfectly homogeneous food products in more than 400 retailers in a market characterized by the persistence of a large number of relatively small traditional food stores, alongside large supermarkets. The extent of observed price dispersion is quite high. When prices in an urban area (where the spatial concentration of sellers is higher) are compared with those in smaller towns and rural areas, differences in search costs and the potentially higher degree of competition do not yield lower prices. Other counteracting factors, including differences in seller costs and consumer incomes, make prices, on average, higher in the urban area for 11 of the 14 products considered. For many, but not all, the products supermarkets proved to be less expensive than traditional retailers, although average savings from food shopping at supermarkets were extremely low. Finally, the results of the study provide evidence that retailers have different pricing strategies and these differences also emerge for supermarkets belonging to the same chain. The results presented in the paper suggest that a variety of factors play a role in explaining price dispersion. In addition to differences in seller costs, the contemporaneous heterogeneity of retailers (in terms of services provided) and consumers (in terms of search costs and preferences) makes the emergence of monopolistic competition possible as well as allowing small traditional food retailers to remain in business.

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Introduction

In recent years linkages between different agents along food chains have received growing attention, both by researchers and in policy debates. In increasingly globalized food markets, the relations between one element of the chain and the others are often imperfectly competitive, opening the possibility for the exercise of market power, with direct implications for the income of the weakest actors along the chain, most often located at opposite ends, small-scale producers and consumers. This paper aims at contributing to the understanding of the functioning of food chains by focusing on a specific element of their final stages, that between retailers and final consumers. In particular, the paper looks at pricing behaviors by food retailers by assessing the extent and determinants of spatial price dispersion, i.e. the fact that at any given time on a specific market the same product is offered and sold at different prices.

The existence of price dispersion, even for homogeneous products, is among the most replicated findings in empirical economics. After Stigler's (1961) seminal paper, a rich literature flourished,

both theoretical and empirical, analyzing the causes and consequences of such "ubiquitous" price dispersion.¹ Most of the theoretical literature expanding on Stigler's paper focused on models where differences in search and production costs are the factors generating the dispersion. Examples include Carlson and McAfee (1983), Salop (1977), Salop and Stiglitz (1977), Stahl (1989) and Waldeck (2008). Other contributions consider price dispersion as endogenously generated, resulting from the behavior of identical firms (Varian, 1980) and consumers (Butters, 1977; Salop and Stiglitz, 1982; Burdett and Judd, 1983). However, research has systematically confirmed that significant price dispersion should be expected even if search costs can be assumed to be very low. Empirical evidence of price dispersion has been found in virtually all markets which have been investigated, including automobiles (Dahlby and West, 1986), air travel (Borenstein and Rose, 1994; Gerardi and Shapiro, 2009), a variety of goods and services (Pratt et al., 1979), gasoline and products sold in gas station stores (Adams, 1997; Barron et al., 2004; Lewis, 2008), books and CDs (Ancarani and Shankar, 2004; Brynjolfsson and Smith, 2000; Clay et al., 1999, 2001), scanners and digital cameras (Baylis and Perloff, 2002; Haynes and Thompson, 2008), and prescription drugs (Sorensen, 2000).

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¹ Baye et al. (2006) provide a survey of the theoretical and empirical literature on price dispersion.

Several studies have addressed the extent and determinants of price dispersion with specific reference to food products (see Price dispersion in food retail markets), but, to the best of our knowledge, this study is the only one conducted in a developed country market characterized by the strong persistence of traditional food retailers (i.e. small shops selling a relatively limited number of products) side by side with large supermarkets. All studies addressing price dispersion for food products in Europe (Bahadir-Lust et al., 2007; Griffith et al., 2009; Hoffmann and Senkler, 2011; Lan et al., 2012; Lloyd et al., 2009, 2012) considered retailers belonging to a supermarket chain.

In addition to measuring the extent of price dispersion in food markets, this paper attempts to answer several questions related to its determinants, including: How important are promotional sales in explaining price dispersion? How important is seller heterogeneity in explaining price dispersion, i.e. is price dispersion greater in supermarkets than in traditional small stores? Are consumer prices higher in traditional food retailers than in supermarkets? Is price dispersion within each supermarket chain lower than across all supermarkets? Are prices and price dispersion higher in smaller towns and rural communities, where search costs can be assumed to be higher and seller competition lower, than in urban settings? Do low/high price setters remain so over time? Our study addresses a relatively little investigated aspect of food markets and may lead to a better understanding of the implications for consumers of changes along the food chain. The paper is organized as follows: the following section provides an overview of relevant empirical contributions assessing the extent and determinants of price dispersion in food retail markets; 'The data' section presents the data analyzed and 'Results' the results of our study; the final section concludes by discussing their implications and significance.

Price dispersion in food retail markets

Empirical research has found significant price dispersion in food retail markets. Ambrose (1979) analyzed prices for 54 grocery products in 6 small independent stores, 4 large independent stores and in 4 stores belonging to a chain, located in inner city, suburban and rural areas in Nebraska. He found prices to be, on average, higher in small independent stores (0.7% higher than the overall average) and in stores located in rural areas (3.8% higher); the largest differences in average prices (10.1%) was found between inner city and suburban stores for the aggregate of meat, poultry and fish products. Gibson and Kim (2013) analyzed the effect of price dispersion on poor consumers based on a survey of consumer prices for 44 identical food items across 210 different sellers in five metropolitan areas in Vietnam. They found that food prices in lower income neighborhoods were, on average, 2.5% higher than in middle income ones, and 4.5% lower than in upper income ones. When average prices in lower income neighborhoods were compared with those in middle and upper income areas combined, the former were 1.4% lower. Leibtag et al. (2010) used Nielsen Homescan data to analyze food purchases by about 40,000 US households over the period 2004–2006. They found prices in non-traditional discount food retailers (stores such as Wal-Mart, Costco, and Family Dollar) lower than in traditional supermarkets for 82% of the products (after having controlled for differences in brand and package size). Expenditure weighted average prices were 7.5% lower in nontraditional food stores, while prices of individual food products were between 3% and 28% lower. Price differences between nontraditional and traditional food stores were smaller in metropolitan areas, where the market share of nontraditional discount retailers is higher. Lloyd et al. (2009) analyzed the role of promotional sales in price variability over time. They used a highly detailed data base of weekly observed prices of over 1700

grocery products sold in the seven largest retail chains in the UK. Their conclusion was that the influence of promotional sales on price dispersion across the chains was significant but relatively modest, explaining at most 29% of price variability. Significant price dispersion across the seven chains considered emerged from the study; even after excluding discount sales, the average difference in the prices of products carrying the same bar code was about 25%. Griffith et al. (2009) used information on food purchases by 25,000 families in Great Britain over the 2006 calendar year to analyze four dimensions of their buying behaviors aimed at containing spending: purchasing products offered at discounted prices, generic brands, and in bulk, and choosing where to buy. They showed that potential and actual savings from these four sources were significant. Hoffmann and Senkler (2011) used scanner data from 80 grocery retail stores in Germany over two years to assess interformat price competition. They considered price levels of typical shopping baskets, rather than individual products, and found evidence of competition between different formats of retailers (discounts, supermarkets and hypermarkets). When a basic shopping basket of 24 often purchased products was considered, the coefficient of variation of the cost of the basket was 14.9% for discount products and 16.7% for top-selling brand products. Pratt et al. (1979) analyzed price dispersion in the Boston area for 39 products and services, including two food products (a liquor and peanuts), the coefficient of variation for the price of the liquor was 8.7%, for the peanuts 32.1%. In Israel, Lach (2002) found price dispersion for four products (three of them food items: frozen chicken, coffee and flour) to be significant, with coefficients of variation ranging between 11.4% and 19.2%, and to persist even after controlling for unobserved product heterogeneity. Over the whole length of the sample period (48 months) most stores were observed to post the lowest and the highest price. Jaeger and Storchmann (2011) analyzed price dispersion for 186 wine brands from 2006 to 2008 and reported coefficients of variation for red and white wines equal to 25.0% and 19%, respectively. Pesendorfer (2002) analyzed prices of two market leader ketchups in 21 supermarkets in Springfield, Missouri over a two year period. Prices of Heinz and Hunt's 32 oz bottles both showed substantial price dispersion on a given day, with the coefficient of variation being equal to 13% and the lowest price about 30% below the average one. Degeratu et al. (2000) analyzed consumer decisions when shopping at an on-line grocery store and at traditional supermarkets, and considered different brands of three categories of goods, one of which a food product. The coefficient of variation of the price of the food product across brands varied between 7.5% and 12.2% in the online store, and between 0.7% and 8.5% in supermarkets. Altroconsumo (2010) analyzed the prices in a sample of 500 retail stores in Italy for three very well-known and popular brand products, including one food product (Coca Cola), for which high price dispersion is reported and a ratio between the maximum and minimum observed prices equal to 2.42. Sexton et al. (2003) addressed retailer behavior in procurement and sale by 20 grocery chains in six US metropolitan markets focusing on fresh produce (iceberg lettuce, fresh tomatoes and bagged salads). They concluded that retailers do exert oligopoly power in setting prices, but not to the full extent available to them as a result of geographical dispersion, brand differentiation and inelastic consumer demand. Hosken and Reiffen (2004) considered monthly prices of 20 food products in 30 US metropolitan areas for up to 5 years. The proportion of observed prices above the mode by 20% or more varied for the different food product groups between 0.5% and 20.1%; the proportion of those below the mode by 20% or more between 1.1% and 21.7%. They found that grocery products typically have a "regular" price and stay at that price at least 50% of the time, most of the deviations from the regular price are downward and promotional sales account for 20–50% of observed annual price variability. Lan et al.

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