



Identifying and characterising price leadership in British supermarkets ☆☆☆



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ABSTRACT

Price leadership is a concept that lacks precision. We propose a deliberately narrow, falsifiable, definition then develop it, illustrate its feasibility and test it using the two leading British supermarket chains. We find both firms engaging in leading prices upward over a range of products, with the larger being initially more dominant but the smaller increasing leadership activity to take overall leadership over time. However, more price leadership events are price reductions than price increases, consistently led by the smaller firm. Nevertheless, the increases are of larger monetary amounts than the falls, so average basket price increases over time.

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1. Introduction

The concept of price leadership lacks precision in existing literature. We aim to improve precision in what is meant by leadership, and then illustrate this using price data on the two leading British supermarkets. In our view, precision requires a careful and *falsifiable* definition of the concept. Unfortunately, this is more difficult than it might seem. To illustrate, the OECD definition “Price leadership refers to a situation where prices and price changes established by a dominant firm, or a firm accepted by others as the leader, and which other firms in the industry adopt and follow”¹ seems rather circular.

Similarly, characterising three types of price leadership, Dominant firm, Collusive and Barometric, Scherer and Ross (1990, p.249) suggest as distinguishing characteristics for the last of these “occasional changes in the identity of the price leader ... the absence of leader power to coerce others into accepting its price; a tendency for the leader formally to validate price reductions that other sellers have already initiated ...”. Since this well-established text is a common reference source for subsequent work, the situation remains confused. Some analyses have argued from effect to attribution of leadership, for example the limited analysis in Competition Commission (hereafter CC, 2000, ch. 7), rather than from an exogenous starting point to investigation of leadership. Finally, we need to accommodate multi-product firms.

We propose a new *falsifiable definition* of what constitutes price leadership (and, by implication, what does not):

Price leadership occurs when one firm makes a change in a *price* (or set of prices) that is followed within a *predetermined short period* by the other (more generally, another) firm making a *price* change of exactly the same monetary amount in the same direction on the *same product(s)*, and doing so *significantly more often than would be expected by chance*.

In our definition, the italicised elements are to be particularised to the specific circumstance or industry. Thus what we propose is a potentially general definition, illustrated using a specific case study of considerable interest.

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¹ See <http://stats.oecd.org/glossary/detail.asp?ID=3285>.

This definition necessarily excludes: simultaneous price changes, those followed with a long lag, price changes of similar monetary amounts, or on a similar but not the same product. It is clearly falsifiable since it may not occur. More positively, the definition identifies candidate cases of which firm is engaging in leadership on which products when. Leadership is deliberately defined narrowly, choosing a specific interval to reduce the possibility that chance movements are included, but allowing time for reaction, so the bias if any is towards not observing it when it occurs. Moreover, by maintaining a tight definition of candidate cases, robust testing against the alternative of chance observation can be performed, thereby sifting from candidate cases those that occur significantly more often than expected by chance. These become our clear cases of leadership.

As an empirical case study, we examine leadership behaviour in the British supermarket industry, a significant market and one which has the useful institutional feature of national pricing. Here, for reasons spelt out below in describing the industry, there are two clear leadership candidates, Tesco and Asda. We examine their pricing behaviour using our new leadership concept. Significant features of the industry lead us to particularise the proposed definition. Specifically, we define what we mean by price and by product and starting point, choose the short period of response by the follower, develop and employ a test of whether leadership happens more often than may be expected, and define sub-types of leadership.

Previewing results, we find considerable evidence that leadership exists. Most strikingly, we find that whilst Tesco appears commonly to lead prices upward in the first four years of our sample, there is a clear switch whereby over the last three years Asda comes to dominate leads upward. However, we observe significantly more leadership in price reductions than in price rises. Asda is more involved in reductions than Tesco, but both are extremely active in leading reductions, particularly in our later years. These results bring out certain features that theoretical models have suggested, most obviously the switch of leadership between firms and the smaller firm being more involved in leading falls.

Our plan is as follows. We outline the analytical literature in [Section 2](#). We then describe the industry ([Section 3](#)), the nature of our sample data ([Section 4](#)) and general features of pricing behaviour in the industry ([Section 5](#)). [Section 6](#) particularises the definition above to the British supermarket industry. Our characterisation of leadership and our analysis of overall leadership, including distinguishing it from random behaviour, is carried out in [Section 7](#), the core of the paper. We move on in [Section 8](#) to looking at more disaggregated levels of price leadership. Finally, [Section 9](#) offers a brief conclusion relating the findings to the theory. We do not draw normative conclusions.

2. The analytical literature on price leadership

Amongst the main contributions to the modern literature on price leadership are [Rotemberg and Saloner \(1990\)](#), [Deneckere and Kovenock \(1992\)](#), [Deneckere et al. \(1992\)](#), [Pastine and Pastine \(2004\)](#), also [Maskin and Tirole \(1988\)](#), [Eckert \(2003\)](#) and [Noel \(2008\)](#). These papers' main focus is on all (both) firms in the market being strategic players, rather than one main actor together with a raft of passive firms, which was common in the more traditional literature.

Rotemberg and Saloner have a collusive story underlying their model; price leadership facilitates tacit collusion by one firm signalling to others that prices should rise. One firm raises its price and the other decides non-cooperatively whether to follow – this involves the usual tradeoff between the immediate benefits of deviating from this strategy against the longer-term benefits of holding to it. They show existence but go beyond this to characterise the equilibrium. The leader earns higher profit but leadership may emerge endogenously with the less informed firm wishing to follow the better informed. Interestingly,

leadership may be characterised by extensive periods of static prices after a leadership move upwards, because the follower benefits from rigid prices.

Again, endogenous leadership is an outcome of the Deneckere papers, although the underlying models differ. The Deneckere and Kovenock paper criticises the dominant firm pricing model, which comes from an earlier less rigorous tradition, under which a large firm with significant market share is assumed to take on the leadership role, the others being passive. In their duopoly game, when firms' capacities are in the range where the simultaneous game leads to mixed strategy solutions, a game of timing emerges with the high capacity player becoming the price leader. Deneckere et al. has firms who cannot discriminate between loyal consumers and others. The firm with the smaller loyal segment strictly prefers to be a price follower. Thus here consumer behaviour significantly influences the identity of the price leader, the firm with the larger loyal consumer base taking on the leadership role. Pastine and Pastine add to this analysis by noting two things. First, there should arguably be a cost of delay, however small, in making a later price announcement. Second, they allow firms to make price announcements at any time. This allows firms to mix over the timing of their pricing moves. Hence, occasional changes in the identity of the price leader will occur. Amir and Stepanova have a model where one firm enjoys lower costs than the other. Despite endogenous timing, in equilibrium a firm with sufficiently lower costs adopts the leadership role; that is it has a first-mover advantage.

In sum, our reading of this branch of the literature leads to several key conclusions. First, the identity of the leader is not assured – it may not be the largest firm, which is the traditional assumption. Second, following from this, the leader may differ over time or products – if for example loyalties shift, or multiproduct firms have strengths that vary across the product range. However, changes in the price leader's identity require some changes over time, or alternatively mixing over timing of moves. Third, leadership need not have collusion as its driving force. Nevertheless, it can result in higher prices than simultaneous pricing (Deneckere and Kovenock). Of the papers discussed above, only Rotemberg and Saloner focus on collusion as the driver. We are unable to test this prediction directly, but [Chevalier et al. \(2003\)](#) find little support for it.

The models covered so far focus attention on endogenous price leadership. A second strand of literature, relating to so-called Edgeworth cycles, has prices rising due to leadership, then falling by smaller amounts as firms in turn undercut rivals in order to dominate the market, before reaching a low point from which they are again raised. The basic theoretical framework is set out in [Maskin and Tirole \(1988\)](#) and the model has been extended by [Eckert \(2003\)](#) and by [Noel \(2008\)](#). Maskin and Tirole's model permits two possible equilibria. Under a non-trivial and possibly broad range of circumstances, firms engage in pricing behaviour of a "saw-tooth" style in one of their Markov-perfect equilibria, with substantial leader-driven price rises. Eckert shows that price cycle equilibria are more likely when relative firm sizes differ. One clear prediction: the smaller firm is the one more likely to undercut. For reasonable parameters, Noel shows using computational techniques that the saw-tooth pattern is robust to fluctuating marginal costs, mild product differentiation and asymmetry between firms. Price rises may be initiated due to cost hikes.

This Edgeworth cycle pattern has been observed in many gasoline retailing markets in the US, Canada, several European countries and Australia ([Wang, 2009](#)). Yet by no means all such markets exhibit these patterns (see e.g. [Lewis, 2011](#); [Noel, 2007, 2009](#); [Lewis and Noel, 2011](#); [Zimmerman et al., 2011](#)). Indeed, the market where the saw-tooth Edgeworth cycle pattern has been studied has almost always been gasoline retailing.

In our context, there are clearly many potential differences between gasoline markets and supermarkets/grocery markets. Most

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