On the Use of Low-Price Guarantees to Discourage Price-Cutting

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Abstract

This paper formulates a novel test to assess whether, and to what extent, firms might be using low-price guarantees to discourage rivals from cutting prices. The test is based on a comparison of paired observations of advertised prices set by competing firms at the same point in time on similar items, where one price is set by a firm that has a low-price guarantee and the other by a firm that does not have a guarantee. Using data on retail tire prices, we find that the majority of paired observations involving firms that have *price-matching* guarantees are consistent with what one would expect if firms were using them to discourage rivals from cutting prices, whereas the majority of paired observations involving firms that have *price-beating* guarantees are not. This suggests that price-matching and price-beating guarantees may be serving different purposes. The evidence also suggests that guarantees that apply to advertised prices only should be distinguished from guarantees that apply to actual selling prices.

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1 Introduction.

Retailers often advertise that they will not be undersold. Some firms promise to match any lower price offered by a competitor on a similar item (price-matching guarantee), while others promise to beat any competitor's lower price on the same item by some percentage of the difference (price-beating guarantee). Examples of companies offering these guarantees include *Tire Kingdom*, *Staples*, *Circuit City*, *Tesco* and *Sears*, and the scope of the coverage ranges from tires and office products on the one hand to electronics, grocery items, and general merchandise on the other.

Although low-price guarantees are popular among retailers, and consumers may say they like them, it is not obvious that consumers are better off with low-price guarantees than they would be without them. On the one hand, if a firm promises to match or beat any lower price, and its rival has a lower price, consumers can ask that the lower price be matched or beaten. All else equal, this makes consumers who are aware of the firm's low-price guarantee weakly better off.[1] On the other hand, if a firm has a low-price guarantee, its rival may have less to gain from lowering its price than if the firm did not have a guarantee (because if asked the firm would be committed to matching or beating the price), and so one would not expect the rival's prices to be the same in the two states of the world. To the extent that low-price guarantees alter firms' incentives and discourage price-cutting, consumers may be worse off with low-price guarantees than without.

In this paper we formulate a test to assess whether, and to what extent, firms might be using low-price guarantees to discourage rivals from cutting prices. The test is based on a comparison of paired observations of advertised prices set by competing firms at the same point in time on similar items (same make and model number), where one price is set by a firm that has a low-price guarantee and the other by a firm that does not have a guarantee. There are two possible outcomes. Either the firm that does not have a low-price guarantee has a higher advertised price than the firm with the low-price guarantee, or it has a weakly lower advertised price. In the latter case, we cannot rule out the possibility that the rival's low-price guarantee is inhibiting the firm from having an even lower price, and so we say that the observation is consistent with what one would expect if the firm with the low-price guarantee were using it to discourage price-cutting by its rival. However, in the former case, when the firm that does not have a low-price guarantee has a higher price, the gain to the firm from decreasing its price by a small amount is unaffected by its rival's low-price guarantee all else equal. In this case, we say that the observation is not consistent with what one would expect if low-price guarantees were being used to discourage price-cutting (the rival's low-price guarantee is not keeping the firm's price higher than it would otherwise be).

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[1] Consumers are strictly better off if they buy from the firm and request that the rival's price be matched or beaten.

Using data on tire prices advertised in Sunday newspapers, we pair price quotes on comparable items (same tire make and model number) in the same city on the same day, where one price quote comes from a firm that has a low-price guarantee and the other price quote comes from a firm that does not. If there is no relationship between low-price guarantees and advertised prices, we would expect that, when prices differ, the assignment of which firm has the higher price in each paired observation to be random. However, this hypothesis can be rejected at the 5% significance level for the sample of all low-price guarantees, the sample of price-matching guarantees only, and the sample of price-beating guarantees only. Surprisingly, given that there is a relationship, the evidence suggests that whether firms with low-price guarantees tend to have higher or lower prices than their competitors without low-price guarantees depends on the particular type of low-price guarantee being considered. The majority of paired observations involving price-matching guarantees are consistent with what one would expect if they were being used to discourage price-cutting, whereas the majority of paired observations involving price-beating guarantees are not.

Our results imply that in paired observations involving price-matching guarantees, the firms with the price-matching guarantees tend to have weakly higher advertised prices than the firms with no guarantees, whereas in paired observations involving price-beating guarantees, the opposite is true. The firms with the price-beating guarantees tend to have strictly lower advertised prices than their rivals. These results are surprising because they suggest that price-matching and price-beating guarantees might be serving different purposes in practice. The results are also surprising because one might have thought that, if anything, price-beating guarantees would be more effective at discouraging rivals from cutting prices than price-matching guarantees, not less effective.

The data also suggests that there is a difference between low-price guarantees that apply to firms' selling prices and low-price guarantees that apply to firms' advertised prices. We find that low-price guarantees that apply to firms' selling prices (whether of the price-matching or price-beating kind) are more likely to be consistent with their use as a device to discourage price-cutting than low-price guarantees that apply only to advertised prices. Moreover, within the sample of paired observations in which the low-price guarantee applies to advertised prices only, the difference between price-matching and price-beating guarantees is insignificant. These results support the claims made in recent theoretical studies (Edlin, 1997; Kaplan, 2000) which suggest that the key distinction in determining whether low-price guarantees may be facilitating higher prices is knowing whether the low-price guarantees apply to advertised prices only or whether they also apply to selling prices.

The rest of the paper is organized as follows. Section 2 provides an overview of related literature. Section 3 proposes a test to assess whether low-price guarantees might be discouraging price-cutting. Section 4 applies the test to paired observations of prices on similar items advertised by retailers on the same day and in the same newspaper. We focus on the differences between price-matching and price-beating guarantees, and between advertised and selling prices. Section 5 concludes.

2 Overview of related literature

Since our purpose is to assess the empirical relevance of the common view that low-price guarantees are used to discourage price-cutting, we focus on the strand of literature that was started by Hay

(1982) and Salop (1986). In the simplest version of their story, two firms sell a homogeneous product to fully informed consumers and there are no hassle costs. In the absence of price-matching guarantees, Bertrand competition leads to marginal-cost pricing for the usual reasons. However, with price-matching guarantees, there exists an equilibrium in which each firm adopts a price-matching guarantee and charges the monopoly price. Monopoly prices are supportable because neither firm has an incentive to undercut the other since each is committed to matching the lowest price.[2] This result has been extended to n firms (Doyle, 1988) and price-beating guarantees (Dixit and Nalebuff, 1991). It has been shown to be robust to whether the guarantees and prices are chosen simultaneously or sequentially (Chen, 1995), and to whether the firms' products are homogeneous or differentiated (Logan and Lutter, 1989). Its robustness to hassle costs has been considered by Hviid and Shaffer (1999). And it has been applied to important issues relating to product variety (Zhang, 1995), free entry (Edlin and Emch, 1999), and entry deterrence (Arbatskaya, 2001).

More recently, a debate has arisen over whether price-beating guarantees are more or less effective than price-matching guarantees in discouraging price-cutting when consumers are fully informed. Sargent (1993) argues that price-beating guarantees will be more effective because they have the potential to deliver more severe punishment. Corts (1995) and Hviid and Shaffer (1994) disagree. Corts posits a model with homogeneous firms and shows that the way to undercut a rival's price is, paradoxically, to adopt a price-beating guarantee and advertise a *higher* price. The difference in posted prices then causes the firm's guarantee to be invoked, resulting in a lower effective price to consumers. Hviid and Shaffer allow for differentiated firms and also find that low-price guarantees do not discourage price-cutting when price-beating guarantees are feasible. Thus, Corts (1995) and Hviid and Shaffer (1994) argue that Hay and Salop's insight is not robust.

However, subsequent literature has shown that the Corts and Hviid and Shaffer results implicitly assume that low-price guarantees apply to advertised prices and not to selling prices. For example, the firm that adopts the price-beating guarantee and raises its advertised price in Corts' model can only achieve a lower effective price provided its rival's low-price guarantee is not activated, which is the case only if its rival's low-price guarantee is limited to advertised prices. As Edlin (1997) and Kaplan (2000) argue, the ability of low-price guarantees (price-matching and price-beating) to support supracompetitive prices is restored if the guarantees apply to actual selling prices.

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[2] Other branches of the literature look at the use of low-price guarantees as a means of price discrimination (Png and Hirshleifer, 1987; Corts, 1997; and Chen et al, 2001), and as a signal of low-prices (Jain and Srivastava, 2000; and Moorthy and Winter, 2004). We will discuss our results in the context of these other models in section 4.

The empirical evidence on low-price guarantees is thin. Part of the problem is that it is difficult to construct the counterfactual 'what would each firm's price be if no firm had a low-price guarantee.' Hess and Gerstner (1991) come the closest to this ideal, as they have data on prices before and after a local supermarket adopted a price-matching policy.[3] They show that price-matching guarantees result in greater conformity in prices and slightly higher market-average prices for products included in the guarantee, relative to those not included in the guarantee. It is unknown to what extent these findings reflect the specific institutional features of the market they study.[4]

Arbatskaya et al (1999) conduct a cross-sectional study (across multiple markets) to analyze the effects of low-price guarantees on the retail tire prices of a particular tire, P185/75R14. They find that while a tire retailer's own price-matching or price-beating guarantee has no significant effect on the retailer's advertised tire price, an increase in the percentage of firms in the same market that offer low-price guarantees does tend to raise the firm's advertised tire price. Their data consists of price quotes from all firms that advertised a price on tire P185/75R14 in a Sunday newspaper in certain select cities over a multi-week period, whether or not the firms offered a low-price guarantee and whether or not other firms in the same market did or did not advertise a price on the same tire. Thus, they are unable to compare relative prices on identical items between firms that have low-price guarantees and firms in the same market that do not, nor does their data allow them to distinguish between low-price guarantees that apply to advertised prices only and low-price guarantees that apply to actual selling prices, which are key features of our analysis.

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[3] One of the supermarkets in their study had a price-matching guarantee throughout the period of study, which complicates the interpretation of their results. For example, it may be that most of the price-raising effects of low-price guarantees occur when the first firm adopts a guarantee, and that subsequent adoption raises prices very little.

[4] The supermarkets studied by Hess and Gerstner matched the prices of the low-price supermarket, *Food Lion*, by automatically lowering the shelf prices of their products. They also regularly published extensive price lists for the products included under their guarantees (over 9,000 items). These factors may have helped facilitate price coordination between firms irrespective of the low-price guarantees. In most other industries, though, firms do not publish extensive price lists, and they match or beat lower prices selectively—only for consumers who ask for refunds.

Arbatskaya et al (2004) document the incidence and variety of low-price guarantees and suggest that there are important differences in the language of price-matching and price-beating guarantees with respect to the number of restrictions imposed and how much search consumers are allowed, e.g., whether consumers are allowed a grace period of 30 days or more to request a refund. The results in this paper support the view that these guarantees may be serving different purposes, but we differ in that we have data on prices and can directly test for price differences between firms.

3 Theory

We begin with a well-known stylized fact. In many retail markets, one can find firms that have low-price guarantees and firms that do not. This is the case, for example, among U.S. firms selling tires. Theory has offered a variety of reasons to explain why these asymmetric outcomes may arise.[5] What has gone unnoticed, however, is the following testable implication. In a comparison of prices on similar items between a firm that has a low-price guarantee and one that does not, the firm with the guarantee must have weakly higher prices if its guarantee is to discourage price-cutting.

We use this insight to formulate an indirect test to assess whether a firm's low-price guarantee may be discouraging its rival from cutting prices (henceforth we will call this effect *pairwise facilitation*). The test is based on prices advertised by the firm and its rival. Before providing a formal definition of pairwise facilitation, we discuss the concept informally. Consider the following two scenarios that can arise when one firm has a low-price guarantee and the other does not. In the first situation, the firm with the low-price guarantee posts a price of $65 and the firm without a low-price guarantee posts a price of $60. In the second situation, the prices are reversed. What can we conclude about the ability of the low-price guarantee to discourage price-cutting in each case?

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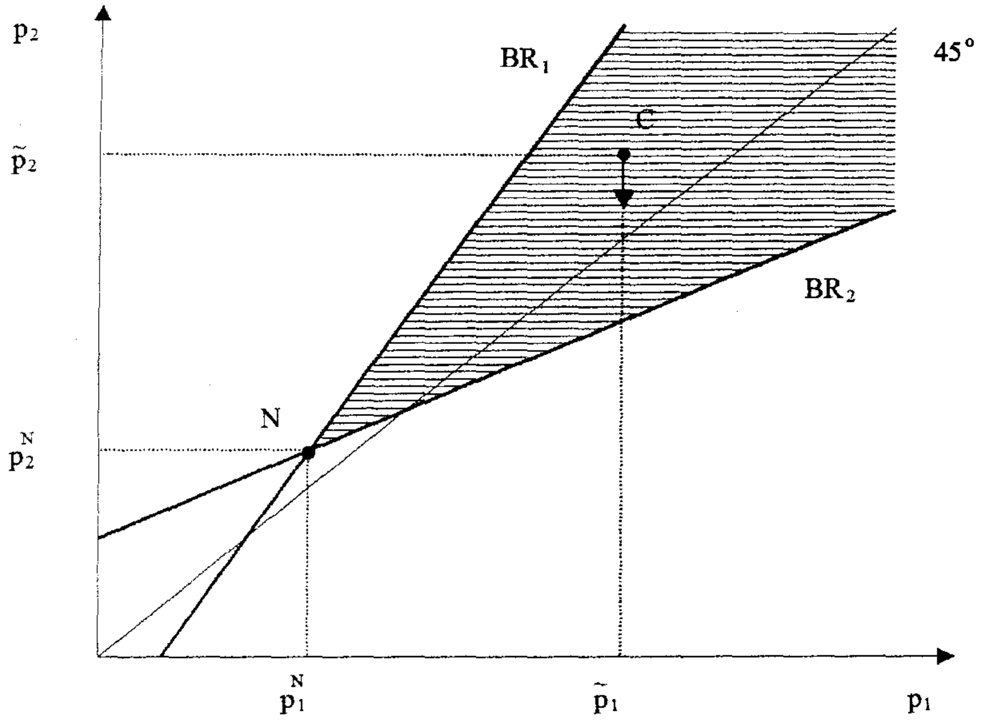
[5] Asymmetric outcomes in which only some firms have low-price guarantees arise in Logan and Lutter, 1989; Corts, 1997; Hviid and Shaffer, 1999; Jain and Srivastava, 2000; Chen et al, 2001; and Moorthy and Winter, 2004.

If the price of the firm that does not have a low-price guarantee is $60 and its rival's price is $65, then we cannot say for sure whether the firm that was pricing at $60 would have preferred to price at $59 were it not for its rival's guarantee. It may be, for example, that the number of consumers who would stop buying from the firm and invoke the rival's guarantee is increasing in the difference between the two firms' prices. To illustrate an extreme case, suppose the hassle costs of asking the rival to match or beat the firm's price is $5 for all consumers. Then no one would be willing to invoke the rival's guarantee when the price difference is $5 but they would be willing to invoke the rival's guarantee if the price difference were more than $5. On the other hand, if the firm's price is $65 and its rival's price is $60, then we definitely know that the firm is not constrained in cutting price. Indeed, the firm would be able to cut its price by as much as $5 before it would even have to worry about its rival's low-price guarantee being invoked. In this case, we can reject any hypothesis which asserts that the rival's low-price guarantee is discouraging the firm from cutting its price.

We can illustrate these points in Figure 1, which depicts the best-response functions of firms competing simultaneously in prices. Let point N denote the Bertrand-Nash equilibrium. Then, if neither firm has a low-price guarantee, equilibrium prices are (p_1^N, p_2^N) in a static non-cooperative price game. Without low-price guarantees, theory suggests that each firm has an incentive to reduce its price in the shaded region between the firms' best-response functions. However, when one firm has a low-price guarantee, theory suggests that some of these points may be sustainable, depending on market asymmetries, the hassle costs of requesting refunds, and which firm has the higher price.

In particular, theory suggests that supracompetitive prices can only be sustained if the firm with the low-price guarantee has a weakly higher price than the firm without a low-price guarantee. To

Figure 1: Best-Response Functions of Firms 1 and 2



see this, suppose to the contrary that there exists an equilibrium with supracompetitive prices in which only firm 1 has a low-price guarantee and firm 1's price is lower than firm 2's price, as depicted by the point $(\tilde{p}_1, \tilde{p}_2)$ in the shaded region between the firms' best-response functions and above the 45^o line ($\tilde{p}_2 > \tilde{p}_1$). We want to know if such a point is sustainable. The answer is no because with $\tilde{p}_2 > BR_2(\tilde{p}_1)$, firm 2 would find it profitable to reduce its price while still maintaining its price above that of firm 1 so as not to activate firm 1's low-price guarantee. This contradicts the supposition that prices $(\tilde{p}_1, \tilde{p}_2)$ are mutual best-responses for the firms and form an equilibrium.

These arguments are formalized in the next subsection for markets with an arbitrary number of firms. We propose the following test for pairwise facilitation: if a firm's low-price guarantee is to discourage price-cutting by its rival, then the firm must be advertising a weakly higher price.

3.1 Preliminaries

In order to formally define pairwise facilitation in an oligopolistic market, it is helpful to introduce some notation. Let $I = \{1, ..., n\}$ denote the set of $n \geq 2$ firms in a market. For $i \in I$, let $p_i \in [0, \infty)$ denote firm i's advertised price, and let $g_i \in \{PM^a, PB^a, PM^s, PB^s, \varnothing\}$ denote its low-price guarantee policy, where PM^a means that firm i has adopted a price-matching guarantee that applies to its rivals' advertised prices only, PB^a means that firm i has promised to beat a rival's lower advertised price by some percentage of the difference, PM^s means that firm i has adopted a price-matching guarantee that applies to its rivals' selling prices, PB^s means that firm i has promised to beat a rival's lower selling price by some percentage of the difference, and $\varnothing$ means that firm i has chosen not to have a guarantee.[6] Denote as the 'low-price guarantee–price game', a game in which firms choose their advertised prices and low-price guarantee policies simultaneously.[7]

Since our purpose is to examine whether low-price guarantees might be discouraging price-cutting, we follow the Hay-Salop line of literature and assume that all consumers are fully informed about all prices and low-price guarantees and, for now, that consumers incur no hassle costs when requesting refunds.[8] Thus, each firm will have at most one selling price.[9] When it exists, we can write firm i's selling price as a function of the advertised prices and low-price guarantee policies of all firms in the market, $s_i = s_i(p, g) \in [0, \infty)$, where p is the vector of advertised prices and g is the vector of low-price guarantee policies. For example, if firm i does not have a low-price guarantee, its selling price is equal to its advertised price, $s_i = p_i$. If firm i promises to match any advertised price, its selling price is equal to the minimum of all advertised prices in the market, $s_i = \min(p_1, ..., p_n)$, and if firm i promises to beat any lower advertised price by λ times the difference, then $s_i = \min(p_1, ..., p_n) - \lambda(p_i - \min(p_1, ..., p_n))$.[10] In each case, we have $s_i \leq p_i$. Writing the expression for s_i is more complicated when firm i's low-price guarantee applies to its rivals' selling prices, and some restrictions must then be placed on λ to ensure that all selling prices converge in equilibrium, but given these restrictions, it can once again be shown that $s_i \leq p_i$.

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[6] We restrict attention to the four types of low-price guarantees found in our data. For a more extensive characterization of the various types of low-price guarantees that one finds in practice, see Arbatskaya et al (2004).

[7] Our results also extend to a game in which low-price guarantees and prices are chosen sequentially.

[8] Hviid and Shaffer (1999) introduce a model in which the existence of hassle costs, even if they are arbitrarily small, can mitigate (and in some cases, eliminate) the ability of low-price guarantees to discourage price cutting.

[9] With uninformed consumers and hassle costs, we would have to keep track of multiple selling prices for each firm.

The profit function of firm j depends on the selling prices of all firms:

$$\Pi_j(s_1, ..., s_n) = \Pi_j(s_1(p, g), ..., s_n(p, g)), \;\; j \in I.$$

We assume that Π_j is twice continuously differentiable and concave. We also assume that selling prices are strategic complements, $\frac{\partial^2 \Pi_j(s_1, ..., s_n)}{\partial s_i \partial s_j} \geq 0$, $i \neq j$, and that the set of profit-maximizing prices for firm j, for any vector of rival prices, p_{-j}, and low-price guarantees, g, is non-empty:

$$BR_j(p_{-j}, g) \equiv \arg\max_{p_j} \Pi_j(s_1(p, g), ..., s_n(p, g)). \tag{1}$$

Finally, we assume that firm j's best response is unique if it does not have a low-price guarantee. Given these assumptions on Π_j and $BR_j(p_{-j}, g)$, we can define pairwise facilitation as follows:

Definition: Consider an equilibrium (p^*, g^*) to the low-price guarantee–price game in which firm i has a low-price guarantee and firm j does not, $i, j \in I$. Let $g^{*i} = (g_1^*, ..., g_i = \varnothing, ..., g_n^*)$ for all $i \neq j$. Then, we say that firm i's low-price guarantee *facilitates* firm j's price in this equilibrium if

$$p_j^* \equiv BR_j(p_{-j}^*, g^*) > BR_j(p_{-j}^*, g^{*i}). \tag{2}$$

In other words, firm i's low-price guarantee facilitates firm j's price in an equilibrium (p^*, g^*) if in the absence of firm i's guarantee firm j would want to lower its advertised price, holding all other advertised prices and low-price guarantees fixed. We refer to this situation as pairwise facilitation.

3.2 Test for Pairwise Facilitation

Having defined pairwise facilitation, we can now formulate a test for it based on observations of prices and low-price guarantees chosen by pairs of firms. Consider two competing firms selling a similar item, one with a low-price guarantee (firm i) and the other without (firm j). What should be true about the relationship between advertised prices p_i and p_j? On the one hand, if there is no relationship between low-price guarantees and advertised prices, then we would expect p_i to be higher or lower than p_j with equal probability. On the other hand, if firms are using low-price guarantees to discourage price cutting, then we would expect firm i's guarantee to be facilitating firm j's price, which by the following proposition, implies that firm i's price must be weakly higher.

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[10] For example, if firm i has a guarantee in which it promises to beat any lower price by 50%, then $\lambda = .5$.

Proposition 1: Consider an equilibrium (p^*, g^*) to the low-price guarantee–price game in which firm i has a low-price guarantee and firm j does not. If firm i's low-price guarantee is facilitating firm j's price then firm i must be advertising a weakly higher price, $p_i^* \geq p_j^*$, $i \neq j \in I$.

Proof. See Appendix A.

We can sketch the intuition for the proof of Proposition 1 as follows. If firm j had the strictly higher advertised price in equilibrium, so that $p_j^* > p_i^*$, then we would be able to conclude immediately that firm j does not have the lowest selling price in the market , and therefore that all other firms' selling prices are independent of firm j's advertised price in the neighborhood of p_j^*. This is important because when it is combined with the observation that, for fixed advertised prices, the existence of firm i's low-price guarantee can only (weakly) reduce all selling prices in the market and the assumption that selling prices are strategic complements, it follows that firm j would not choose to lower its advertised price in the absence of firm i's adoption of a low-price guarantee. But this contradicts the supposition that firm i's low-price guarantee facilitates firm j's price.

Note that the condition in Proposition 1 is necessary but not sufficient for firm i's low-price guarantee to facilitate firm j's price. That is, it is possible that $p_i^* \geq p_j^*$ holds in equilibrium and yet at the same time firm i's low-price guarantee does not facilitate firm j's price. To see this most clearly, consider the case of two firms which produce a homogeneous product at a constant marginal cost c. Then, there exists an equilibrium in which firm i has a low-price guarantee and $p_j^* = p_i^* = c$, and yet, given p_i^*, firm j would have no incentive to change its price even in the absence of firm i's low-price guarantee. In this case we have an example in which the condition in Proposition 1 is satisfied but firm i's low-price guarantee is not facilitating firm j's price. Thus, Proposition 1 and the test for pairwise facilitation that is based on it (see below) should be interpreted with some caution. When we say that the evidence is consistent with what one would expect if firm i were using its guarantee to discourage price-cutting by firm j, we mean that we cannot rule it out.

Test for Pairwise Facilitation: An observation is *not* consistent with pairwise facilitation if the firm with a low-price guarantee advertises a lower price than the firm without a guarantee. An observation is consistent with pairwise facilitation in the sense that we cannot rule it out if the firm with a low-price guarantee advertises a weakly higher price than the firm without a guarantee.

The test for pairwise facilitation is a direct application of Proposition 1. Thus, we can reject the notion of pairwise facilitation if the firm with a low-price guarantee advertises a lower price than the firm without a guarantee. However, we know from the discussion above that the converse is not necessarily true. If the firm with a low-price guarantee instead advertises a weakly higher price than the firm without a guarantee, then pairwise facilitation may or may not be satisfied.

The test is simple and yet it can be used in a wide variety of environments. Notice that the statement in Proposition 1 holds regardless of the number of firms in the market and whether or not there are asymmetries. Therefore, to apply the test for pairwise facilitation we do not need to have information on the number, cost, or demand characteristics of the firms in the market.[11]

This is an important point because in the environment that we consider– the retail tire market– firms are typically not homogeneous. There are reasons to believe that prices will differ across firms even in the absence of low-price guarantees and that consumers may have strong preferences over where to shop. Consider, for instance, two sellers: (a) National Tire and Battery (NTB), a seller with a wide national network; and (b) Barney's Tires, a local single-store seller. Now consider an identical Goodyear tire being sold by both. Setting aside any strategic considerations, a priori it is difficult to say whether NTB's price will be higher or lower. First, NTB is buying thousands of tires from Goodyear and they would potentially be in a position to sell for less due to volume discounts they get from Goodyear while purchasing tires. Second, NTB offers many more services at their stores and a nationwide warranty for replacement and repair. Due to these additional aspects, NTB's price could be higher. The net effect, of course, is far from clear. Moreover, due to NTB's additional services, the composite of the 'product plus services' will not in general be the same and so many consumers may not view these two tire shops as strong substitutes. Think of a person exclusively stays in town versus a sales representative who travels a lot. The latter may well prefer to shop at NTB over Barney's due to its wide geographic (nationwide) service area.

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[11] We have assumed that consumers can costlessly invoke low-price guarantees. If they must incur a hassle cost, $h > 0$, to obtain a refund, then $p_i^* > p_j^*$ must be satisfied if firm i's low-price guarantee is to facilitate firm j's price.

While all of these observations are important and relate to the underlying cost and demand asymmetries that may be present in the industry, our analysis takes this as a starting point and asks whether the adoption of a low-price guarantee, whether by NTB or Barney's, might be facilitating the other's prices over and above what would exist in the absence of the guarantee, holding all other advertised prices and low-price guarantee choices constant. If it turns out that Barney's, for example, has both a low-price guarantee and lower prices than NTB, then the answer is no. Barney's low-price guarantee cannot be said to be discouraging NTB from price-cutting. If, on the other hand, Barney's has higher prices than NTB, then we must be more cautious in our conclusion but we cannot rule out the possibility that price-cutting on the part of NTB is being discouraged.

4 Evidence from Retail Tire prices

Our data comes from advertisements placed by automobile tire dealers in sixty-one Sunday newspapers dated between September 29 and December 8, 1996. The newspapers were back issues of unsold stock at a national retail chain and represented twenty-seven different cities in the United States.[12] We chose to study the U.S. tire market because: (1) tire dealers advertise frequently in the U.S. Sunday newspapers: all but three newspapers had at least one ad from a tire dealer, and all but seven had two or more ads; (2) each advertisement typically contains a large number of price quotes on different makes and models; (3) the model numbers on tires are standardized, allowing for price comparisons and ensuring the applicability of low-price guarantees; (4) low-price guarantees are frequently adopted in this market and their features vary across firms, which enables us to study how the characteristics of low-price guarantees affect the incidence of pairwise facilitation.

We collected information about tire prices from the ads placed by all tire dealers who advertised in our Sunday newspapers, whether or not a low-price guarantee was offered by the advertising firm. We found a total of two-hundred and thirteen tire ads, of which ninety eight contained a low-price guarantee. In the event a firm had a low-price guarantee, we also gathered information about the actual wording of the guarantee, classifying it as either price-matching or price-beating.

An example of a price-matching guarantee is "We have the lowest prices in town—guaranteed" and "We won't be undersold." We classified these as price-matching because the firm makes no promise to beat a rival's lower price. Other firms do make this promise. An example of a price-beating guarantee is the advertisement from Just Tires, *Baltimore Sun*, September 29, 1996:

> Find a lower *advertised* price in your local newspaper on any tires you purchased from us within 30 days of purchase, and we'll refund 125% of the difference.

Over 60 percent of the low-price guarantees in the tire ads are of the price-beating kind (60/98), and almost all of these promise to beat by some percentage of the difference in prices. In the above guarantee, Just Tires promises to beat any competitor's lower price by 25% of the difference in prices. We also have low-price guarantees in which the price-beating percentages are 10% and 50%.

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[12] To verify that the twenty-seven newspapers were representative of the top fifty U.S. Sunday newspapers, we applied the t-test for equal means to the 1996 circulation figures as reported in the *Wall Street Journal Almanac*.

Edlin (1997) and Kaplan (2000) suggest that whether a firm's guarantee applies only to advertised prices or also to selling prices is important. The low-price guarantee above is an example of the former because it explicitly states that the guarantee only applies to advertised prices. In contrast, Tires Plus' low-price guarantee "150% Best Price Guarantee—We'll Meet or Beat *any* Tire Price" is an example of a guarantee that applies to the rival's best deal, or selling price.

Although the majority of low-price guarantees are easily classified as one or the other, in some cases, the guarantees are ambiguously worded, neither explicitly referring to the rival's advertised price nor making it clear that the guarantee applies to the rival's best deal. The claim "We won't be undersold' is a classic example. This type of guarantee accounts for almost 37 percent of our total (36/98). In all, 80 percent of the price-beating guarantees are based on advertised prices (48/60), while the majority of the price-matching guarantees are ambiguously worded (26/38).

As mentioned above, in addition to the actual tire prices, retailers may vary in other charges associated with putting on new tires, as well as in services like mounting, warranties, lifetime rotation, and balancing, making the composite of the 'product plus services' value difficult to ascertain. However, while this value may be relevant for consumers in determining where to shop, it is not typically needed for determining whether a firm's low-price guarantee applies, because firms' low-price guarantees typically apply only to the cost of the actual tires, as long as the price quote is legitimate and the tires are comparable. Thus, to ensure the applicability of a firm's guarantee, we discarded price observations unless they came from competing firms advertising the same model make and number (e.g., Goodyear tires, P185/75R14) on the same date in the same city and newspaper. Formally, we define a 'tire match' observation to be a pair of price quotes on the same tire make and model from two competing tire dealers advertising in the same city on the same date and in the same newspaper. We included all such pairs in the data.[13] When one firm in the tire-match offers a low-price guarantee and the other does not, we denoted the case as 'No LPG - LPG.' We have one-hundred and forty-three 'No LPG - LPG' tire matches in our data.

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[13] The empirical tests that we employ assume that observations are independent random draws. The assumption could be violated because in some cases we collected multiple observations on prices for a pair of tire dealers and we included all possible tire matches when more than two tire dealers advertised the same tire in the same newspaper

4.1 Testing for Randomness

A good place to start in analyzing the data is to see whether low-price guarantees have *any* directional effect on advertised prices, or whether, when tire prices differ, the assignment of which firm has the higher price in each tire match is random. For example, if low-price guarantees are not associated with advertised prices in any way, then we would expect a firm with a strictly higher price in a No LPG - LPG tire match to be as likely to have a low-price guarantee as not. That is, we would expect the LPG firm to be as likely as the non LPG firm to have the higher price.

Hypothesis 1 (H1: Randomness). When tire prices differ in a No LPG - LPG tire-match, the firm with a low-price guarantee has the same probability as its rival of having the higher price.

To test for randomness, we employ a Fisher sign test. The test has a number of advantages over other statistical methods. It is non-parametric – it does not rely on any distributional assumptions – and the population from which each pair of observations is drawn does not have to be the same for it to be valid. This is important since in our data tire matches are gathered in different markets and for different tires. The sign test is an exact test and it can be applied in small samples.[14]

To apply the test to our data we look at the sign of the difference between the prices of the two firms for each pair of price observations. The zero values for price differences (i.e., equal prices) are discarded and the sample size is redefined accordingly. The sign statistic is the number of positive price differences, i.e., the number of cases where the firm with the low-price guarantee (LPG firm) has a higher price than the firm without a low-price guarantee (no-LPG firm). A large test statistic suggests that an LPG firm is more likely to have a higher price than a no-LPG firm, while a small

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on the same date. We also implicitly assume that two tire dealers advertising in the same newspaper are competitors when one of them has a low-price guarantee. This may be justified by the fact that the advertisements are in the same newspaper, and the guarantee itself links the two firms since they must account for each other's price.

[14] See Hollander and Wolfe (1999) for further details on the Fisher sign test.

Table 1. Testing for Randomness

Low-Price Guarantee Type	Alternative Hypotheses		
	H1a: $\pi \neq 0.5$	H1b: $\pi > 0.5$	H1c: $\pi < 0.5$
All LPGs	0.025*		0.012*
Price-Matching LPG	0.029*	0.014*	
Price-Beating LPG	0.000**		0.000**

* denotes significance at a 5 percent level; ** denotes significance at a 1 percent level.

test statistic indicates that an LPG firm is more likely to have a lower price. For a sufficiently large or small signed rank statistic we can reject the two-sided null hypothesis H1.

The null hypothesis can be stated as follows: The probability of a positive (rather than negative) price difference between the prices of the LPG and no-LPG firms is 0.5:

$$H1 : \pi \equiv \Pr\left(p_{LPG} - p_{noLPG} > 0 | p_{LPG} \neq p_{noLPG}\right) = 0.5.$$

Table 1, which reports the p-values for the test of the null hypothesis H1 against the alternatives H1a, H1b, and H1c, shows that the sign test allows us to reject the null hypothesis in favor of the two-sided alternative H1a: $\pi \neq 0.5$ for the population of all No LPG - LPG tire matches, the population of price-matching guarantees only, and the population of price-beating guarantees only. The p-values for the first two populations are smaller than 5 percent and the p-value for the third population is smaller than 1 percent. Thus, we find that in all three populations, the probability of a positive price difference is not equal to the probability of a negative price difference.

Surprisingly, whether the LPG firm is more likely to have a higher or lower price than the no-LPG firm depends on the type of low-price guarantee it has. One-sided sign tests reveal that for tire-matches with price-matching guarantees, the LPG firm is more likely to have a higher price, while the opposite is true for tire-matches with price-beating guarantees. In particular, the sign test allows us to reject the null hypothesis H1 in favor of the one-sided alternative H1b: $\pi > 0.5$ for the population of price-matching guarantees, and it allows us to reject the null hypothesis H1 in favor of the one-sided alternative H1c: $\pi < 0.5$ for the population of price-beating guarantees.

The p-value for the Upper-Tail test is less than 5 percent. The p-value for the Lower-Tail test is less than 1 percent. Given that different one-sided alternatives are favored, these results suggest that price-matching and price-beating guarantees may be serving different purposes in practice.

4.2 Testing for Pairwise Facilitation

The Hay (1982) and Salop (1986) view of low-price guarantees is that they are adopted to discourage price-cutting. However, most of the literature fails to distinguish between price-matching and price-beating guarantees and between guarantees that apply to rivals' advertised prices and those that apply to rivals' selling prices. Table 1 suggests that this lack of distinction may not be innocuous with respect to the type of LPG, and recent theoretical claims by Edlin (1997) and Kaplan (2000) suggest that whether the guarantees apply to advertised or selling prices will also be important.

In this subsection, we apply the test of pairwise facilitation to our sample of tire-matches. We say that an observation is consistent with pairwise facilitation (in the sense that we cannot rule it out) if the price of the LPG firm is weakly higher than the price of the no-LPG firm, and it is not consistent with pairwise facilitation if the price of the LPG firm is strictly lower than the price of the no-LPG firm. Table 2 presents the raw data with the ambiguously worded LPGs and LPGs that apply to rivals' selling prices lumped together in the category 'Not Advertised-Price LPG.' As we will show in Appendix B, our qualitative results are broadly similar if the ambiguously worded LPGs are instead lumped together with LPGs that apply only to rivals' advertised prices.

Table 2 shows that a firm with a price-matching guarantee has the weakly higher price in 75 percent of the cases in which it is compared with a firm that does not have an LPG, whereas a firm with a price-beating guarantee has the weakly higher price in only 40.4 percent of the cases. In the second set of rows, we see that low-price guarantees that apply to advertised prices are consistent with pairwise facilitation in 31.65 percent of the cases, whereas low-price guarantees that are not restricted to advertised prices are consistent with pairwise facilitation in 75 percent of the cases. In

Table 2. **Incidence of Pairwise Facilitation.**

No LPG - LPG Type	Consistency with Pairwise Facilitation	Number of Tire Matches
No LPG - Price-Matching LPG	75.00%	44
No LPG - Price-Beating LPG	40.40%	99
No LPG - Advertised-Price LPG	31.65%	79
No LPG - Not Advertised-Price LPG	75.00%	64
No LPG - Advertised-Price **PM**	25.00%	8
No LPG - Not Advertised-Price **PM**	86.11%	36
No LPG - Advertised-Price **PB**	32.39%	71
No LPG - Not Advertised-Price **PB**	60.71%	28

the third set of rows, consistency with pairwise facilitation ranges from a low of 25 percent in the population of price-matching guarantees that apply to advertised prices to a high of 86.11 percent in the population of price-matching guarantees that are not restricted to advertised prices.

If an observation is equally likely to be consistent or not with pairwise facilitation, then we would expect to observe consistency in 50 percent of the cases. We formalize this as follows.

Hypothesis 2 (H2: Pairwise Facilitation). The pair of tire prices in a No LPG - LPG tire-match are as likely to be consistent with pairwise facilitation as not.

To test for pairwise facilitation, we employ the same sign test as before, assigning a positive number to tire matches that are consistent with pairwise facilitation and a negative number to tire matches that are not consistent with pairwise facilitation. The null hypothesis to be tested is

$$H2 : \tilde{\pi} \equiv \Pr\left(p_{LPG} - p_{noLPG} \geq 0\right) = 0.5.$$

Table 3, which reports the p-values for the test of the null hypothesis H2 against the alternatives H2a, H2b, and H2c, shows that the sign test allows us to reject the null hypothesis H2 in favor of the two-sided alternative H2a: $\tilde{\pi} \neq 0.5$ for the population of price-matching guarantees only, the population of low-price guarantees that apply only to rivals' advertised prices, and the population of low-price guarantees that are not restricted to rivals' advertised prices. More importantly, Table 3 shows that for the tire-matches with price-matching guarantees, the LPG firm is more likely to

Table 3. Testing for Pairwise Facilitation.

Low-Price Guarantee Type	Alternative Hypotheses		
	H2a: $\tilde{\pi} \neq 0.5$	H2b: $\tilde{\pi} > 0.5$	H2c: $\tilde{\pi} < 0.5$
Price-Matching LPG	0.001^{**}	0.001^{**}	
Price-Beating LPG	0.070		0.035^{*}
Advertised-Price LPG	0.001^{**}		0.001^{**}
Not Advertised-Price LPG	0.000^{**}	0.000^{**}	
Advertised-Price **PM**	0.289		0.145
Not Advertised-Price **PM**	0.000^{**}	0.000^{**}	
Advertised-Price **PB**	0.004^{**}		0.002^{**}
Not Advertised-Price **PB**	0.185	0.092	

* denotes significance at a 5 percent level; ** denotes significance at a 1 percent level.

have the weakly higher price, whereas the opposite is true for the tire-matches with price-beating guarantees. In particular, the sign test allows us to reject the null hypothesis H2 in favor of the one-sided alternative H2b: $\tilde{\pi} > 0.5$ for the population of price-matching guarantees, and it allows us to reject the null hypothesis H2 in favor of the one-sided alternative H2c: $\tilde{\pi} < 0.5$ for the population of price-beating guarantees. The p-value for the Upper-Tail test is less than 1 percent. The p-value for the Lower-Tail test is less than 5 percent. Simply put: price-matching guarantees are consistent with pairwise facilitation in a majority of the cases whereas price-beating guarantees are not.

The one-sided tests also provide confirming evidence for the importance of matching or beating advertised prices versus matching or beating selling prices in determining whether the majority of paired observations involving firms that have low-price guarantees are consistent with what one would expect if firms were using them to discourage rivals from cutting prices. These tests reveal that for tire-matches with LPGs that apply only to advertised prices, the LPG firm is less likely to have the weakly higher price, while the opposite is true for tire-matches with LPGs that are not restricted to advertised prices. In particular, the sign test allows us to reject the null hypothesis H2 in favor of the respective one-sided alternatives for both populations at the 1 percent level.

Overall, the empirical evidence supports the view that price-matching guarantees differ from price-beating guarantees in purpose; that observations with price-matching guarantees are more likely to be consistent with pairwise facilitation than observations with price-beating guarantees (indeed, the majority of observations with price-beating guarantees are not consistent with discouraging price-cutting); that it matters whether low-price guarantees are based only on advertised prices or also on selling prices; and that observations with guarantees that are based only on advertised prices are less likely to be consistent with pairwise facilitation. Importantly, the data does not support the view that price-matching and price-beating guarantees are primarily being adopted to discourage price-cutting. Most price-beating guarantees do not seem to be adopted to discourage price-cutting, and even when we are unable to reject the hypothesis that the majority of observations with price-matching guarantees are consistent with discouraging price-cutting, the observed low-price guarantee-price patterns could alternatively be explained by the use of low-price guarantees to implement effective price discrimination, not necessarily to facilitate higher prices (for models of low-price guarantees in which price-discrimination is the primary motive, see Corts, 1997; and Chen et al, 2001). As both of these rationales for low-price guarantee adoption imply higher advertised prices for the firm with the low-price guarantee, the empirical assessment of prices consistent with pairwise facilitation does not allow us to discriminate between the two theories. However, we can be confident that when pairwise-facilitation is not supported in the data, the low-price guarantee cannot be said to be discouraging price-cutting. One would then have to appeal to the literature that considers the use of low-price guarantees as a way to signal low prices to explain these observations (see Jain and Srivastava, 2000; and Moorthy and Winter, 2004).

5 Conclusion

There are many approaches that one can use to assess whether, and to what extent, the use of low-price guarantees in practice is or is not consistent with firms using them to discourage price-cutting. One approach is to compare the average prices of firms with low-price guarantees in a market to those of firms without low-price guarantees in the same market. However, this approach is problematic because it implicitly assumes that absolute price differences matter in facilitating higher prices, and moreover it is prone to selection bias, which may arise due to an association between low-price guarantee adoption and unobserved product heterogeneities. For example, if low-price guarantees are adopted by firms that sell product lines with more higher-end tires, then higher average prices at low-price guarantee firms cannot be fully attributed to the low-price guarantee policies. Nor is such a comparison valid unless one can be sure that the firms' product lines overlap. For example, most guarantees only apply to tires of the same make and model, which makes comparing Goodyear tires to Firestone tires problematic. Even if the product lines and proportions sold of each item are identical between firms, a comparison of the average prices of firms with and without low-price guarantees may still be misleading if there are outliers in some of the prices, e.g., a firm may have a lower price on 99 of 100 products but if the price difference on the last product is sufficiently large, it may well have the higher average price.

A second approach is to compare the average price (across all markets) on a particular item set by firms with low-price guarantees to the average price (across all markets) on the same item set by firms with no low-price guarantees (e.g. Arbatskaya, 1999). Unfortunately, this approach is also problematic and its interpretation can be misleading. Suppose, for example, that for a particular product there are four firms with low-price guarantees and prices of 50, 40, 30, and 80, respectively, and three firms with no guarantees and prices of 51, 41, and 31. In this case the average price of the firms with low-price guarantees is clearly higher than the average price of the firms without guarantees. But, without more information, we would not be able to say anything about pairwise facilitation. Indeed, the data is consistent with the absence of any pairwise facilitation. Suppose the prices (50, 51) come from market 1, prices (40,41) come from market 2, prices (30,31) come from market 3, and the price 80 comes from market 4. Then the data is inconsistent with pairwise facilitation in markets 1, 2, and 3, and there is simply no basis for comparison in market 4.

Our approach avoids these criticisms by ensuring that the markets in which the firms compete are the same, making sure that the products to be compared are the same, and looking only at relative, not absolute, prices. To this end, we collected *paired observations* on prices for same make and model automobile tires which were advertised by tire dealers in the same market at the same point in time in the same Sunday newspaper. We then checked whether, and to what extent, the necessary condition for pairwise facilitation was met. The intuition behind the test for *pairwise facilitation* is as follows: if firms are using low-price guarantees to discourage price-cutting, then a firm with a guarantee should be advertising a weakly higher price than a firm without a guarantee.

We found that the empirical evidence supports the view that firms may be adopting price-matching guarantees for different reasons than price-beating guarantees; observations with price-matching guarantees were more likely to be consistent with pairwise facilitation than observations with price-beating guarantees. Indeed, in the majority of cases, we found that observations involving price-beating guarantees were not consistent with firms using them to discourage price cutting. We have also found that whether the guarantees are based on advertised prices or selling prices matters; observations with guarantees that are based on advertised prices are less likely to be consistent with pairwise facilitation. Importantly, the data does not support the view that price-matching and price-beating guarantees are primarily being adopted by firms to discourage price-cutting.

Our empirical findings should be interpreted as suggesting that in many cases a firm's low-price guarantee cannot be said to be discouraging price-cutting (the data violates our necessary condition). In other cases, however, our findings suggest only that the evidence is consistent with pairwise facilitation. In this sense the interpretation of our findings is not symmetric. In the cases where the evidence is consistent with pairwise facilitation, one would need to obtain some further empirical evidence (for example, one could collect prices before and after low-price guarantees were adopted) before one could definitively assert that low-price guarantees were facilitating prices.

Lastly, our results suggest that the focus of the recent literature (Edlin, 1997; Kaplan, 2000; Arbatskaya et al, 2004) on the particulars of low-price guarantees is well-justified. We have found that it matters whether the low-price guarantee is price-matching or price-beating, and whether it is based on advertised or selling prices. It is our hope that future work will further the study of the interactions between these low-price guarantee features and their effects on market prices.

Appendix A

Proposition 1: Consider an equilibrium (p^*, g^*) to the low-price guarantee-price game with n firms in which firm i has a low-price guarantee and firm j does not. If firm i's low-price guarantee is facilitating firm j's price then firm i must be advertising a weakly higher price, $p_i^* \geq p_j^*$, $i \neq j \in I$.

Proof. Consider an equilibrium (p^*, g^*) in which firm i has a low-price guarantee and firm j does not. Using (1) and (2), firm i's low-price guarantee facilitates firm j's price if and only if

$$p_j^* \equiv \arg\max_{p_j} \Pi_j(s_1^*(p_j), ..., s_n^*(p_j)) > \arg\max_{p_j} \Pi_j(s_1^{*i}(p_j), ..., s_n^{*i}(p_j)), \tag{A.1}$$

where $s_k^*(p_j) \equiv s_k(p_1^*, ..., p_j, ..., p_n^*, g^*)$ and $s_k^{*i}(p_j) \equiv s_k(p_1^*, ..., p_j, ..., p_n^*, g^{*i})$, $k \in I$ (recall that $g^{*i} = (g_1^*, ..., g_i = \varnothing, ..., g_n^*)$). Thus, we need to show that (A.1) implies $p_i^* \geq p_j^*$, $i \neq j \in I$.

Suppose to the contrary that firm i's low-price guarantee is facilitating firm j's price but in the equilibrium $p_j^* > p_i^*$. Let $s^* = (s_1^*(p_j^*), ..., s_n^*(p_j^*))$ denote the vector of equilibrium selling prices. Then, since firm i has a low-price guarantee and firm j does not, it must be that $s_j^*(p_j^*) = p_j^* > p_i^* \geq s_i^*(p_j^*)$. It follows that for any $k \neq j$, $k \in I$, firm k's selling price is independent of firm j's advertised price, and hence also of firm j's selling price, in the neighborhood of p_j^*. To see this note that if firm k does not have a low-price guarantee then $s_k^*(p_j) = p_k^*$, which is independent of p_j, and if firm k does have a low-price guarantee then it is committed to matching or beating the lowest advertised or selling price in the market, neither of which belong to firm j when firm j is pricing in the neighborhood of p_j^*. Moreover, this independence of firm k's selling price to firm j's advertised price around p_j^* holds even if firm i does not have a guarantee. Thus, we have that

$$\frac{\partial s_k^*(p_j)}{\partial p_j}\Big|_{p_j = p_j^*} = \frac{\partial s_k^{*i}(p_j)}{\partial p_j}\Big|_{p_j = p_j^*} = 0. \tag{A.2}$$

Using (A.2) and the definition of p_j^*, we can totally differentiate Π_j to obtain

$$\frac{d\Pi_j(s_1^*(p_j), ..., s_n^*(p_j))}{dp_j}\Big|_{p_j = p_j^*} = \frac{\partial \Pi_j(s_1^*(p_j), ..., s_n^*(p_j))}{\partial s_j}\Big|_{p_j = p_j^*} = 0. \tag{A.3}$$

Using (A.2), (A.3), and the definition of p_j^*, and noting that $s_k^{*i}(p_j^*) \geq s_k^*(p_j^*)$ for any $k \neq j$, $k \in I$ (because, for fixed advertised prices, the existence of firm i's low-price guarantee can only (weakly) reduce all selling prices in the market), we can totally differentiate Π_j to obtain

$$\frac{d\Pi_j(s_1^{*i}(p_j), ..., s_n^{*i}(p_j))}{dp_j}|_{p_j=p_j^*} = \frac{\partial\Pi_j(s_1^{*i}(p_j), ..., s_n^{*i}(p_j))}{\partial s_j}|_{p_j=p_j^*} \geq 0. \tag{A.4}$$

where the inequality follows because selling prices are assumed to be strategic complements.

It follows that, under the supposition that $p_j^* > p_i^*$, firm j would not choose to lower its advertised price in the absence of firm i's adoption of a low-price guarantee. More formally, (A.4) implies that $\arg\max_{p_j} \Pi_j(s_1^{*i}(p_j), ..., s_n^{*i}(p_j)) \geq p_j^*$, which contradicts (A.1). Hence, our supposition that $p_j^* > p_i^*$ cannot be true when firm i's low-price guarantee is facilitating firm j's price. Q.E.D.

Appendix B

Table A1. Incidence of Pairwise Facilitation.

No LPG - LPG Type	Consistency with Pairwise Collusion	Number of Tire Matches
No LPG - Selling-Price LPG	100.00%	24
No LPG - Not Selling-Price LPG	41.18%	119
No LPG - Selling-Price **PM**	100.00%	7
No LPG - Not Selling-Price **PM**	70.27%	37
No LPG - Selling-Price **PB**	100.00%	17
No LPG - Not Selling-Price **PB**	28.05%	82

Table A2. Testing for Pairwise Facilitation.

Low-Price Guarantee Type	Alternative Hypotheses		
	H2a: $\tilde{\pi} \neq 0.5$	H2b: $\tilde{\pi} > 0.5$	H2c: $\tilde{\pi} < 0.5$
Selling-Price LPG	0.000^{**}	0.000^{**}	
Not Selling-Price LPG	0.066		0.033^{*}
Selling-Price **PM**	0.016^{*}	0.008^{**}	
Not Selling-Price **PM**	0.020^{*}	0.010^{**}	
Selling-Price **PB**	0.000^{**}	0.000^{**}	
Not Selling-Price **PB**	0.000^{**}		0.000^{**}

* denotes significance at a 5 percent level; ** denotes significance at a 1 percent level.

Table A1 presents the raw data with the ambiguously worded LPGs and LPGs that apply only to a rival's advertised price lumped together in the category 'Not Selling-Price LPG.' It shows that in paired observations in which the firm's guarantee is based on selling prices, the firm with the guarantee has the weakly higher price in *every* case, whereas in paired observations in which the firm's guarantee is not based on selling prices, the firm with guarantee has the weakly higher price in only 41.18 percent of the cases. In the second set of rows, consistency with pairwise facilitation ranges from a low of 28.05 percent when the guarantee promises to beat only a rival's lower advertised price to a high of 100 percent in both populations of selling-price guarantees.

The difference between low-price guarantees that are based on selling prices and low-price guarantees that are not based on selling prices is striking and significant. Observations involving the former, whether they are of the price-matching or price-beating kind, are always consistent in our sample with pairwise facilitation, whereas the majority of the observations involving the latter are not. Table A2, which reports the p-values for the test of the null hypothesis H2 against the alternatives H2a, H2b, and H2c, confirms these findings with evidence from the sign test.

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Effects of low price guarantees on consumer post-purchase search intention: The moderating roles of value consciousness and penalty level

3

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/hile past research has focused on pre-purchase effects of low price guarantee (LPG), the present paper examines probable post-purchase
sequences of such signals. Results of an experiment indicate that in an effort to enhance value from a purchase, consumers are more likely
ngage in post-purchase search for lower prices when a purchase is made under an LPG. The experiment also indicates that presence of
.PG encourages post-purchase search intention only for consumers who are highly motivated to enhance value. Furthermore, it is seen
an LPG that offers higher refund leads to higher post-purchase search intention and this effect is also stronger for consumers with high
cerns for enhancing value. The paper discusses several important implications of these findings for signaling theory and LPG-related
iling strategy.

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vords: LPG; Post-purchase; Penalty level

Introduction

The field of information economics involves market trans-
ons characterized by information asymmetry between
ısacting parties (Macho-Stadler & Pérez-Castrillo 2001).
a recent paper, Kirmani and Rao (2000) have proposed
the traditional approach of studying effects of market
ormation on consumers by emphasizing mental processes
ted to acquisition, integration, and retrieval of such infor-
tion be supplemented with an approach based in infor-
ion economics where the key researchable issues are
er and buyer responses to situations involving informa-
asymmetry. Primarily encouraged by this proposition, we
sent the rationale and results of a study examining possible post-purchase effects of low price guarantee (LPG),[2] an increasingly popular class of tools that retailers use to eliminate price-related buyer–seller information asymmetry. Through our research, we hope to contribute to the presently lean body of research on buyer responses to seller actions under information asymmetry, actions that are referred to as "signals", based in Spence's (1974, 2002) signaling theory.

Past research indicates that an offer accompanied by an LPG enhances consumer value perception of the offer, raises their shopping intention, improves retailer price image and reduces consumer intention to search for lower prices prior to a purchase, compared to an offer that is not accompanied by

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[2] Various terms have been used by past consumer researchers to refer to such guarantees. We prefer to use the phrase "LPG" as we realize that this is also a phrase that is widely used in practice and in our opinion is more general in meaning, in that it refers to both types of price guarantees, ones that claim to *match* lower market prices and ones that claim to *beat* lower market prices.

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ıch a guarantee (Biswas, Pulling, Yagci, & Dean 2002; Jain : Srivastava 2000; Kukar-Kinney & Walters 2003; Srivastava : Lurie 2001). These results suggest that all retailers are kely to gain from issuing low price signals, irrespective of ıe retailers' actual price status. However, we argue that one eeds to consider probable post-purchase effects of LPG for more complete understanding of their benefits to retailers. ince an LPG promises a refund if a lower price is detected ter purchase, consumers, especially those who are highly nscious of value, are likely to search after purchase in order take advantage of the refund to enhance the overall value om the purchase.

While pre-purchase search intention is likely to be lower ross consumers when an LPG accompanies an offer, in this ıdy we show that post-purchase search intention is likely be higher for a purchase made under an LPG, especially r consumers who are highly concerned with maximizing lue from a purchase. That is, by issuing an LPG, retailers e likely to discourage search prior to a purchase but are ely to encourage search after the purchase. This is likely pose a problem for retailers who are not truly low-priced d might be opportunistically or mistakenly issuing a price ıarantee; and perhaps also to low-priced retailers, in highly mpetitive and turbulent markets that are characterized by equent price changes. Thus, our research suggests that when ıe considers probable post-purchase effects of LPG, these gnals are not seen to be beneficial to all retailers in all uations.

Besides this important practical contribution, our research fers some theoretical contribution. First, we find some idence in support of signaling theory's assumption of conmer rationality in their response to signals. An aspect of nsumer rationality is the tendency to enhance utility (Tellis Gaeth 1990) and our results do indicate that after making ourchase in response to a low price signal, some consumers e motivated to enhance their utility by seeking lower prices. cond, our findings do not uphold the suggested possibility at a low price guarantee prompts consumers to postpone arch until after a purchase (i.e., a "buy now, search later" ıd of philosophy; Arbatskaya 2003). Finally, we offer some idence suggesting benefits of incorporating consumer perectives in firm-based models of signaling. Specifically, we ovide evidence based on consumer-side perspective for the sition that with respect to LPG, pooling equilibrium (a uation where it is profitable for both low-priced and highced retailers to issue an LPG) is sustainable only if such guarantee is used as a price discriminatory tool (Png & shleifer 1987).

The manuscript proceeds as follows. First, we discuss the ionale for conceptualizing LPG as marketplace signals and licate how past research based on such conceptualization ds to the present study. Second, we present our rationale for ecific hypotheses related to LPG's effect on consumer postchase search intention. Third, we describe the procedure a laboratory experiment conducted to test our hypotheses d then present the results of the experiment. Fourth, we discuss theoretical and managerial implications of our findings. Finally, we mention some limitations of our study and offer suggestions for future research.

LPG as marketplace signals

A retailer issuing an LPG claims its offer price to be the lowest in the market and promises to compensate consumers suitably, before or after a purchase, when such a claim is proven to be untrue (Sivakumar & Weigand 1996). Such a guarantee purports to "signal" to consumers the proximity of the retailer's offer price to the lowest market price, a piece of information that the consumer might seek prior to transacting with the retailer and one that might be costly for the consumer to obtain.

Marketplace signals arise from information asymmetry between marketers and consumers about the characteristics of market offerings (Kirmani & Rao 2000; Spence 1974, 2002). For instance, information asymmetry might occur with regard to the precise location of an offer price in the market price continuum. Whereas a retailer knows that the price it offers for a product is the lowest in the market, consumers might lack that knowledge. In order to eliminate such information asymmetry, a retailer might offer an LPG that signals to consumers that the price offered by the retailer is truly the lowest in the market. The refund condition accompanying such a guarantee promises to pay buyers an amount of money that is equal to or more than the difference between the offer price and a lower market price, should one be detected by consumers, before or after a purchase. The refund condition acts as a bond that retailers have to forfeit in case the guarantee is violated, and the condition primarily renders credibility to the signal (Biswas et al. 2002; Ippolito 1990).

To the extent that an LPG is found by consumers to be diagnostic of an offer price's true location in the market price continuum, providing such a guarantee favorably affects such pre-purchase consumer cognitions as value perception, search intention and shopping intention (Biswas et al. 2002; Kukar-Kinney & Walters 2003; Srivastava & Lurie 2001). However, even though LPG have been shown to favorably affect consumer pre-purchase cognitions, Srivastava and Lurie (2001) concluded that consumers process price guarantees as "imperfect signals" in that such a signal, although being generally indicative of the proximity of an offer price to the lowest market price, does not assure consumers that the offer price is *the* lowest market price. This indicates the possibility that even when a consumer makes a purchase under the influence of a low price signal, she might search for a lower price after the purchase, because the signal was not believed to be perfectly diagnostic of the precise location of the offer price in the market price continuum. Furthermore, post-purchase detection of a lower price enables consumers to enhance their acquisition value from the purchase, by taking advantage of the promised refund. This ought to provide onsumers additional incentive to undertake search, follow- ıg a purchase under an LPG. In the next section, we present ecific hypotheses related to the effects of LPG on consumer ost-purchase search intention.

Hypotheses

PG and post-purchase search intention

Given that an LPG primarily informs consumers about ie proximity of an offer price to the lowest market price and iat retailers stand to incur penalties if such an information is scovered to be false, such a guarantee is likely to discourage nsumer search for better prices prior to purchase (Biswas al. 2002; Srivastava & Lurie 2001). Thus, in the context of a irchase decision, consumers evaluating a retailer who offers price guarantee signal are likely to harbor lower intention to arch for better prices than consumers evaluating a retailer ho does not offer such a signal, *ceteris paribus*.

How does a price guarantee signal affect consumer inten- ons to search after the purchase? We posit that consumers ho make a purchase under the assurance of a price guar- itee are likely to express higher intention to search after e purchase than those who make the purchase without such guarantee. The refund condition associated with a price iarantee signal offers consumers an opportunity to enhance eir acquisition and transaction utilities (Lichtenstein, etemeyer, & Burton 1990; Thaler 1985), through detec- on of a lower price in the market. Perceived acquisition lue[3] has been defined as the algebraic difference (or ratio) etween the totality of perceived benefits from a product or rvice (an acquisition), and the money given up to acquire e product or service (Grewal, Monroe, & Krishnan 1998). btaining a refund depresses the sacrificial component of the ility formulation thereby enhancing perceived acquisition ility. When a purchase is made under a price guarantee, erefore, consumers might seek to enhance their acquisition ility through post-purchase search.

Perceived transaction value has been defined as the per- ption of psychological satisfaction or pleasure obtained om taking advantage of the financial terms of the price deal rewal et al. 1998). Thus, the focus here is on deriving plea- re by paying a low price. Obtaining a refund following purchase under a price guarantee is tantamount to pay- g an effectively lower price for the purchased product and ch an experience is likely to be psychologically gratifying. ierefore, when a purchase is made under a price guarantee, nsumers might be motivated to enhance their transaction lity through post-purchase search.

Opportunities to enhance acquisition and transaction val- s through location of a lower market price are, however, absent for consumers who purchase without a price guarantee signal and hence they have less of a motivation to engage in post-purchase search. Consequently, consumers purchasing a product under the assurance of an LPG are likely to possess higher post-purchase search intention than consumers purchasing without an LPG. However, we would argue that such an effect of LPG consumer post-purchase search intention is subject to consumer value consciousness.

Interest in the role of consumer individual characteristics in price-related judgments has a long tradition in behavioral pricing research (e.g., Lichtenstein, Bloch, & Black 1988; Lichtenstein et al. 1990; Mittal 1994; Miyazaki, Sprott, & Manning 2000). Firm-based signaling models assume all consumers to be equally rational and an important aspect of consumer rationality is the inherent motivation to enhance utility (Tellis & Gaeth 1990). However, is there a boundary condition to consumer motivation to enhance utility? Although firm-based signaling models do not consider the possibility that consumers might differ with respect to their tendencies to maximize utilities, behavioral research indicates that consumers differ with regard to their propensity to enhance utilities from purchases (e.g., Garretson & Burton 2003; Lichtenstein, Burton, & Netemeyer 1997). Particularly, research has demonstrated that consumer value consciousness bounds their tendencies to maximize value from a transaction (Lichtenstein et al. 1990; Lichtenstein, Ridgway, & Netemeyer 1993).

Value consciousness has been defined as reflecting "a concern for price relative to quality received" (Lichtenstein et al. 1993:235). Given the conceptualization of perceived acquisition value and perceived transaction value stated earlier (Grewal et al. 1998), it appears that consumers with high value consciousness are more likely to be motivated to enhance their acquisition and transaction values than consumers with low value consciousness.[4] Considering our premise that post-purchase search intention in case of a purchase made under LPG is largely based on a desire to enhance utilities, it seems likely that a purchase made under LPG would have a stronger effect on post-purchase search intention (compared to a purchase made without such guarantee) in case of consumers with high value consciousness. Based on these arguments, we hypothesize:

H1. Consumer value consciousness will moderate the effect of LPG on consumer post-purchase search intention. LPG

Throughout the text, the terms acquisition value and acquisition utility used interchangeably. The terms "acquisition value" (Grewal et al. 1998) ear to be more comprehensive, and are hence used here.

[4] Initially, we had posited and tested for effects of consumer price consciousness (Lichtenstein et al. 1993) in the capacity of a moderator. Following a conversation with Kent Monroe, we decided not to include this construct in our final analyses. We found the value consciousness measure to be highly correlated to the price consciousness measure and this was, according to Kent Monroe, perhaps due to an emphasis on "search behavior" in the price consciousness items (see Lichtenstein et al. 1993 for details). Given that value consciousness is likely to favor search, it was highly correlated with price consciousness and their effects were identical in our analyses. Since the price consciousness measure is not likely to enhance our contribution, we decided to exclude it from our final analyses.

s a stronger effect on post-purchase search intention when nsumer value consciousness is high.

le of penalty level

When a signal is issued by a seller, a self-imposed penalty ually accompanies the signal and acts as a "bonding mponent" for the signal promising to protect the sig- l receiver from probable negative consequences of pos- le signal default (Ippolito 1990; Wernerfelt 1988). In case LPG, refunds promised by retailers in case of detec- n of lower market prices constitutes the penalty accom- ying the signal. The level of such a penalty is based the size of the refund that is promised upon consumer covery of a lower market price, the refund being usu- y expressed as a percentage of the difference between two prices. Thus, a low price signal that promises to und 100 percent of the difference between a guaranteed / price and a lower market price has a lower penalty el than one promising to refund 120 percent of the ference.

Although a clear-cut effect of penalty on consumer pre- chase cognitions has not been demonstrated in case of G, arguments base on signaling theory would suggest t higher levels of penalty are likely to favorably affect h cognitions (e.g., Biswas et al. 2002; Kukar-Kinney & lters 2003). How might a purchase made under LPG with igher level of penalty (e.g., one that promises 150 percent und) affect consumer post-purchase search intention com- ed to a purchase characterized by a price guarantee with a er level of penalty? Should refund be obtained, a greater und essentially means that the consumer pays an effec- ly lower price for a purchased product and hence should d to higher perceived acquisition utility (by reducing the rificial component of the value equation) and higher per- ved transaction utility (owing to enhanced psychologi- satisfaction). Given an inherent consumer motivation to ance utility, this leads us to propose that the penalty level n LPG is positively related with consumer post-purchase rch intention in case of a purchase made under such a rantee. We further propose that the hypothesized effect enalty level will be moderated by consumer value con- usness such that the effect is stronger for higher levels value consciousness. Given the higher level of motiva- to enhance utility, highly value conscious consumers likely to respond to the increased opportunity for util- enhancement in case of a higher penalty level more ngly than those who are less value conscious. Hence we othesize:

. In case of a purchase made under the assurance of an G, consumer value consciousness will moderate the effect enalty level on their post-purchase search intention. The ct of penalty level on post-purchase search intention is nger for consumers with higher levels of value conscious- s.

Experimental procedure

A 3 × 2 between subjects design was used to test the three hypotheses. The experiment involved three conditions related to LPG (an LPG absent condition; an LPG present condition with the refund equaling 100 percent of the difference between the offer price and a lower price; and an LPG present condition with the refund equaling 150 percent of the difference between the offer price and a lower price) and two levels of consumer value consciousness (high and low). The conditions related to LPG were manipulated through print ads designed to emulate newspaper-based ads from local retailers. Also, the penalty levels adopted for the study were consistent with those prevalent in the local market. Consumer value consciousness was measured using a scale adapted from Lichtenstein et al. (1993). Values obtained for items of these scales were summated across the items and the summed scores were subjected to median split for the purpose of creating two levels of the variable.

Two hundred and seventy-six undergraduate students from the College of Business of a large public university were used as subjects for the experiment. The subjects were randomly assigned to the three LPG-related conditions (LPG absent; LPG with 100 percent penalty level; LPG with 150 percent penalty level). Subjects were first asked to imagine that while actively seeking to buy a palm pilot they came across an ad from a local retailer. Subjects were then exposed to a mock-up print ad with photographs and description of Toshiba Pocket PC e310 palm pilot (PDA), being offered at a price of $299.99. The terms "100 percent (or 150 percent) LPG" appeared across the top of the ad in the LPG present conditions and the refund conditions related to the LPG appeared at the bottom of the ad. The refund conditions included an explanation of how the amount of refund was to be determined in case of a price discrepancy and as per the prevailing practice, stipulated a time period of 30 days for the validity of the conditions. Subjects were told that the name of the retailer had been intentionally blocked out and a blank gray patch, appearing at the bottom of the ad, was designed for this purpose. The ad used for the control condition (the LPG-absent condition) was identical to the other ads except for the information about the price guarantee.

After viewing the ad, subjects responded to a set of items measuring their intention to search for better prices, their perception of deal value, and their intention to shop the retailer. Next, subjects were exposed to a filler task for about ten minutes. The filler task was deemed necessary for three reasons: in order to minimize monotony; in order to create a virtual sense of passage of time between exposure to the ad and purchase-related response to it; and in order to prevent hypothesis guessing on the parts of the subjects.

After completing the filler task, subjects were provided with a brief scenario where they were asked to imagine that they had purchased the advertised PDA and that they were satisfied with its performance. The clause specifying satisfactory performance of the PDA was included to obviate search intenı due to possible cognitive dissonance or regret and also 'orestall consideration of alternate consumer responses :h as returning the purchased item to the store, using ıdard store return policies) that might truncate the motiva- ı to search for better prices. In short, this clause served to ure that post-purchase search intention was largely moti- :d by the goal of seeking a lower price. After reading the chase scenario, subjects responded to scales measuring r search intention and their value consciousness. Finally, jects responded to manipulation check questions, PDA ıership related questions and demographic questions.

Results

ıipulation checks and scale reliabilities

;ubjects responded to two manipulation check questions, where they were asked if the advertisement they had n exposed to contained an LPG claim (LPG manipula- ; check) and another where they were asked about the :l of refund that was promised in the advertisement with) refund" being one of the options (refund manipulation ck). Analyses revealed that 85 out of 96 subjects (i.e., 54 percent) in the 100 percent LPG condition qualified h the manipulation checks; 84 out of 96 respondents (i.e., 5 percent) in the 150 percent LPG condition qualified h the manipulation checks; 71 out of 84 subjects (i.e., 1 percent) in the LPG absent condition qualified both the ıipulation checks. After eliminating subjects who failed to lify either or both of the manipulation checks the sample : was reduced to 240 respondents.

?ost-purchase search intention was measured using three ns adapted from Biswas et al. (2002), and the Cronbach ıa for this scale was .95. Value consciousness was mea- :d using a 7-item scale adapted from Lichtenstein et al. 93) had a Cronbach alpha of .80. Value consciousness was ıotomized with respect to the median, 5.54. Two levels of ıe consciousness were created with the lower level having ean of 4.63 and the higher level having a mean of 6.19. h of the levels of value consciousness had 120 respon- ts in them and the difference between the means of the levels was statistically significant ($t = 20.97$; $p < .01$).

liminary analyses

\ 3 (LPG) × 2 (value consciousness) ANOVA (presented 'able 1) was conducted on post-purchase search intention to test for overall effects of these factors and their interaction effect. Results of the ANOVA indicated that the interaction between the two factors was significant ($F_{2,234} = 8.36$; $p < .01$); the main effect of LPG was significant ($F_{2,234} = 5.30$; $p < .01$) and the main effect of value consciousness was significant ($F_{1,234} = 9.95$; $p < .01$). Based on these results, further analyses were conducted in order to test the specific hypotheses.

Table 1
The effects of LPG (three levels) and value consciousness (two levels) on post-purchase search intention

Sources	Degrees of freedom	F-value	p-value	Eta-squared
Main effects				
LPG	2	5.30	.01	.4
Value consciousness	1	9.95	.01	.04
Interaction				
LPG × value consciousness	2	8.36	.01	.7
Residual	234			

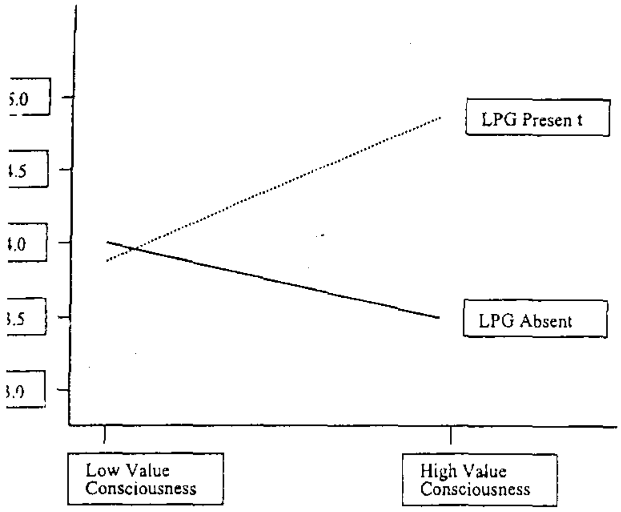
Hypotheses tests

Hypothesis H1 predicted that consumer value consciousness would moderate the effect of LPG on their post-purchase search intention such that the effect is stronger for higher levels of value consciousness. Preliminary support for this hypothesis is indicated by the significant interaction between LPG and value consciousness in the full factorial ANOVA model ($F_{2,234} = 8.36$; $p < .01$). In order to specifically test for H1, we pooled subjects across the two penalty conditions and created two conditions of LPG: LPG present and LPG absent. The results of specific contrasts and the relevant means appear in Table 2 and the interaction is pictorially depicted in Fig. 1.

As shown in Table 2, although the level of post-purchase search intention for low value conscious subjects was slightly higher in the absence of an LPG ($M = 3.99$) than in its presence ($M = 3.74$), this difference was non-significant ($t = .88$; $p < .38$). In contrast, and as predicted by H1, the level of post-purchase search intention for subjects with a high level of value consciousness was higher in the presence of an LPG ($M = 5.01$) than in its absence ($M = 3.45$) and this difference in means was statistically significant ($t = 4.70$; $p < .01$). We also conducted specific contrasts between each of the penalty conditions and the control condition for each level of value consciousness and the results are presented in Table 2 and the interaction is depicted in Fig. 2.

: 2
ıed contrasts on post-purchase search intention for low and high value consciousness

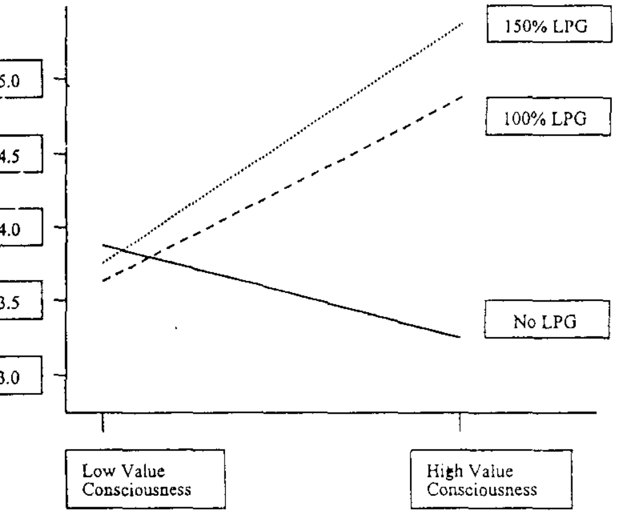
: ciousness	LPG present	LPG absent	t-value (p-value)	LPG with 150 percent refund	LPG absent	t-value (p-value)	LPG with 100 percent refund	LPG absent	t-value (p-value)
	3.74	3.99	.88 (.38)	3.83	3.99	.46 (.32)	3.68	3.99	.99 (.16)
	5.01	3.45	4.70 (.01)	5.23	3.45	4.91 (.00)	4.71	3.45	3.25 (.00)



;. 1. LPG × value consciousness interaction (pooled across penalty con- ions; vertical axis denotes post-purchase search intention).

As shown in Table 2 and Fig. 2, post-purchase search inten- n does not differ significantly between either of the penalty /els and the control condition (i.e., the LPG absent condi- n) when value consciousness is low ($t = .46$ and $p < .32$ for 0 percent LPG; $t = .99$ and $p < .16$ for 100 percent LPG). owever, search intention is significantly higher for 150 per- nt LPG ($M = 5.23$; $t = 4.91$; $p < .01$) and for 100 percent G ($M = 4.71$; $t = 3.25$; $p < .01$) than for the control condi- n ($M = 3.45$). These results support H1.

Hypothesis H2 was concerned with purchases made under G and hence analyses for it's testing were restricted to the PG present" conditions. Appropriate mean comparisons ere conducted to test for the proposed effects. In general, e results showed that a 150 percent LPG ($M = 4.67$) led to significantly higher level of post-purchase search intention an a 100 percent LPG ($M = 4.13$; $t = 2.12$; $p < .02$). Also, as edicted by H2, search intention for the 150 percent LPG condition ($M = 3.83$) was not significantly higher than that for the 100 percent LPG condition ($M = 3.68$; $t = .47$; $p < .32$) when value consciousness was low; however, this difference was marginally significant when value consciousness was high (respective $Ms = 5.23$ and 4.71; $t = 1.49$; $p < .06$) thereby supporting this hypothesis.



;. 2. LPG × value consciousness interaction (including all three LPG con- ions; vertical axis denotes post-purchase search intention).

In sum, the experimental results support our hypotheses. As predicted in H1, the effect of LPG on post-purchase search intention was stronger for high consumer value consciousness. Furthermore, purchase made under a higher level of LPG penalty led to significantly higher post-purchase search intention and this effect was stronger for high value consciousness (H2).

Additional analyses

Although not formally hypothesized, pre-purchase effects of LPG were examined to replicate past findings and to demonstrate the contrasting nature of such effects in comparison to post-purchase effects. A 3 (LPG) × 2 (value consciousness) ANOVA on pre-purchase search intention resulted in a non-significant interaction effect ($F_{2,234} = 1.86$; $p < .16$), a significant main effect of LPG ($F_{2,234} = 11.03$; $p < .01$), and a significant main effect of value consciousness ($F_{1,234} = 30.50$; $p < .01$). Specific contrasts, with subjects pooled across the penalty conditions in order to create an "LPG present" condition, revealed that pre-purchase search intention was significantly lower when LPG was present than when it was absent for high value consciousness consumers ($M_{\text{LPG present}} = 5.97$; $M_{\text{LPG absent}} = 6.51$; $t = 3.33$; $p < .01$) and for low value consciousness consumers ($M_{\text{LPG present}} = 5.20$; $M_{\text{LPG absent}} = 6.01$; $t = 3.14$; $p < .01$). Additional analyses revealed that post-purchase search intention was significantly lower than pre-purchase search intention when LPG was present ($M_{\text{post}} = 5.70$, $M_{\text{pre}} = 4.20$, $t = 12.87$, $p < .01$, all respondents; $M_{\text{post}} = 5.01$, $M_{\text{pre}} = 5.97$, $t = 5.91$, $p < .01$, high value conscious respondents; $M_{\text{post}} = 3.74$, $M_{\text{pre}} = 5.02$, $t = 6.33$, $p < .01$, low value conscious respondents). In the following section, we discuss the theoretical and managerial implications of our key and additional findings, point out some limitations in our approach and offer some ideas for future research.

Discussion

Although retailers use LPG primarily to influence consumer pre-purchase cognitions and behavior (Sivakumar & Weigand 1996), our study shows that low price signals can have a "carry-over" effect in that they are likely to affect consumer post-purchase search. Traditionally, signaling theory has not considered probable post-purchase effects of signals, and no firm-based or consumer-based analysis of marketplace signals has investigated such connotations. The present research has attempted to initiate an effort in this direction. In one experiment, it was seen that although presence of a low e guarantee led to lower pre-purchase search intention for onsumers, purchase made under such a guarantee led to er post-purchase intention for consumers who are highly scious of value. In this section, we discuss the managerial theoretical implications of our findings.

agerial implications

Vith regard to low price signals, retailers face the strate- decision of whether or not to issue such signals and such cision is likely to be based on anticipated benefits of ing the signal. Past research has indicated that retailers ikely to benefit from issuing a low price guarantee since ence of a guarantee leads to higher perception of offer e, lower search intention and higher shopping intention was et al. 2002; Jain & Srivastava 2000; Kukar-Kinney & ters 2003; Srivastava & Lurie 2001). The present study vs that although an LPG discourages consumer search ntion prior to a purchase, it is likely to encourage search ower prices after a purchase is made under such a guaran- especially for consumers who are highly concerned with imizing value from a purchase. We also found that higher refund promised by an LPG, higher is the likelihood of -purchase search, especially among high value conscious sumers. Such post-purchase search is likely to be detri- tal to high-priced retailers who might be using the signal ortunistically (especially in markets characterized by a e proportion of highly value conscious consumers), given ikelihood of a higher incidence of refunds and consequent etary loss to these retailers. Once a purchase is made er an LPG, post-purchase search for lower prices may be imental to low-priced retailers also, if the market is char- rized by a high degree of price variation, a large number ompeting retailers and frequent price change. Thus, our arch indicates that considered collectively, likely pre- and -purchase effects of an LPG provide us with a more com- e picture of the net benefit of issuing such a signal. Our ings indicate that if one takes into account probable post- hase effects of an LPG, the signal may not prove to be eficial to all retailers in all market conditions, contrary to conclusion that one might draw from past research.

n explicit recommendation that follows from our find- is that before offering an LPG, retailers should be abso- ly confident about their position with respect to market es and only relatively low-priced retailers should offer . Simply put, our findings strongly recommend against ortunistic use of LPG. On a similar note, our findings cate that higher levels of penalty should be attached to guarantees only when retailers are confident of being -priced. Perhaps, one way of preventing LPG backlash is etailers to strengthen environmental scanning.

owever, retailers might be able to generate some advan- out of price guarantees in turbulent markets by devel- g a good idea of how the market is segmented in terms onsumer value consciousness, perhaps with the help of ket research, scanner panel data, and such. We infer from our findings that if the proportion of highly value conscious consumers is low in a served market, high-priced retailers might be able to offset monetary loss from refunds by revenue generated. Although we do not recommend that retailers deliberately adopt such a practice of price discrimination, we do suggest that an assessment of consumers' value orientation be made in order to guard retailers against possible LPG backlash, particularly in turbulent markets.

Theoretical implications

Why would consumers search for lower prices following a purchase with an LPG? Based on some inconsistency between predictions based on signaling theory and their actual findings, Srivastava and Lurie (2001) concluded that perhaps, consumers process low price guarantees as "imperfect signals" with the implication that such a signal, although indicating the proximity of an offer price to the lowest market price, does not assure consumers that the offer price is *the* lowest market price. Hence, part of the consumer intention to search after purchase might arise from a conservative evaluation of low price signals. However, we found low price guarantee to be quite effective in favorably affecting consumer pre-purchase cognitions.[5] Also, if low price signals are evaluated as not being properly indicative of the proximity of the offer price to the lowest market price, one might expect consumer search to remain unabated after purchase. However, for a purchase made under an LPG, we found post-purchase search intention to be significantly lower than pre-purchase search intention, irrespective of the level of consumer value consciousness. These results indicate that additional explanation for probable post-purchase search is in order. Such an explanation is based on consumer motivation to enhance utility. Our results indicate that consumers are more likely to search after a purchase accompanied by an LPG compared to one without such a guarantee. Since this effect of LPG was seen to be stronger for higher levels of consumer value consciousness and also for higher levels of refund promised by an LPG, it is reasonable to assume that it is the motivation to enhance utility that leads consumers to engage in post-purchase search in case of purchases that involve low price signals. Signaling theory assumes consumers to be rational and one aspect of rationality is the tendency to enhance utility (Tellis & Gaeth 1990). Our results do indicate some support for the assumption of rationality integral to signaling theory. However, contrary to assumptions of the theory, not all conumers are equally motivated to enhance utility, as indicated y their likely post-purchase responses to low price signals.

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[5] Apart from a favorable effect of LPG on consumer pre-purchase search intention reported in the text, we found consumer purchase intention (measured with the help of three items, each on a 7-point Likert-type scale, based on Biswas et al. (2002)) to be significantly higher in the presence of an LPG ($M_{\text{LPG present}} = 6.16$; $M_{\text{LPG absent}} = 5.51$; $t = 3.54$; $p < .01$) and their perception of financial risk (measured with the help of four items, each on a 7-point Likert-type scale, based on Biswas et al. (2002) to be significantly lower in the presence of an LPG ($M_{\text{LPG present}} = 4.82$; $M_{\text{LPG absent}} = 2.88$; $t = 12.36$; $p < .01$; higher mean implies lower level of perceived risk since items were reverse coded).

Recently, a firm-based econometric model of LPG has een offered based on the assumption that such a guaran- e gives consumers an opportunity to postpone search until fter a purchase (Arbatskaya 2003). Are consumers so highly ational that when exposed to an LPG, they show a tendency "buy now, search later" and postpone searching till after the urchase (Arbatskaya 2003)? Although past research (Biswas al. 2002; Kukar-Kinney & Walters 2003) and our own study emonstrate that exposure to an LPG leads to higher purchase itention,[5] it does not appear that consumers altogether post- one searching until after purchase. Specifically, we found at even when an LPG accompanies a purchase, consumers e less likely to search for lower prices after the purchase an before the purchase.

Our research contributes to the notion that models and eories in economics may be inadequate because they fail to operly incorporate consumer perspectives (e.g., Soman and ourville 2001; Thaler 1985). Based on firm-side analyses, odels of signaling to date have been concerned with market haracteristics that lead to one or two types of equilibria, sep- ating equilibrium and pooling equilibrium (Macho-Stadler id Pérez-Castrillo 2001; Spence 2002). These analyses of gnals start with an a priori classification of possible signal nitters into those that truly possess the characteristics on hich information is sought by buyers and those that do not ossess those characteristics. "Separating equilibrium" refers a situation where it is profitable for only sellers who pos- ss the characteristic of interest to issue a signal and "pooling quilibrium" refers to a market situation where it is prof- able for all types of sellers to issue the signal, regardless of eir true possession of the characteristic. With respect to low ice signals, a separating equilibrium would occur when it is ofitable for only low-priced retailers to issue such signals id a pooling equilibrium would occur when it is profitable r both low- and high-priced retailers to issue such signals. n awareness of the ability of LPG to induce higher post- urchase search intention (and perhaps, consequent higher arch behavior) among value conscious consumers might eate a disincentive to issue the signal for high-priced retail- s, given the likelihood of a large number of refunds that ay have to be issued. Thus, high-priced retailers might find at benefits seeming to arise from a low price signal by con- dering its pre-purchase effects only may be completely or ore than offset by refunds and hence they would be no etter off by issuing the signal. This implies that a pooling uilibrium may not be sustainable in markets characterized a large proportion of highly value conscious consumers, outcome that may not be derivable from analyses solely sed on firm-side perspectives.

Finally, the findings we reported earlier, combined with me additional analyses indicate support for the hypothesis at LPG may be used as a price discriminatory tool (Png id Hirshleifer 1987). Additional analyses revealed that in e presence of an LPG, low value conscious consumers had lower pre-purchase and lower post-purchase search intention than consumers with high value consciousness.[6] This indicates that if a lower price (than that being offered by an LPG providing retailer) exists in the market, low value conscious consumers are less likely to be able to detect it than high value conscious consumers. A high-priced retailer may be able to offset refunds issued to high value conscious consumers with revenue earned from low value conscious consumers thereby effectively charging two different prices to these two groups of consumers, provided the proportion of the former group in a market does not exceed a critical level.[7] In sum, we provide evidence based on consumer-side analyses that pooling equilibrium is sustainable so long as an LPG may be used as a price discriminatory tool and this may be possible in markets where the proportion of high value conscious consumers is not extremely high.

Limitations and future research

Our paper suffers from the usual limitations of laboratory experiments and of using paper and pencil measures of behavioral intentions. Specifically, we cannot be entirely certain as to whether or not the higher level of post-purchase search intention observed for subjects who purchased under a price guarantee is likely to be expressed in a higher level of actual search after purchase. However, even if higher search intention makes subjects somewhat more watchful of prices in the market, we will have made our point that signals do affect post-purchase consumer thoughts and decisions. It is important to remember that searching is not necessarily effort intensive and a higher level of search intention can manifest itself in consumers making an extra effort to check a few more aisles while visiting a store or flipping through those pages of the newspaper that may be ignored otherwise.

Another limitation of our study relates to our reliance on a single form of LPG. Price guarantees widely vary with respect to their semantics. For instance, while many retailers explicitly claim that theirs is the lowest price (something used for our study), others simply promise to match or at competitors' prices. Are signal effects likely to depend semantic variations? Future research needs to investigate obable effects of semantic variation of price guarantees on nsumer perceptions.

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[6] The details of the tests are as follows: (i) $M_{\text{pre-purchase/high vc}} = 6.04$; $M_{\text{pre-purchase/low vc}} = 5.35$; $t = 2.53$; $p < .01$ (ii) $M_{\text{post-purchase/high vc}} = 4.66$; $M_{\text{post-purchase/low vc}} = 3.68$; $t = 2.98$; $p < .01$.

[7] We do not claim to have found support for Png and Hirshleifer's 1987 specific model of pooling equilibrium of LPG but our findings indicate support for their overall rationale of possible price discrimination using price guarantees. These authors suggested that price guarantees dichotomize consumers into two groups—uninformed and informed—the former having higher search costs than the latter. Thus, search costs were used as antecedents to price knowledge and the specific groups of consumers used in the models were local residents of a market (the informed group) and tourists (the uninformed group). Although we realize that at any given point in time consumers in a market may be differentiated with regard to their price knowledge (e.g., Dickson & Sawyer 1990), in today's marketplace where information is freely available, it does not seem that this is due in any significant part to differential search costs. However, since value consciousness may be positively correlated with price knowledge (this is likely since value consciousness leads to higher search intention; Lichtenstein et al. 1993), our findings might have rendered an indirect support to these authors' models.

We manipulated exposure to price guarantees through an vertisement. Subjects had no information as to who else ight or might not be providing guarantees in the same arket. Since the terms of LPG refunds involve a spatial nstraint (e.g., Circuit City's guarantee covers competitors thin a 30-mile radius), the degree of seller concentration a geographic market is likely to affect consumer responses LPG. The degree of seller concentration is likely to be rrelated with the price dispersion in a market and as past search indicates, the effect of consumer perception of price spersion on their reactions to LPG demands further research rivastava & Lurie 2001).

Finally, future research could address probable psycho-gical consequences of LPG default. A signal is defaulted hen its claim is shown to be untrue (Kirmani & Rao 2000). ow does such a default influence consumer perceptions of e retailer? Signaling theory offers no clear prediction in is regard. However, since the theory assumes rationality consumers whose primary concern is to maximize utility, ne might be led to believe that since default is compensated rough activation of the penalty associated with the signal, onsumer perceptions should not suffer as a result of such efault. Is it likely, however, that consumers feel betrayed hen a signal is defaulted and they feel disappointment or gret for their decision? Are consumers less likely to trans-t with a retailer in the future once an LPG from the retailer is efaulted? Research in this direction is likely to further high-ght the limitations of the rationality assumption of signaling eory.

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UNBEATABLE VALUE LOW-PRICE GUARANTEE: COLLUSIVE MECHANISM OR ADVERTISING STRATEGY?

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This paper investigates the effects of a low-price guarantee (price-beating guarantee) on the patterns of price setting of three supermarkets using micro-level price data. Following recent theoretical developments, the paper analyzes the ability of low-price guarantees to sustain anticompetitive prices. My empirical analysis suggests instead that this low-price guarantee may serve as an advertising device to signal low prices. The supermarket offering the low-price guarantee, aware of its price advantage in a subset of products, uses it to signal low prices to induce consumers to switch supermarkets.

1. INTRODUCTION

In September 1996 Tesco, the supermarket with the largest market share in the UK, announced the introduction of the following low-price guarantee:

> *Lowest Local Value or We'll Refund You DOUBLE the Difference.*

In reaction to this announcement, on the eve of the start of Tesco's low-price guarantee, *The Times* (5th September 96) read:

> *Tesco starts a new Price War*

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Much of the economic theory on such guarantees, however, suggests that their purpose is to sustain anticompetitive pricing. Specifically, Dixit and Nalebuff (1991) state:

> *Yet although they sound competitive, these promises to beat the rival's price can enforce discipline in a price-setting cartel.*

The lack of agreement about the potential effects of low-price guarantees seems quite clear.

Low-price guarantees can be formally defined as promises to meet (price-matching guarantee) or beat (price-beating guarantees) a competitor's price on a similar product.

Whereas the theoretical literature on price-matching and price-beating guarantees is fairly extensive, empirical work on this topic is scarce. Arbatskaya et al. (2004) provide evidence on the incidence and variety of low-price guarantees using data of 515 low-price guarantees obtained from newspaper advertisements. They conclude that the majority of these low-price guarantees are not consistent with their use as a device facilitating higher prices. Arbatskaya et al. (1999), on the other hand, study the effects of various kinds of low-price guarantees (price-matching guarantees and different types of price-beating guarantees). Specifically, using data on a single product for 46 firms that advertise in US Sunday newspapers, the authors conclude that a firm's own decision on whether or not to adopt a price-matching or price-beating guarantee does not have a significant effect on its own posted price. The authors point out, however, that this result could be due to firm, market, or low-price guarantee heterogeneity. Finally, Hess and Gerstner (1991) analyze the effect of a low-price guarantee on supermarket price setting. Using data on between-supermarket price coordination and price levels, they conclude that the price-matching guarantee allowed supermarkets to collude tacitly to increase prices to supra-competitive levels.

As in Hess and Gerstner (1991) the present paper analyzes the effect of a low-price guarantee on pricing patterns in supermarkets. But whereas Hess and Gerstner (1991) analyze a price-matching guarantee, I examine a price-beating guarantee: in particular, I analyze the aforementioned Tesco's price-beating guarantee taking into account its possible use as an advertising strategy to signal low prices. This analysis is relevant both from a competition policy and a managerial point of view. From a competition-policy perspective, if low-price guarantees allow firms to raise prices to supra-competitive levels, then of course claims for antitrust actions against the use of such guarantees (e.g., Sargent, 1993; Edlin, 1997) would be warranted. From a managerial perspective, understanding how other supermarkets react to guarantees of this kind is a valuable instrument to devise future price strategies in this and potentially other retail sectors.

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The price data I rely on were collected on a fortnightly basis from November 1995 to March 1997, a period that covers the implementation of the guarantee, from three superstores operating in the South of Coventry. Each one of these three stores belongs to one of the chains with the largest market shares in the UK.[1] The dataset covers several products, both included and not included in Tesco's low-price guarantee.

The empirical analysis suggests that Tesco's low-price guarantee could actually be an advertising device used to signal low prices.

The paper is organized as follows. Section 2 briefly reviews the theoretical literature. Section 3 describes Tesco's low-price guarantee and the characteristics of the dataset. The empirical analysis of the effects of the low-price guarantee on supermarkets' prices is performed in Section 4. Finally, I present concluding remarks in Section 5.

2. THEORETICAL ARGUMENTS AND EMPIRICAL IMPLICATIONS

When offering a low-price guarantee, each firm's selling price (s_i) is given by

$$s_i = \min\{p_i, p_i - (1+\lambda)(p_i - p_j)\}, \qquad (1)$$

where p_i is the price posted by firm i, p_j is that of a potential competitor, and $\lambda \geq 0$. In economic theory, low-price guarantees have been analyzed from three different perspectives: as cartel-facilitating devices, as price discrimination devices, and as signals of low prices. I devote the rest of Section 2 to review these three strands.

2.1 LOW-PRICE GUARANTEES AS CARTEL FACILITATING DEVICES

Since Salop's (1986) paper the use of low-price guarantees as cartel-facilitating devices has been extensively discussed. Salop's original argument is that price-matching ($\lambda = 0$ in 1) leads to higher prices by removing the rivals' incentives to undercut their competitors. If all firms adopt price-matching and post the joint profit-maximization price, no firm has an incentive to deviate from this price. Any price reduction is automatically matched resulting in a lower price that is not compensated by any increase in market share. Hviid and Shaffer (1994, 1999) extend

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[1] Market shares in 1997 (sales in value).

Tesco	23.6
Sainsbury	19.6
Asda	13.5
Safeway	10.8

the analysis of price-matching guarantees to asymmetric markets, that is, markets where firms have different costs and/or some firms have demand advantages over the others. They show that if asymmetries are small, price-matching guarantees still preserve their ability to sustain supra-competitive prices, but they lose this ability when the degree of asymmetry in the market becomes sufficiently large. Whereas in symmetric markets all firms must adopt price-matching guarantees for prices to rise above the competitive level, in markets with small asymmetries prices rise over the competitive prices, not only when all firms adopt price-matching but also when it is adopted only by the higher-priced firms. Furthermore, Hviid and Shaffer (1999) show that if guarantee activation is not costless for consumers, price-matching guarantees only have a limited ability to raise prices. Specifically, if the value of activation for consumers outweighs its cost, equilibrium prices are higher than they would be without price-matching but lower than in the absence of activation costs. In this case, also, it is not necessary that all firms adopt price-matching for prices to rise; adoption by the higher-priced firm is sufficient. As regards consumers' activation, Hviid and Shaffer (1999) indicate that if low-price guarantees are not activated they lose their ability to raise prices to supra-competitive levels.

As for price-beating guarantees ($\lambda > 0$ in 1), Dixit and Nalebuff (1991), Sargent (1993), and Edlin (1997) conclude that these are even more effective than price-matching guarantees at supporting high prices. However, Hviid and Shaffer (1994) and Corts (1995) show that the introduction of price-beating guarantees in the space of strategies restores the incentive to undercut rivals' prices and hence they cannot support any supra-competitive prices in equilibrium. Although price-matching guarantees remove the incentive to unilaterally cut prices, with price-beating guarantees nothing prevents a firm from lowering its selling price by raising its posted price and offering an adequate price-beating guarantee. This result is independent of the degree of asymmetry in the market.[2]

2.2 LOW-PRICE GUARANTEES AS PRICE DISCRIMINATION DEVICES

Corts (1996), among others,[3] points out the possibility of price discrimination through low-price guarantees and finds that they can have both

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[2] Other theory papers analyzing price-beating guarantees are Baye and Kovenock (1994) and Chen (1995).

[3] Belton (1987) and Png and Hirshleifer (1987) also analyze the possible use of low-price guarantees as price discrimination devices but Corts (1996) is more general. Belton (1987) and Png and Hirshleifer (1987) restrict, respectively, consumer demand and firm strategies in ways that limit the applicability of their results.

anticompetitive and procompetitive effects. In his model, heterogeneous firms (in a way that is reflected in a variety of optimal prices) compete for a dual population of consumers—sophisticated and unsophisticated. Sophisticated consumers consider only effective prices, whereas unsophisticated consumers consider only posted prices. Without low-price guarantees sophisticated consumers buy from the lowest-priced firm. However, low-price guarantees allow high-priced firms to compete with the lowest-priced firm for this segment of consumers, leading to a change in the price-setting behavior of the lowest-priced firm in this asymmetric model. If price-matching is allowed, sophisticated consumers become relatively less important for the lowest-priced firm because some of them can invoke a high-priced firm's price-matching guarantee, and this leads the lowest-priced firm to set a price closer to its unsophisticated demand optimal price. As a result, when the sophisticated consumers' demand is relatively elastic at the appropriate prices, the lowest-priced firm increases its price. Through strategic complementarity this price increase by the lowest-priced firm results in an increase in the posted price of all firms. If sophisticated consumers have a relatively inelastic demand, the opposite happens. Therefore, price-matching can have anticompetitive as well as procompetitive effects. Furthermore, when price-matching is available, in equilibrium either all firms adopt price-matching or all the firms except the lowest-priced firm do, as the latter is indifferent between adopting or not; in either case, it will sell to sophisticated consumers.

Price-beating allows even more flexibility than price-matching in competing for the sophisticated consumers. Their importance for the lowest-priced firm is further reduced to the point that the lowest-priced firm ignores the highly competitive sophisticated consumers' market when setting its posted price. As a result, the anticompetitive or procompetitive effects of price-matching are reinforced. In equilibrium with price-beating, any firm except the lowest-priced may have adopted the guarantee. In this model, price-matching and price-beating guarantees must be used by some consumers in equilibrium, leading effectively to price discrimination by the firms.

2.3 LOW-PRICE GUARANTEES AS LOW-PRICE SIGNALS

Jain and Srivastava (2000) and Moorthy and Winter (2002) analyze the use of price-matching guarantees as low-price signals. They use similar arguments to explain possible procompetitive effects of price-matching guarantees. Let us consider a model in which differentiated and asymmetric firms compete for a dual population of consumers—informed and uninformed. Informed consumers choose a firm based on firms' posted prices and on whether the firm offers a price-matching guarantee; uninformed consumers choose a firm based on their expectations of posted prices (they expect lower posted prices at the firms offering price-matching) and once they have chosen they pay posted prices. When price-matching is not allowed uninformed consumers are shared by all firms. However, when price-matching is allowed uninformed consumers only patronize price-matching firms. The model works as follows: first, firms decide simultaneously whether to adopt price-matching or not; then, they decide simultaneously on posted prices.[4] At the pricing stage each firm takes its set of uninformed consumers as captive consumers, over which it has monopoly power. Hence, uninformed consumers' demand is more inelastic than that of informed consumers. If price-matching is not allowed, firm asymmetry produces a variety in optimal prices. However, if all firms offer price-matching guarantees, the effective price paid by informed consumers to all firms is unique and equal to the lowest price posted in the market. When a high-priced firm adopts price-matching, it inherently delegates to the lowest-priced firm the pricing decision for the informed consumers. Such delegation is costly: although it allows high-priced firms to sell to uninformed consumers, it also lowers the effective price paid by informed consumers to the lowest-priced firm optimal price. When firm asymmetries are sufficiently large and uninformed consumers are a small share of total consumers' population, the lowest-priced firm's optimal price may be too low for high-priced firms. In particular, this happens when the decrease in revenues derived from lower effective prices for informed consumers more than offsets the increase in revenues obtained from selling to uninformed consumers. In the latter case, the high-priced firms are better off refraining from the price-matching adoption and setting their own optimal price for informed consumers. Hence, when both the share of informed consumers and firm asymmetries are large, uninformed (but rational) consumers know that if a high-priced firm decides to offer price-matching, it will be penalized by the behavior of informed consumers invoking their price-matching rights. Therefore, the high-priced firms will find it costly to offer price-matching, providing credibility to the price-matching guarantees as low-price signals. Consequently, uninformed consumers know that only low-priced firms will adopt price-matching.

Furthermore, adoption of a price-matching guarantee by the lowest-priced firm leads it to increase its prices while at the same time the non-adopting higher-priced firms will decrease theirs. The reason is as follows: when price-matching is not used, uninformed consumers are shared by all firms because there are no low-price signals. However, when only the lowest-priced firm adopts price-matching, all uninformed consumers are reallocated to this firm. This reallocation has a direct effect on the price elasticity of demand faced by each firm. The lowest-priced firm, which increases its number of uninformed, captive consumers faces a more inelastic demand, so it would like to set a higher price. All other firms that lose their share of uninformed consumers, face a more elastic demand and therefore they have incentives to lower prices. The direct effect of the change in own elasticity of demand for each firm is mitigated, though not completely offset, by the change in the rivals' price under strategic complementarity. Finally, it is important to note that if price-matching is adopted just by the lowest-priced firm in the market, it will never be activated.

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[4] In Jain and Srivastava (2000), firms decide simultaneously whether to offer price-matching and what prices they will charge. However, this different timing of the decisions does not affect main results.

Table I summarizes the main testable implications of the three theories considered on low-price guarantees.

3. UNBEATABLE VALUE: AN EMPIRICAL CASE

3.1 DESCRIPTION OF THE LOW-PRICE GUARANTEE

Tesco implemented its "Unbeatable Value" low-price guarantee in September 1996. The slogan of the low-price guarantee was the following:

> *Lowest Local Value or we'll refund you DOUBLE the difference Applies to any Unbeatable Product where you buy an equivalent product of the same quality in the same week within 3 miles. Receipts are required.*

This type of guarantee is a price-beating guarantee as consumers are promised double the price difference.[5] If I assume perfect information for consumers and no activation costs, the effective selling price of the supermarket offering the low-price guarantee (Tesco) would be

$$s_T = \min\{p_T, p_T - 2(p_T - p_J)\}$$

where T denotes Tesco and J denotes a competing supermarket.

The text of the guarantee establishes four necessary conditions for the customers to make it effective: the products should be equivalent,

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[5] Tesco's Unbeatable Value could also be understood as a price-matching guarantee with a penalty clause to make the guarantee more credible for consumers. Higher credibility (following Baye and Kovenock, 1994) is associated with a reduction in the probability of failing to honor the guarantee. The higher the reward from activating the guarantee, the higher the probability of consumers taking a firm to court if it fails to honor the guarantee and so the more credible the guarantee.

TABLE I.
SUMMARY OF TESTABLE IMPLICATIONS

	Number of Firms Adopting Low-Price Guarantees	Is Consumer Activation Expected?	Effect on Prices of Firms Adopting Low-Price Guarantees	Effect on Prices of Firms *not* Adopting Low-Price Guarantees
Cartel-facilitating device				
Price-matching	Either all firms or only high-priced firms[a]	Yes	Increase	Increase
Price-beating	No firm	No	No effect	No effect
Price-discrimination device				
Price-matching	Either all firms or only high-priced firms	Yes	Increase/decrease	Increase/decrease
Price-beating	High-priced firms	Yes	Increase/decrease	Increase/decrease
Low-price signal				
Price-matching	Low-priced firms	No	Increase	Decrease

[a] In symmetric markets all firms must adopt price-matching for prices to rise above the competitive level.

they have to be bought in the same week, the lower price should be found in a supermarket located within 3 miles (4.8 km) and consumers must produce a proof of purchase. In this section I analyze the requisite of quality equivalence among products, leaving the other three conditions and their implications to the next sections.

Large UK supermarket chains such as Tesco, Sainsbury, and Safeway offer three quality variants for most of the products they sell. From higher to lower quality these are: manufacturer-branded products (sometimes referred to as national brands), high-quality store-brands, and low-quality store-brands. The products sold under the manufacturer's brand name are marketed under intense manufacturer advertising and product development, and are provided with identical specifications to all the supermarkets (e.g., Heinz Baked Beans). UK supermarkets introduced high-quality store-brands more than 20 years ago to compete directly with the manufacturers' brands. These products are located on shelves very close to the manufacturers' brands and tend to mimic very closely their packaging and presentation. The products of this quality variant are sold under each supermarket brand name: Tesco, Sainsbury, and Safeway (e.g., Tesco Baked Beans and so on).

The low-quality store-brand products (the lowest quality variant) were introduced in UK supermarkets from 1993 onward. Their development was a reaction to the arrival in the UK of Continental discounters that offered a limited range of tertiary brand products sold at very reduced prices. The products of this quality variant can be characterized as basic products of manifestly lower quality that are sold at very low prices. Supermarkets have tried to avoid sales cannibalization between the two store-brand variants by means of differentiation.[6] Specifically, the three supermarkets sell high and low-quality store-brands under different brand names and with completely different packaging. Whereas the high-quality store-brands are sold just under the supermarket brand name, the low-quality store-brands combine the supermarket denomination with another word that suggests their basic characteristics: Tesco Value, Sainsbury Essentials, and Safeway Savers. In addition, although high-quality store-brand product packaging mimics that of the manufacturers' branded product's, the packaging of the low-quality store-brands reflects the "value-for-money" approach that supermarkets pursue with them.

The Unbeatable Value low-price guarantee does not include all the products sold by Tesco, but only a selection of them: six hundred so-called Unbeatables. These can in turn be categorized in two distinct groups: first, there are the Temporary Unbeatables, included for a limited period of 3 weeks. Most of these are manufacturers' branded products with only a small percentage of high-quality store-brand products. They are the usual temporary sales of the supermarket. Second, there is a category of Permanent Unbeatables, which consists of those products included in the Unbeatable Value guarantee for the whole period of analysis. More than 95% of the Permanent Unbeatables are low-quality store-brands but, in a few cases, where Tesco does not sell a low-quality store-brand for a given product category, it uses the high-quality store-brand product as a Permanent Unbeatable. The distinction between temporary and permanent Unbeatables was quite obvious at the supermarket: the deadline of the sale was only shown in the price labels of the Temporary Unbeatables and end-of-aisle displays were used for them only. In contrast, the initial location of the Permanent Unbeatables was not modified.

For the purpose of empirical analysis I only consider the low-quality store-brand products that Tesco uses as Permanent Unbeatables. To consider the Temporary Unbeatables would require a theoretical framework related to temporary sales, which is outside the scope of this analysis. Data restrictions prevent us from considering the high-quality store-brand products used as Permanent Unbeatables. However, these represent less than 5% of the products considered in that category.

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[6] For example, the mean price in my sample of Heinz Baked Beans is 45 pence, while the price of high-quality store-brand baked beans is 35 pence and for low-quality store-brand baked beans, it is about 10 pence.

As regards the requisite of quality equivalence across supermarkets, for comparison purposes note that the low-quality store-brand products have the same size and physical characteristics at all three supermarkets. Although they are sold under different brand names at each supermarket, the very nature of the low-quality store-brand products as a budget line limits supermarket product differentiation possibilities. Any additional product refinement aimed at differentiating them would increase their price and preclude the purpose for which they were developed, namely offering a basic product at a very low price.

3.2 DESCRIPTION OF THE DATA SET

The data used in this analysis are prices directly collected by the author in three superstores in the south of Coventry, one from each of the first, second, and fourth biggest supermarket chains in the UK (Tesco, Sainsbury, and Safeway). Both other supermarkets are located within the 3-mile range specified by Tesco's low-price guarantee, at 1.4 and 2.8 miles, respectively, for Sainsbury and Safeway.[7] No other supermarket is located within this 3-mile radius.

The dataset is composed of 27 price observations for 46 low-quality store-brand products taken from November 1995 to March 1997 on a fortnightly basis (but for the Christmas periods). Tesco started its Unbeatable Value program in September 1996, the sixteenth fortnight in my sample. Hence, 15 observations belong to the period before and 12 belong to the period after the start of the guarantee program. Moreover, the sample contains a number of low-quality store-brand products that are covered (22) and not covered (24) by the low-price guarantee. Hence, it is possible to compare their respective patterns of price setting.

The criteria used to select the products for the sample are the following: (i) they should be present in the grocery basket of the representative UK consumer, and (ii) they should be available in all the three supermarkets in the sample.[8] Usually low-quality store-brand products are available in only one size and this is the size that I use for the analysis. The list of products used in the analysis, classified as Unbeatable (included in the low-price guarantee) and Non-Unbeatable (not included in the low-price guarantee), can be found in the Appendix.

[7] It would have been interesting to analyze the effect of Unbeatable Value over a superstore belonging to the Asda chain (the third biggest the UK) but there was no Asda superstore in the south of Coventry.

[8] In fact, I required that the product should be available as a manufacturer-branded product, high-quality store-brand, and low-quality store-brand at all three supermarkets. This is because the data were originally collected to analyze price competition between multi-quality supermarkets. The start of the Unbeatable Value policy by Tesco in the price-taking period also allowed me to analyze the effect of such policies.

3.3 MARKET CHARACTERIZATION

Theoretical predictions about low-price guarantees depend upon market asymmetries that can arise from two possible sources: demand and costs. If I assume the physical quality equivalence of low-quality store-brand products across supermarket chains, demand asymmetries basically would only arise from differences in the supermarket attributes. These attributes relate mainly to the location and mix of services provided by the supermarket (parking space, loyalty cards, packing assistance, etc.). Asymmetries due to locational differences should be small because the three supermarkets are located close to one another in an area that is quite homogenous from a socioeconomic point of view. Similarly any new service provided by one supermarket that successfully attracts shoppers can be quickly copied by the others (Corstjens and Corstjens, 1995).[9] Thus differences in the mix of services should be very small as would be the asymmetries that they could generate.

In order to analyze cost asymmetries, I split the supermarket costs into two components: the wholesale-price of the products and all other costs (labor, distribution and storage, advertising, etc.). The wholesale cost of the low-quality store-brand products is the result of a process of bilateral bargaining between the product manufacturer and the supermarket. Different supply contracts, with different conditions and mostly with different product manufacturers, could lead to some degree of wholesale price dispersion across supermarkets. Analogously, one can also expect some differences across supermarkets in the second component of costs. Therefore, I cannot rule out the existence of some degree of cost asymmetries in my relevant market.

4. LOW-PRICE GUARANTEES AND PRICES

In this Section I use supermarket price data on Unbeatable Value to test the three theoretical literature strands on low-price guarantees described in Section 2 (cartel-facilitating devices, price discrimination devices, and low-price signals). For this purpose, I first consider the patterns of low-price guarantee adoption. Second, I analyze those products that Tesco included in the low-price guarantee. Third, I check the credibility of Unbeatable Value as a low-price signal. Fourth, I examine whether the expected savings from activating are large enough to make activation worthwhile for consumers. Finally, I explore the effects of Tesco's low-price guarantee on prices and between-supermarkets price differentials.

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[9] Recent examples of this phenomenon are extension of opening hours and loyalty cards.

4.1 PATTERNS OF LOW-PRICE GUARANTEE ADOPTION

In this section I address two questions: first, whether the low-price guarantee is adopted by all firms in the market or just by a subset of them; and second, whether the firms adopting low-price guarantees were pricing higher or lower than their non-adopting rivals prior to adoption.

As regards the first question, in the market I am analyzing only Tesco adopts a low-price guarantee. As noted earlier (see Table I), the three theoretical lines of analysis considered are compatible with just a subset of firms adopting low-price guarantees in asymmetric markets (as the one I analyze). However, there is no agreement about which firms should adopt them, the firms pricing higher or the firms pricing lower. This controversy leads us to consider the second question.

Both the cartel theory and the price discrimination theory predict that the subset of firms offering low-price guarantees should include the firms pricing higher. The signaling theory predicts, by contrast, that only the low-priced firms should adopt low-price guarantees.

The prices of the basket of products included (P_{jt}^{UNB}) and not included (P_{jt}^{NOUNB}) in the guarantee in fortnight t in each of the supermarkets are calculated as[10]

$$P_{jt}^{UNB} = \sum_{i=1}^{22} p_{ijt}^{UNB},$$

$$P_{jt}^{NOUNB} = \sum_{i=1}^{24} p_{ijt}^{NOUNB},$$

where p_{ijt} is the price set by supermarket j in fortnight t for product i; *UNB* refers to the products included in the low-price guarantee ($n = 22$); *NOUNB* refers to the products that are not included ($n = 24$) and j = Tesco, Sainsbury, Safeway.

Figures 1 and 2 show the prices of the baskets of products included and not included in the guarantee at each of the three supermarkets. The figures show that in the pre-guarantee period (fortnights 1 to 15) Tesco's prices for both baskets of products are systematically lower than those of Sainsbury and Safeway, consistent with the price-signaling theory but

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[10] The baskets of Unbeatable and Non-Unbeatable products would ideally weight the products according to their importance in the representative consumer's budget. Hence, Hess and Gerstner (1991) used the weights of the consumer price index in the US. However, equivalent weights are not publicly available in the UK, as per the Office of National Statistics.

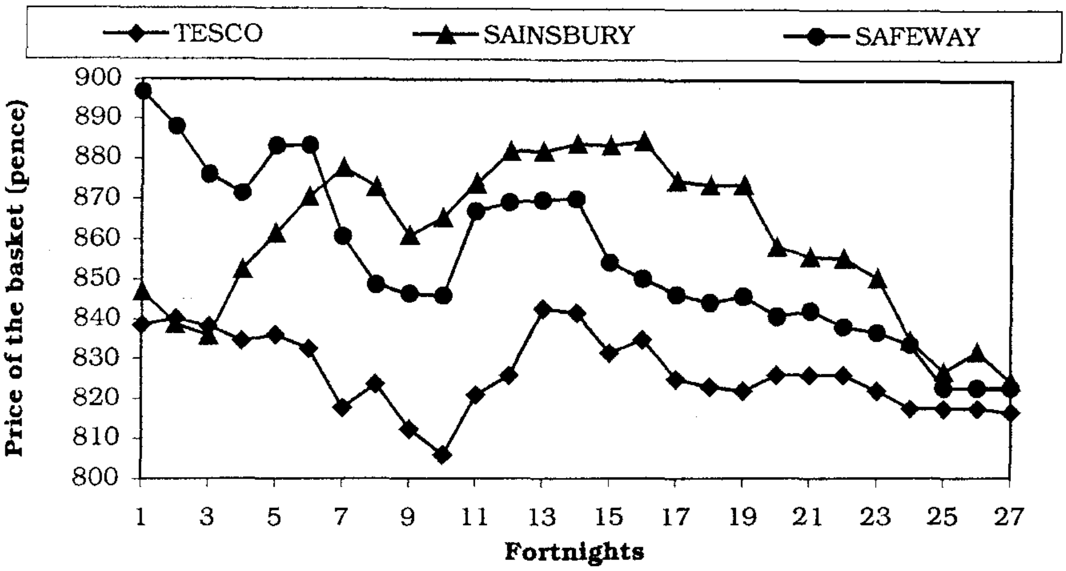

FIGURE 1. EVOLUTION OF THE PRICE OF THE BASKET OF UNBEATABLE PRODUCTS

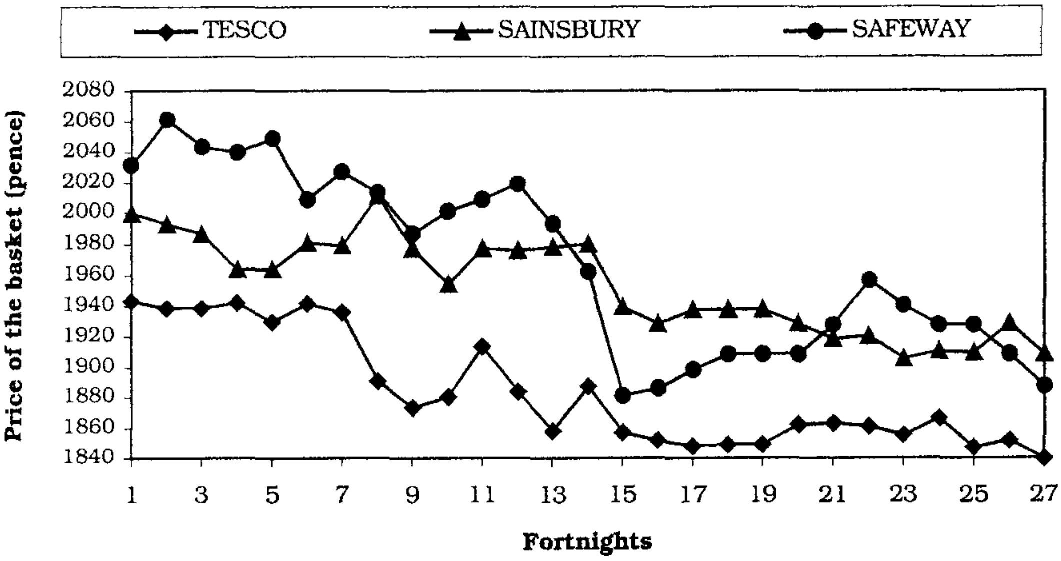

FIGURE 2. EVOLUTION OF THE PRICE OF THE BASKET OF NON-UNBEATABLE PRODUCTS

not with the other two theories that predict adoption by the high-priced firms.

The tests of equality of means (see Table II) also suggest that in the pre-guarantee period Tesco's average prices for the full baskets of products included and not included in the guarantee, where the baskets are comprised of one unit of each good, are significantly lower than Sainsbury's and Safeway's. In particular, for the basket of products later included in the guarantee, Sainsbury's and Safeway's average prices

TABLE II.
AVERAGE PRICES OF THE BASKETS OF UNBEATABLE AND NON-UNBEATABLE PRODUCTS IN THE PRE-GUARANTEE PERIOD AND DIFFERENCE IN MEANS TEST

	Average Prices			Difference in Means Tests			
	Unbeatable Products	Non-Unbeatable Products		Unbeatable Products		Non-Unbeatable Products	
				t	*p*-Value	*t*	*p*-Value
Tesco (T)	829.59	1907.54	T-S	7.15	0.000	7.27	0.000
Sainsbury (S)	865.91	1977.33	T-F	7.91	0.000	7.15	0.000
Safeway (F)	868.73	2008.47	S-F	0.49	0.627	2.55	0.016

are 36.32 and 39.14 pence higher than Tesco's average price (829.59) respectively; and for the basket of products not included, Sainsbury's and Safeways´s average prices are respectively 69.79 and 100.93 pence higher than Tesco's average price (1907.54). Hence, the results of the difference in means tests confirm that the supermarket offering the low-price guarantee is the lowest-priced supermarket in the pre-guarantee period.

Additionally, the fact that Tesco is the lowest-priced supermarket in the pre-guarantee period suggests that its aim with the guarantee is not to avoid being undercut by its competitors, but rather to signal its already low prices. The adoption of a low-price guarantee merely by the lowest-priced supermarket is consistent with the signaling theory, but not with either the cartel or the price discrimination theories. Therefore, after ruling out the cartel and price discrimination theories, I devote the rest of Section 4 to: (i) check whether in the pre-guarantee period there is any difference in Tesco's pricing patterns for the products included and not included in the guarantee, (ii) analyze the credibility of Tesco's Unbeatable Value as a signal of low prices, and (iii) explore whether the observed patterns of consumer activation and supermarket pricing suit the signaling theory predictions.

4.2 WHICH PRODUCTS DOES TESCO INCLUDE IN THE LOW-PRICE GUARANTEE?

Checking whether there are differences in Tesco's pre-guarantee period pricing policies for the products that are included and not included in the guarantee could help us understand why Tesco offered the low-price guarantee for only a subset of its products. To perform an individual product price analysis, I create two dummy variables: *Lowest*

Price and *Unbeatable*. Each observation corresponds to a product in a given fortnight of the pre-guarantee period. The *Lowest Price* variable takes the value 1 if, for a given product and fortnight, Tesco is setting a price lower than Sainsbury and Safeway and zero otherwise. The variable *Unbeatable* takes the value 1 for each observation of a given product if the product was later included in Unbeatable Value low-price guarantee and zero otherwise. A logit regression of *Unbeatable* on *Lowest Price* for pre-guarantee period fortnights suggests that the probability of a product being included by Tesco in the guarantee is 10% higher for those products that Tesco was pricing lower than Sainsbury and Safeway in the pre-guarantee period (the probability of being chosen as an Unbeatable is 0.5548 when the *Lowest Price* variable is set equal to one and 0.4543 when it is set to zero, for a difference of 0.1005).[11] Furthermore, whereas the average frequency of *Lowest Price* for the products later included in the guarantee Tesco is 4.13 fortnights (out of 15 pre-guarantee fortnights), for the products not included it is just 3.04. Therefore, Tesco included in its Unbeatable Value low-price guarantee those products for which it was more likely to enjoy a price advantage over the other two supermarkets.

4.3 CREDIBILITY OF THE LOW-PRICE GUARANTEE AS A LOW-PRICE SIGNAL

Low-price guarantees are a credible signal of low prices only if the cost of using this signal is higher for the high-priced supermarkets (Sainsbury and Safeway) than for the low-priced supermarket (Tesco). Otherwise, both would have an incentive to adopt a low-price guarantee that would, then, lose its informative value for consumers. In order to check whether the cost of offering a low-price guarantee is higher for Sainsbury and Safeway than for Tesco, let us assume that the three supermarkets offer a guarantee with the characteristics of Unbeatable Value for the 15 fortnights of the pre-guarantee period. I measure the cost

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[11] The results of the logit regression of Unbeatable on Lowest Price are:

	Unbeatable
Constant	−0.183 (0.087)
Lowest price	0.403 (0.179)
Number of obs.	690
Percentage of correctly predicted outcomes	54.78

Robust standard errors in parentheses.

TABLE IIII.
AVERAGE REFUNDS FROM LOW-PRICE GUARANTEE ACTIVATION IN THE PRE-GUARANTEE PERIOD (WHEN BUYING ALL THE PRODUCTS INCLUDED IN THE GUARANTEE)

	Average Refunds (in Pence)	Average Refunds (as a Proportion of Total Amount Spent, in %)
Customer claims guarantee at Sainsbury after purchasing at Tesco	96	11.11
Customer claims guarantee at Safeway after purchasing at Tesco	84	9.66
Customer claims guarantee at Tesco after purchasing at Sainsbury	23	2.81
Customer claims guarantee at Safeway after purchasing at Sainsbury	70	8.15
Customer claims guarantee at Tesco after purchasing at Safeway	6	0.71
Customer claims guarantee at Sainsbury after purchasing at Safeway	64	7.40

of adopting the guarantee as the amount of money that a supermarket would have to pay as a result of consumer activation. This amount depends both on the average refund and on the frequency of refund claims. As I am analyzing a potential low-price guarantee, I do not have data on frequency of activation. However, if it is assumed that the frequency of activation is independent of the supermarket considered, the cost of offering the guarantee only depends on the average refund. I can proxy this average refund using my data. First, for every fortnight of the pre-guarantee period, I calculate the refund that a customer could get by buying at supermarket J all the guaranteed products of my sample and then claiming the guarantee at supermarket K for all products it applies to. Then I average these refunds over the 15 pre-guarantee period fortnights. Table III shows that the average refund that a Tesco customer could get each fortnight by claiming the low-price guarantee at Sainsbury and Safeway (96 and 84 pence, respectively) is at least four times larger than the average refund that a Safeway or Sainsbury customer could obtain by doing the same at Tesco (23 pence for the Sainsbury customer and 6 pence for the Safeway customer). These results suggest that the cost of offering the price-beating guarantee is significantly higher for Sainsbury and Safeway than it is for Tesco, confirming that Tesco's low-price guarantee is a credible signal of low prices.

4.4 LOW-PRICE GUARANTEES AND CONSUMERS' ACTIVATION

If Tesco's Unbeatable Value is a signal of low prices, then its aim is exclusively to act as a credible signal that is costly for higher-priced supermarkets to duplicate. Because it is only offered by the lowest-priced supermarket, consumers' activation should not be observed.

To learn about the actual activation of Tesco's Unbeatable Value it would have been optimal to have firm data about the frequency of activation and the amounts paid. However, the lack of such data precludes this kind of analysis. Notwithstanding, I can still make inferences based on price differentials as to whether customers would be interested in activating Tesco's low-price guarantee. To get a proxy for the expected refund I calculate, for every fortnight of the post-guarantee period, the refund that a Sainsbury or Safeway customer could obtain if they bought all 22 Unbeatable products in the sample in one of these supermarkets and visited Tesco to claim the low-price guarantee whenever it were possible.

The minimum and maximum refunds of the 12 fortnight refunds calculated are 2 and 18 (16) pence for the Sainsbury (Safeway) customer respectively. The expected refund a consumer can obtain from activating the low-price guarantee (6 pence for the habitual Sainsbury's shopper and 8 pence for the habitual Safeway's shopper) represents just 0.68% of the total cost of the basket of Unbeatable products for a Sainsbury's shopper and 0.95% of the cost of this basket for a Safeway's shopper. These refunds are quite small, unlikely to make it worthwhile for customers to activate the guarantee very often if ever.[12] After all, Tesco's Unbeatable Value low-price guarantee is not hassle free, it requires proof of purchase and so a previous visit to a supermarket different from Tesco. As a result, I expect the low-price guarantee will seldom be requested.

This rather likely lack of activation is consistent with the signaling theory, which, as stated above, predicts that consumers' activation should not be observed. Finally, the small size of the refunds expected from activating the guarantee reinforces the evidence that Tesco includes in its guarantee those products for which it enjoys a price advantage (as discussed previously).

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[12] Even if I assume that customers are buying more than one unit of each product, the expected reward of the guarantee would not be enough to compensate activation costs. When buying five units of each product, the expected reward from activating the guarantee would be 30 pence for the habitual Sainsbury's shopper and 40 pence for the habitual Safeway's shopper.

4.5 IMPACT OF THE LOW-PRICE GUARANTEE ON PRICES AND PRICE DIFFERENTIALS

Under the signaling theory, where the aim of the low-price guarantee is to signal one's low prices, the impact of the low-price guarantee is to increase posted prices of the lowest-priced firm adopting the guarantee and to lower the posted prices of higher-priced firms that do not adopt guarantees.[13] Therefore, adoption by the lowest-priced firm results in a reduction of price differentials between firms, that is, Tesco's low-price guarantee should result in a reduction of between-supermarket price differentials. As the signaling theory does not consider the possibility of a multiproduct firm offering a low-price guarantee just for a subset of products, I analyze the evolution of the prices of the products included and not included in the guarantee at the three supermarkets and compare them to look for differences or similarities.

To analyze the effect of Tesco's low-price guarantee on supermarket prices and between-supermarkets price differentials, I make use of the following reduced-form equation. Price at supermarket k (k = Tesco, Sainsbury, Safeway) of product j of type s (s = Unbeatable or Non-Unbeatable products) in fortnight t can be represented by

$$P_{jt}^{ks} = \beta_0 + \beta_1 D_S + \beta_2 D_F + \beta_3 D_P + \beta_4 D_S D_P + \beta_5 D_F D_P + \mu_{jt}. \tag{2}$$

D_S is a dummy variable set equal to 1 for Sainsbury prices, D_F is a dummy variable set equal to 1 for Safeway prices, D_P is a dummy variable set equal to 1 for post-guarantee prices, and $\mu_{jt} = \alpha_j + \varepsilon_{jt}$ where α_j are the product effects and ε_{jt} is the error term. By construction, β_0 is the mean price of the products of type s at Tesco in the pre-guarantee period, and β_3 is the average change in this price after the start of the low-price guarantee. Furthermore, β_1 and β_2 are the pre-guarantee average price differentials between Sainsbury and Tesco, and Safeway and Tesco, respectively. Analogously, $(\beta_1 + \beta_4)$ and $(\beta_2 + \beta_5)$ capture the post-guarantee price differential between Sainsbury and Tesco and Safeway and Tesco, respectively. The average changes in Sainsbury's and Safeway's prices after the start of the low-price guarantee are $(\beta_3 + \beta_4)$ and $(\beta_3 + \beta_5)$, respectively. Signaling predicts that whereas β_3 should be positive, both $(\beta_3 + \beta_4)$ and $(\beta_3 + \beta_5)$ should be negative.

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[13] See Proposition 6 by Moorthy and Winter (2002).

TABLE IV.
PRICE DIFFERENTIALS FOR THE BASKETS OF UNBEATABLE AND NON-UNBEATABLE PRODUCTS

	Unbeatable Products	Non-Unbeatable Products
Constant	37.71 (5.02)**	79.48 (11.39)**
D_S	1.65 (0.26)**	2.91 (0.61)**
D_F	1.78 (0.26)**	4.21 (0.61)**
D_P	−0.31 (0.28)	−2.24 (0.65)**
$D_S D_P$	−0.25 (0.12)*	−0.06 (0.92)
$D_F D_P$	−1.12 (0.12)**	−1.65 (0.92)
Number of obs.	1782	1944

Note: Standard errors in parentheses; ** significant at 1%; * significant at 5%.

The panel data estimates[14] of (2) for the sets of Unbeatable and Non-Unbeatable products respectively appear in Table IV. Let us start by analyzing the evolution of the price of the products included in the guarantee. The coefficient estimates confirm that Tesco is the lowest-priced supermarket in the pre-guarantee period, since the mean pre-guarantee Sainsbury–Tesco (β_1) and Safeway–Tesco (β_2) differentials are 1.65 and 1.78 pence, respectively. On average, the price differentials between Safeway–Tesco and Sainsbury–Tesco in the post-guarantee period are 1.12 and 0.25 pence lower than their respective pre-guarantee differentials. These lower price differentials come from price reductions by the non-adopting supermarkets (Sainsbury and Safeway). Whereas Tesco' s average price reduction, 0.31 pence, is not statistically significant, Sainsbury's average price reduction is 0.56 pence ($\beta_3 + \beta_4$) and Safeway's price reduction is 1.43 pence ($\beta_3 + \beta_5$) and both reductions are statistically significant. In spite of these reductions in price, the mean post-guarantee differentials between Sainsbury and Tesco and between Safeway and Tesco, however, remained positive, at 1.40 (1.65–0.25) and 0.66 (1.78–1.12) pence on average respectively.[15]

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[14] In this case there is no difference between the estimates of the fixed and random effects models. The reason is that given the way in which I have constructed all the independent variables they do not show any between-groups variation (in my case each product is a group). As the fixed effects model estimates are obtained from the within-group estimator, and the random effects model estimates are a weighted average of the within and between-group estimators, if there is no between-group variation the estimates of both models are identical.

[15] Another effect of Tesco's low-price guarantee on Tesco's price setting for the Unbeatable basket of products was to reduce the variability of the price of this basket. I can check statistically this hypothesis by means of an F-test for equal variances with the following null and alternative hypothesis:

Although the observed reduction in price differentials is consistent with signaling, this reduction does not arise, as the theory would predict, from an increase in the prices of the adopting firm combined with the decrease in prices of the non-adopters. Rather, it arises because the latter firms decrease their prices whereas Tesco's prices do not significantly change. The price reduction by Sainsbury and Safeway may suggest that they interpreted the guarantee as the start of a potential threat and reacted by reducing their prices for the products included in the low-price guarantee. This interpretation is consistent with the declarations of a Sainsbury representative shortly after the start of Tesco's low-price guarantee: "When we launched Autumn Value, we said that we would undercut the competitors and that is just what we have done with this offer."[16]

Tesco's low-price guarantee also causes a reduction in the prices of the Non-Unbeatable products at all supermarkets. The main difference between the Unbeatable and Non-Unbeatable products is that whereas for the Unbeatable products the low-price guarantee reduces the price differentials between Tesco and the other two supermarkets, for the Non-Unbeatable products the low-price guarantee does not reduce these differentials.

Summing up, Tesco's Unbeatable Value caused a reduction in the price of the basket of products included in the guarantee as well as in the price of the basket of not-included products. The observed reduction in price differentials for the products included in the guarantee is, very likely, due to an intensification of price competition triggered by Tesco's low-price guarantee. Tesco's Unbeatable Value could be interpreted in the context of a battle for market share between Tesco and Sainsbury.

H_0: There is no difference between the variance of P_{jt}^{UNB} for pre and post-guarantee periods.

H_1: The variance of P_{jt}^{UNB} is greater in the pre-guarantee than in the post-guarantee period.

The result of the F-test ($F = 4.57$, p-value $= 0.008$) confirms that the introduction of the low-price guarantee implied a reduction in the degree of variation in the prices of the basket of Unbeatable products at Tesco. A possible interpretation is that the low-price guarantee reduces Tesco's price-setting leeway for the products included in it. For Sainsbury and Safeway the null hypothesis of equal variances is not rejected at a 5% level of significance ($F = 1.64$ and 2.47 with p-values 0.2 and 0.07 respectively).

[16] Sainsbury's *Autumn Value* was, in principle, advertised as a low-price guarantee for 700 products, but it cannot be considered as such because it was always linked to a multi-unit product purchase of the kind "Buy two units and have the third at half price." Additionally, it was never stated if the price relevant for the low-price guarantee was the price per unit of the multiproduct purchase or the price when only one unit was purchased. *Autumn Value* started just in the fortnight after the start of Tesco's Unbeatable Value and it lasted until Christmas (five observations in my sample). It is possible to observe in Figure 1 that although the start of Tesco's low-price guarantee substantially affected the patterns of price setting of Sainsbury for the products included in the low-price guarantee, *Autumn Value* does not seem to have any relevant effect on price setting by competitors.

Tesco's share overtook that of Sainsbury during 1995 and by the middle of 1996 it had opened a 2% lead.

In sum, my empirical analyses suggest that Tesco's Unbeatable Value very likely was part of its overall positioning strategy. Tesco, aware of its price advantage for a subset of products, uses the low-price guarantee as an advertising device to signal low prices aimed at luring consumers into the shop. Sainsbury and Safeway's reaction was to reduce their prices, resulting in lower prices overall for consumers.

5. CONCLUDING REMARKS

The empirical analysis of Tesco's low-price guarantee sheds light on some remarkable facts. First, the low-price guarantee is not offered by the firms pricing higher but by the firm with the lowest price (contrary to most theoretical predictions). Furthermore, Tesco did not include in the guarantee all its products, but only those for which it enjoyed a price advantage in the pre-guarantee period. Second, the expected consumers' reward from activating the low-price guarantee is very small. If I assume positive activation costs, as Hviid and Shaffer (1999) suggest, Tesco's low-price guarantee would not be expected to have any effect on prices. Yet this low-price guarantee caused a reduction in the prices of the products in my sample, whether or not they were covered by the guarantee. Moreover, it reduced between-supermarkets price differentials for the products included in the guarantee. The only theory that is consistent with most of this evidence is the signaling theory, as the predictions of this theory fit the observed evidence except for the fact that the adopting firm does not increase its prices after the start of the guarantee.

I conclude that Tesco's low-price guarantee was not a collusive device leading to higher prices, as Dixit and Nalebuff (1991) suggest, but rather an advertising tool to signal its already low prices. Tesco, aware of its price advantage in a subset of products, includes these products in a low-price guarantee to build market share. Sainsbury and Safeway interpreted Tesco's Unbeatable Value as a clear threat to their market share and reacted with significant price reductions of their own. In this context, the distinction between price-matching and price-beating guarantees becomes relevant, as a price-beating guarantee is more costly for supermarkets with higher prices to adopt. This, in turn, increases the credibility of such a guarantee.

By providing evidence that a price-beating guarantee, rather, can be a signal of low prices, this paper suggests that general antitrust claims against such guarantees are not warranted. Instead, policy makers would be well advised to consider the objectives of the firms announcing such strategies. Otherwise, they run the risk of banning a business practice that can be beneficial to consumers.

APPENDIX: PRODUCTS INCLUDED IN THE SAMPLE AND MEAN PRICES

Non-Unbeatable Products				Unbeatable Products			
	Average Price				Average Price		
	T	S	F		T	S	F
Beer 330 ml	179.0	165.7	176.4	Baked beans in tomato sauce 425 g	9.0	10.0	9.6
Bleach 2 litres	112.7	109.5	116.5	Canned peas 400 g	14.9	14.9	14.9
Canned sweet corn 340 g	29.6	39.0	35.0	Canned spaghetti 200 g	9.8	11.7	11.1
Cat food 400 g can	34.4	34.4	33.1	Canned tomatoes 400 g	10.9	11.7	11.7
Conditioner 2 litres	40.8	49.7	41.1	Cornflakes 500g	51.4	51.4	51.4
Deodorant 150 ml	91.9	95.4	99.0	Cola 2 litres	25.0	25.2	25.2
Dog food 400 g can	33.0	32.9	33.1	Fish fingers (10 units)	34.1	34.6	34.9
Frozen peas 340 g can	115.1	115.6	115.9	Flour 1.5 kg	16.6	17.1	17.2
Hair shampoo 400 g	59.7	62.6	65.2	Ketchup 340 g	29.5	29.7	29.8
Instant coffee 200 g	192.4	194.6	209.0	Kitchen towel (2 rolls pack)	61.9	65.1	62.6
Kitchen foil 450 mm × 5 m	65.0	63.3	65.4	Long grain rice 1 kg	81.8	82.0	84.2
Orange juice 1 litre	40.7	41.1	40.8	Margarine 500 g	24.8	31.4	25.1
Oven chips 1810 g	101.9	117.9	112.4	Mayonnaise 400 g	55.5	55.5	59.0
Pasta sauce 475 g	78.4	78.0	78.1	Peach Halves in syrup 415 g	17.1	19.3	21.0
Salad dressing 285 g	31.0	31.4	31.6	Salted crisps (multipack; 6 packs)	34.6	35.3	35.7
Shower Gel 500 ml	97.5	98.0	100.3	Sanitary Towels (16 units)	38.1	38.3	38.8
Strawberry yoghurt 200 g	17.7	21.6	19.6	Smoked back (8 slices)	86.9	90.9	90.1
Tea 250 g	69.0	75.0	60.2	Soap 250 g	25.7	35.0	27.6
Toothpaste 100 ml	69.0	74.8	73.2	Spaghetti 500 g	25.0	25.3	24.9
Tuna in oil 200 g can	37.6	37.5	38.5	Strawberry jam 454 g	50.2	52.5	56.0

Continued

APPENDIX: CONTINUED

Non-Unbeatable Products	Average price			Unbeatable Products	Average price		
	T	S	F		T	S	F
Vanilla ice cream 750 g	75.0	75.7	75.9	Tissues (90 units)	50.2	50.2	50.1
Washing powder 2 kg	220.3	245.1	247.3	Toilet roll 4 rolls pack	73.6	73.6	73.9
Washing up liquid 500 ml	52.0	53.5	59.4				
White bread 800 g	40.0	40.7	40.0				

Note: Tesco (T), Sainsbury (S) and Safeway (F).

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business it is possible to have the very best product or service and have excellent sales volume, but the wrong price has been set on the product or the service the business will eventually fail. In any isiness, the ultimate reason for a pricing system is to make a profit from your work. The amount of ofit depends on your costs, both variable and fixed, selling price, and the number of items sold or rvices rendered. Some components to consider when setting a price include:

- What are customers willing to pay?
- What is the break-even point; are all costs covered?
- How much profit do you want to make?
- What is your competition charging?

etermining a Product Price

determining a price for your product, it is important to use your costs of production as base. ierefore, you must know your cost of production so that a break-even point can be established.

ie first step in pricing is to determine your product cost. All costs can be divided into variable and ced (overhead) costs. Variable costs, sometimes called out-of-pocket costs, are the costs of doing isiness. These are production-related and include materials, labor, advertising and packaging. The ced costs are the costs of being in business. They include all items that you pay for regardless of iether or not you are producing or selling a product. Examples are tools, equipment, depreciation, ilities and taxes. Remember, the reason for establishing your product cost is to form the base for ur pricing formula.

) single pricing formula will work for all businesses, nor is there a formula that will assure aximum profits in all situations. Every business must approach the problem individually. What llows are several formulas to help you determine a price. Each formula adds an additional item to sider in determining a selling price. By making conscious decisions based on facts, you can rmine your price. If, after using the formulas, you find that your selling price is noticeably higher n that of your competitors, you may need to look for ways to lessen your production costs, reduce rhead costs or accept less profit, and become more efficient without affecting the quality of your luct.

elping to compare the pricing formulas, assume a firm has determined that a market exists for nea pig cages. The cost of materials per cage is $4. It takes one hour of labor to construct the cage the labor rate is $5 per hour. Overhead costs are $2 per cage.

rmula A

erials + labor (production time x hourly wage) divided by number of units = selling price per unit.

mple: $4.00 + $2.00 + $5.00 divided by 1 cage = $9.00 selling price

s approach is often used by beginners because it provides a reasonable wage. You must determine erial cost and give yourself a labor rate. There should be a value placed on your time. There is no wance for overhead costs, inflation or profit.

rmula B

terials + overhead + labor (production time x hourly wage) divided by number of units = selling e per unit.

mple: $4.00 + $2.00 + $5.00 + $2.50 divided by 1 cage = $11.00 per cage

rhead costs have been added in this formula.

rmula C

terials + overhead + labor + profit divided by 1 cage = selling price per unit

mple: $4.00 + $2.00 + $5.00 + $2.50 divided by 1 cage = $13.50

s is the most individualized approach because a conscious decision is made about the profit you nt from your business. You decide on a satisfactory wage and the amount of time you spend ning it. Profit and your labor rate are not the same.

rmula D

olesale price (Formula C) X 2 = retail selling price per unit.

mple: $13.50 x 2 = $27.00

s is a general distributor or retail pricing formula.

ssumes efficiency in production and a steady demand. When you decide to wholesale you must erstand that the buyer will mark up your item a certain percentage. If you sell directly anywhere in vicinity of the retailer, you must not under-cut the shop that is handling your work.

termining a Service Price

ervice-oriented business needs to figure the operating or fixed costs and the variable costs simply eep the business going. These costs are the same as for the product-oriented business. In a ice-oriented business the price should include:

- Variable costs
- Fixed (operating expenses) costs
- Profit

or is usually the major portion of the service-oriented business expense. You must figure out what r time per hour is worth for each service job you do and include it in your price.

ı may decide to change the hourly minimum wage for yourself. If the service you provide is ıplicated and/or requires special expertise not readily available, you may want to charge a higher ›unt for your labor. Keep in mind this will create a higher price and some customers will either be illing or unable to buy your service. Some entrepreneurs are willing to charge less than minimum e for their labor until they have established their business reputation.

it should also be included in the price. A business cannot continue to operate if it does not make a it. You will want to find out the profit percentage made by other similar service- oriented nesses and include a comparable amount in your price. Use the following formula to determine a e to charge for your services.

- First, you must decide on the amount to charge per hour for your labor.
- Second, determine the amount of overhead and variable expenses you incur to deliver your service.
- Third, decide what you think is a fair and competitive amount of profit.

mula A-Price Per Hour of Service

or expenses per hour + overhead and variable expenses + profit = price per hour charged.

mula B-Price Per Job

ieu of charging an hourly rate for your service, you may wish to have a per job charge. To figure this price, determine the total hours to do the job, then add this figure to this formula.

or expenses per hour x hours needed to do job + overhead and variable expenses + profit = price rged per job.

nember, the key to setting prices for your product or service is to set them high enough to cover all r costs and low enough to encourage people to buy. Learning to set prices takes some business erience. The information in this fact sheet is presented as a helpful guide; some degree of ibility is needed.

nsumer Psychology Toward Price

ether they know it or not, most consumers develop mental attitudes about the price they are willing ay for a product or service. There is considerable evidence that the importance of price in the ision to purchase varies from product to product and person to person.

re are numerous price strategies used by businesses to take advantage of customer pricing chology. Three of the more common are listed below.

ltiple Unit Pricing

mply put, this is a strategy where the customer perceives quantity buying as involving greater vings. An example is an item that normally sells for 49 cents. Multiple pricing would change this uation to a two for 89 cents or perhaps three for $1.39 price. In general, multiple unit pricing is ually effective in increasing immediate sales. However, this pricing technique may not increase the te of consumption of the product. People will buy extra units of the product and use them as needed.

veral factors ought to be considered when using multiple unit pricing. First, the multiple-unit price s to be easy to understand. Eight for 79 cents is usually less effective than simple multiples of two r 19 cents. Second, the bargain concept of multiple pricing is not usually effective over the $10 nge. It is, however, very effective for items within the $1 range.

dd Number Pricing

ld number pricing refers to setting a price just below the psychological breaks in the dollar, such as price is set at 49 cents or 99 cents rather than 50 cents or $1. Prices may be set at 19 cents or 49 nts or $19.95. This gives the psychological impression to the customer that the price is not 20 cents 50 cents or $20, but less. Odd number pricing is often avoided in prestige stores or with higher iced items. An expensive dress could be priced at $150, **not** $149.95.

restige Pricing

estige pricing refers to high markups and/or pricing above the market. Many consumers are willing pay more for a product or service because it is felt the product or service is of higher quality or ssesses brand or manufacturer prestige. Usually above-market pricing can be done only when the oduct is unique or distinctive, or when the seller or manufacturer has acquired prestige in the field.

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Committee of Advertising Practice
(Non-broadcast)

Help Note on Lowest Price Claims and Price Promises

CAP Help Notes offer guidance for non-broadcast marketing communications under the British Code of Advertising, Sales Promotions and Direct Marketing (the CAP Code). For advice on the rules for TV or radio commercials, contact the BACC www.bacc.org.uk for TV ads or the RACC www.racc.co.uk for radio ads.

1. Background

These guidelines, drawn up by the Compliance team, are intended to help marketers and agencies interpret the rules in the British Code of Advertising, Sales Promotion and Direct Marketing. The "Key points" are intended to guide media ad departments. The Help Note is based on past ASA rulings and advice from the CAP General Media Panel and the CAP Sales Promotion & Direct Response Panel. It neither constitutes new rules nor binds the ASA Council in the event of a complaint about a marketing communication that follows it.

2. Key points for media ad departments

- "Lowest price" claims (or "best price" claims) must be backed up by suitable evidence to show that marketers will always beat, and not merely match, competitors' prices (Section 4).
- If "lowest price" claims are based on monitoring carried out on a specific date, marketing communications should include that date. Monitoring should be carried out by the marketer as close as possible to the appearance or distribution dates of marketing communications. (Section 4).
- Offering a price promise (e.g. to beat a competitors' cheaper price if informed of that price by a consumer) does not justify a "lowest price" claim if the latter claim cannot be supported (Section 4).

Chairman Andrew Brown • **Secretary** Roger Wisbey
Advertising Association • Broadcast Advertising Clearance Centre • Cinema Advertising Association • Direct Marketing Association • Direct Selling Association • Incorporated Society of British Advertisers • Institute of Practitioners in Advertising • Institute of Sales Promotion • Interactive Advertising Bureau • Mail Order Traders Association • Newspaper Publishers Association • Newspaper Society • Outdoor Advertising Association • Periodical Publishers Association • Proprietary Association of Great Britain • Radio Advertising Clearance Centre • Royal Mail • Scottish Daily Newspaper Society • Scottish Newspaper Publishers Association

- Any significant conditions attached to price promises should be clearly stated (Section 5).
- "Lowest prices guaranteed" and "lowest prices guarantee" are often confused. The former constitutes a claim that the product cannot be purchased as cheaply or cheaper elsewhere, the latter a price promise (Sections 5 & 6).
- Marketers offering to match, but not beat, competitors' prices should ensure that their marketing clearly reflects that (Section 7).
- Marketers should ensure that "lowest price" claims in media with long copy deadlines (e.g. magazines) are still accurate at the time that marketing communications appear. Similarly, "lowest price" claims in marketing material with a long "shelf-life" (e.g. advertisements in directories or brochures) should remain accurate for the duration of the marketing communications' appearance (Section 4).

3. The law and the Code

3.1 Marketers should seek legal advice or contact their home authority to ensure that their claims are legal. Individual circumstances will determine whether or not any marketing communication breaches the law but marketers should pay particular attention to the Consumer Protection Act 1987 (and the Code of Practice for Traders on Price Indications published by the DTI), the Price Marking Order 1999 and the Control of Misleading Advertisements Regulations 1988 (as amended); and

3.2 The Code state:

"Before submitting a marketing communication for publication, marketers must hold documentary evidence to prove all claims, whether direct or implied, that are capable of objective substantiation" **(clause 3.1)**;

"No marketing communication should mislead by inaccuracy, ambiguity, exaggeration, omission or otherwise" **(clause 7.1)**; and

4. “Lowest price” claims

4.1 Marketers must be able to back up claims that they offer the lowest prices (e.g. “lowest price guaranteed”);

4.2 Marketers that claim to offer “the lowest prices” (or “the best prices”) should be able to beat, and not merely match, competitors’ prices;

4.3 “Lowest price” claims should relate to every product sold by the marketers unless the marketing communications state prominently that the claims relate only to specific products;

4.4 Marketers should compare the same or the most similar products (unless they state prominently that their competitors offer more comparable, cheaper products). “Lowest price” claims should apply only to products that are not exclusive to the marketers (unless it is clear that the claims are a comparison with the marketers’ own previous prices);

4.5 If “lowest price” claims are based on monitoring carried out on a specific date, marketers should state that date. They should, however, be able to satisfy the ASA that price changes by their competitors are not so frequent that there is a reasonable likelihood that the claims will be inaccurate by the time that they appear;

4.6 If price changes by competitors are so frequent that there is a reasonable likelihood that “lowest price” claims will be inaccurate by the time that they appear, marketers should develop a price monitoring and adjustment policy to ensure that such claims can be supported. That might involve carrying out extensive monitoring of all relevant competitors’ prices and lowering their prices when those competitors offer lower prices;

4.7 Marketers should take all reasonable steps to ensure that any monitoring is carried out as close as possible to the appearance dates of marketing communications. Marketers who make “lowest price” claims in media with long copy deadlines (e.g. magazines) or who make block bookings that do not allow for amendments to marketing communications should ensure, by adopting a price monitoring and adjustment policy, that claims remain accurate at the time that marketing communications appear. Similarly, those who use marketing material with a long "shelf-life" (e.g. marketing communications in directories or brochures) should ensure that "lowest price" claims remain accurate. In both cases, marketers should state when the price check was carried out;

4.8 Similarly, if marketers claim that they will always offer the lowest prices, they should develop a price monitoring and adjustment policy to ensure that that claim can be supported. Again, that might involve carrying out extensive monitoring of all relevant competitors' prices and lowering their prices when those competitors publish or announce lower prices; and

4.9 Offering a price promise (e.g. to beat a competitors' cheaper price if informed of that price by a consumer) does not justify a "lowest price" claim in the absence of adequate monitoring or an adequate price monitoring and adjustment policy. Even "lowest price" claims that are immediately qualified to refer to the price promise (e.g. "lowest prices or your money back") should be backed up by adequate monitoring or an adequate price monitoring and adjustment policy.

5. Price promises

5.1 Price promises such as a "lowest prices guarantee" are often confused with absolute lowest price claims such as "lowest prices guaranteed". Marketers should be aware that there is a difference between a "guarantee" and "guaranteed" and should distinguish clearly between the two (see 6. below);

5.2 Any significant conditions attached to price promises should be stated clearly (e.g. required proof of competitors' lower prices, time limits, local or regional boundaries, exclusivity of handling or delivery costs, whether the price promise applies only to a competitors' advertised prices). For advice on the prominence of any conditions, please refer to the CAP Help Note on Claims that Require Qualification; and

5.3 Unless price promises provide for a specific level of compensation in the event of consumers finding cheaper prices elsewhere (e.g. by promising "double the difference"), marketers should normally beat, and not merely match, competitors' prices.

6. Guarantee vs. guaranteed

6.1 A useful rule of thumb to distinguish between "lowest price" claims and price promises when the words "guarantee" and guaranteed" are used is to determine whether the words are being used in verb or noun form. If in verb form (e.g. "lowest prices guaranteed" and "we guarantee the lowest prices"), they are likely to be seen to relate to "lowest price" claims (see 4. above). If in noun form (e.g. "we offer a lowest price guarantee"), they are likely to be seen to relate to price promises (see 5. above).

7. "Unbeatable low prices" claims and promises

7.1 Marketers that offer to match but not beat competitors' prices, or that offer a price promise to match but not beat competitors' lowest prices, should ensure that they do not imply that they will beat competitors' prices. They could, for example, claim "no one beats our prices", "unbeatable low prices", "we won't be beaten on price" or "unbeatable price guarantee". As with 'lowest price" claims, marketers must be able to support those claims (see 4.5, 4.6, 4.7 and 4.8 above).

Advice on specific marketing communications is available from the Copy Advice team by telephone on 020 7492 2100, by fax on 020 7404 3404 or by email on copyadvice@cap.org.uk. The CAP website at www.cap.org.uk contains a full list of Help Notes as well as access to the AdviceOnline database, which has links through to relevant Code rules and ASA adjudications.

December 2001
Revised: March 2003

CHAPTER 31
GUARANTY

Article 1. Definition of Guaranty.
Article 2. Creation of Guaranty.
Article 3. Interpretation of Guaranty.
Article 4. Liability of Guarantors.
Article 5. Continuing Guaranty.
Article 6. Exoneration of Guarantors.

ARTICLE 1
DEFINITION OF GUARANTY

§ 31101. What is a Guaranty.
§ 31102. Knowledge of Principal Unnecessary.

§ 31101. What is a Guaranty.

A *guaranty* is a promise to answer for the debt, default, or miscarriage of another person.

SOURCE: CC § 2787.

§ 31102. Knowledge of Principal Unnecessary.

A person may become guarantor even without the knowledge or consent of the principal.

SOURCE: CC § 2789.

NOTE: No 1970 Civil Code §§ 2789-2791 existed.

ARTICLE 2
CREATION OF GUARANTY

§ 31201. Necessity of Consideration.
§ 31202. Guaranty in Writing.
§ 31203. For the Obligation of Another, Original.
§ 31204. Acceptance of Guaranty.

§ 31201. Necessity of Consideration.

Where a guaranty is entered into at the same time with the original obligation, or with the acceptance of the latter by the guarantee, and forms with that obligation a part of the consideration to him, no other consideration need exist. In all other cases, there must be a consideration distinct from that of the original obligation.

SOURCE: CC § 2792.

§ 31202. Guaranty in Writing.

Except as prescribed by the next section, a guaranty must be in writing, and signed by the guarantor; but the writing need not express a consideration.

SOURCE: CC § 2793.

§ 31203. For the Obligation of Another, Original.

A promise to answer for the obligation of another, in any of the following cases, is deemed an original obligation of the promisor, and need not be in writing:

1. Where the promise is made by one who has received property of another upon an undertaking to apply it pursuant to such promise; or by one who has received a discharge from an obligation, in whole or in part, in consideration of such promise;

2. Where the creditor parts with value, or enters into an obligation, in consideration of the obligation in respect to which the promise is made, in terms or under circumstances such as to render the party making the promise the principal debtor, and the person in whose behalf it is made, his surety;

3. Where the promise, being made for an antecedent obligation of another, is made upon the consideration that the party receiving it cancels the antecedent obligation, accepting the new promise as a substitute therefor; or upon the consideration that the party receiving it releases the property of another from a levy; or his person from imprisonment under an execution on a judgment obtained upon the antecedent obligation or upon a consideration beneficial to the promisor, whether moving from either party to the antecedent obligation, or from another person;

4. Where a factor undertakes, for a commission, to sell merchandise and guarantee the sale;

5. Where the holder of an instrument for the payment of money, upon which a third person is or may become liable to him, transfers it in payment of a precedent debt of his own, or for a new consideration, and in connection with such transfer enters into a promise respecting such instrument.

SOURCE: CC § 2794.

§ 31204. Acceptance of Guaranty.

A mere offer to guarantee is not binding, until notice of its acceptance is communicated by the guarantee to the guarantor; but an absolute guaranty is binding upon the guarantor without notice of acceptance.

SOURCE: CC § 2795.

NOTE: No 1970 Civil Code §§ 2796-2798 existed.

ARTICLE 3
INTERPRETATION OF GUARANTY

§ 31301. Incomplete Contract Guaranteed.
§ 31302. Guaranty of Obligation.
§ 31303. Recovery of Guaranty.
§ 31304. Guarantor's Liability.

§ 31301. Incomplete Contract Guaranteed.

In a guaranty of a contract, the terms of which are not then settled, it is implied that its terms be such as will not expose the guarantor to greater risks than he would incur under those terms which are most common in similar contracts at the place where the principal contract is to be performed.

SOURCE: CC § 2799.

§ 31302. Guaranty of Obligation.

A guaranty to the effect that an obligation is good, or is collectible, imports that the debtor is solvent, and that the demand is collectible by the usual legal proceedings, if taken with reasonable diligence.

SOURCE: CC § 2800.

§ 31303. Recovery of Guaranty.

A guaranty, such as is mentioned in the last section, is not discharged by an omission to take proceedings upon the principal debt, or upon any collateral security for its payment, if no part of the debt could have been collected thereby.

SOURCE: CC § 2801.

§ 31304. Guarantor's Liability.

In the cases mentioned in § 31302, the removal of the principal from Guam, leaving no property therein from which the obligation might be satisfied, is equivalent to the insolvency of the principal in its effect upon the rights and obligations of the guarantor.

SOURCE: CC § 2802.

NOTE: No 1970 Civil Code §§ 2803-2805 existed.

ARTICLE 4
LIABILITY OF GUARANTORS

§ 31401. How Guaranty to be Construed.
§ 31402. Liability, Guaranty of Payment.
§ 31403. Liability on Conditional Obligation.
§ 31404. Obligation Limited to Principals.
§ 31405. Void on Illegal Contract.

§ 31401. How Guaranty to be Construed.

A Guaranty is deemed to be unconditional unless its terms import some condition precedent to the liability of the guarantor.

SOURCE: CC § 2806.

§ 31402. Liability, Guaranty of Payment.

A guarantor of payment or performance is liable to the guarantee immediately upon the default of the principal, and without demand or notice.

SOURCE: CC § 2807.

§ 31403. Liability on Conditional Obligation.

Where one guarantees a conditional obligation, his liability is commensurate with that of the principal, and he is not entitled to notice of the default of the principal, unless he is unable, by the exercise of reasonable diligence, to acquire information of such default, and the creditor has actual notice thereof.

SOURCE: CC § 2808.

§ 31404. Obligation Limited to Principals.

The obligation of a guarantor must be neither larger in amount nor in other respects more burdensome than that of the principal, and if in its terms it exceeds it, it is reducible in proportion to the principal obligation.

SOURCE: CC § 2809.

§ 31405. Void on Illegal Contract.

A guarantor is not liable if the contract of the principal is unlawful, but he is liable, notwithstanding any mere personal inability of the principal, though the disability be such as to make the contract void against the principal.

SOURCE: CC § 2810.

NOTE: No 1970 Civil Code §§ 2811-2813 existed.

ARTICLE 5
CONTINUING GUARANTY

§ 31501. What is Continuing Guaranty.
§ 31502. Revocation of Continuing Guaranty.

§ 31501. What is Continuing Guaranty.

A guaranty relating to a future liability of the principal, under successive transactions, which either continue his liability or from time to time renew it after it has been satisfied, is called a continuing guaranty.

SOURCE: CC § 2814.

§ 31502. Revocation of Continuing Guaranty.

A continuing guaranty may be revoked at any time by the guarantor, in respect to future transactions, unless there is a continuing consideration as to such transactions which he does not renounce.

SOURCE: CC § 2815.

NOTE: No 1970 Civil Code §§ 2816-2818 existed.

ARTICLE 6
EXONERATION OF GUARANTORS

§ 31601. What Dealings with Debtor Exonerates Guarantor.
§ 31602. Void Promises.
§ 31603. Rescission of Alteration.
§ 31604. Part Performance.
§ 31605. Delay of Creditor does not Discharge Guarantor.
§ 31606. Guarantor Indemnified by Debtor, not Exonerated.
§ 31607. Discharge of Principal by Law, Guarantor not Released.

§ 31601. What Dealings with Debtor Exonerates Guarantor.

A guarantor is exonerated, except so far as he may be indemnified by the principal, if by any act of the creditor, without the consent of the guarantor, the original obligation of the principal is altered in any respect, or the remedies or rights of creditor against the principal, in respect thereto, are in any way impaired or suspended.

SOURCE: CC § 2819.

§ 31602. Void Promises.

A promise by a creditor, which for any cause is void, or voidable by him at his option, does not alter the obligation or suspend or impair the remedy, within the meaning of the last section.

SOURCE: CC § 2820.

§ 31603. Rescission of Alteration.

The rescission of an agreement altering the original obligation of a debtor, or impairing the remedy of a creditor, does not restore the liability of a guarantor who has been exonerated by such agreement.

SOURCE: CC § 2821.

§ 31604. Part Performance.

The acceptance, by a creditor, of anything in partial satisfaction of an obligation reduces the obligation of a guarantor thereof, in the same measure as that of the principal, but does not otherwise affect it.

SOURCE: CC § 2822.

§ 31605. Delay of Creditor does not Discharge Guarantor.

Mere delay on the part of a creditor to proceed against the principal, or to enforce any other remedy, does not exonerate a guarantor.

SOURCE: CC § 2823.

§ 31606. Guarantor Indemnified by Debtor, not Exonerated.

A guarantor, who has been indemnified by the principal, is liable to the creditor to the extent of the indemnity, notwithstanding that the creditor, without the assent of the guarantor, may have modified the contract or released the principal.

SOURCE: CC § 2824.

§ 31607. Discharge of Principal by Law, Guarantor not Released.

A guarantor is not exonerated by the discharge of his principal by operation of law, without the intervention or omission of the creditor.

SOURCE: CC § 2825.

NOTE: No 1970 Civil Code §§ 2826-2830 existed.
