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Price-matching guarantees: Influences on pricing strategy in a market with asymmetric firms

Dong-Hee Koh [a], Junyean Moon [a,*], Ralf Schellhase [b]

[a] Department of Business, School of Business and Economics, Hanyang University, Republic of Korea
[b] University of Applied Sciences Darmstadt, Germany

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ABSTRACT

This study analyzes the price effects of price-matching guarantees in a duopoly where consumers are heterogeneous with respect to firm loyalty, and a firm has more loyal customers than the other firm. The results show that equilibrium matching policy and pricing strategy depend on market conditions. Price-matching guarantees can result either in the form of price collusion or price discrimination.

1. Introduction

Firms in many industries, such as sellers of consumer goods, manufacturers and sellers of industrial goods, and those who operate e-commerce, use price-matching guarantees (PMGs). Previous theoretical research on PMGs focuses on three explanations: price collusion, price discrimination, and price signaling (Manez, 2006; Moorthy and Winter, 2006).

The price collusion explanation for PMGs is that they reduce incentives of rivals to cut prices. In accordance with the view of Salop (1986), many authors demonstrate that this policy is a means to raise prices to a level that maximizes joint profits. The view that PMGs reduce price competition is dominant in literature and leads to calls for antitrust actions against firms offering such guarantees (Hviid and Shaffer, 1999; Chen et al., 2001).

Png and Hirshleifer (1987) point out the possibility of price discrimination occurring through PMGs. According to their explanation, firms use PMGs to charge different prices to each segment of consumers differentiated by their information about rivals' prices. Consumers with low search costs are well informed of prices and will claim refunds. However, those with high search costs who are unaware of rivals' prices will not make the claim. Thus, PMGs can cause firms to charge different prices among consumers.

Two basic problems undermine these two explanations. First, all firms weakly prefer to adopt PMGs in a market with symmetric firms. In an asymmetric-firm market, either all firms adopt PMGs or all but the lowest-priced firms do so. However, theoretical and empirical observations are inconsistent with this view and suggest that consumers seem to associate PMGs with firms with low prices. Using a game theoretic analysis, Moorthy and Winter (2006) and Moorthy and Zhang (2006) find that PMGs may be useful for a low-cost firm to signal low prices to uninformed consumers in a market with firms that are differentiated horizontally and vertically.

Meanwhile, Chatterjee et al. (2003) provide empirical evidence that consumers prefer markets in which one out of two firms offers PMGs to markets without them; this evidence supports the theory of low price signaling of PMGs. They also suggest that consumers think that PMGs foster competition rather than facilitate collusion. Kukar-Kinney and Grewal's (2007) experiments show that consumers associate firms with PMGs with lower prices more frequently, and these consumers are more willing to search for a lower price after purchasing an item in the presence of a PMG policy. They also claim that these effects are stronger in the bricks-and-mortar market than the online market.

Second, the logic of these two explanations assumes that PMGs are effective in preventing price reductions. In contrast, some studies challenge this conventional wisdom (Corts, 1996; Hviid and Shaffer, 1999; Jain and Srivastava, 2000; Chen et al., 2001; Arbatskaya et al., 2004). Hviid and Shaffer (1999) argue that when firms do not automatically match prices and consumers experience hassles in the process of receiving a refund, any price increase due to PMGs is smaller. They show that the collusion effect of PMGs either disappears in a market with symmetric firms or decreases in a market with asymmetric firms.

* Corresponding author at: Department of Business, School of Business and Economics, Hanyang University, 1271 Sa-dong, Sangnok-gu, Ansan, 426-791 Kyeonggi-do, Republic of Korea. Tel./fax: +82 31 400 5653/5591.
E-mail addresses: dhkoh@hanyang.ac.kr (D-H. Koh), jmoon@hanyang.ac.kr (J. Moon), schellhase@fh-darmstadt.de (R. Schellhase).

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Corts (1996) finds that PMGs can have not only anti-competitive but also pro-competitive effects. In his model, firms compete for two types of consumers: sophisticated and unsophisticated. Sophisticated consumers consider effective prices computed from posted prices and PMGs, whereas unsophisticated consumers consider posted prices. Without PMGs, sophisticated consumers buy from the lower-priced firm. However, the guarantees allow higher-priced firms to compete with the lower-priced one. Thus, this type of consumer becomes less important for the lower-priced firm, which sets a price closer to the optimal price for the unsophisticated consumer. As a result, when sophisticated consumers' demands are relatively elastic, prices increase; but if their demands are relatively inelastic, prices decrease.

In their analysis of a market where consumers are heterogeneous with respect to firm loyalty and search cost for finding price information, Chen et al. (2001) argue that PMGs generate a competition-enhancing effect as well as a competition-dampening effect. They show that PMGs can facilitate competition, thus making firms worse off when the number of loyal customers with low search costs is large. This is because PMGs encourage those consumers to find out the rival's prices. They argue that the fact that some firms may suffer substantial losses to pay for the rebate supports their findings.

This paper challenges the second assertion and focuses on the price effect of PMGs without considering the signaling effect in a market with asymmetric firms that compete for a dual population of consumers. It shows that the effects of PMGs depend not only on how they affect the purchasing behavior of consumers who prefer to buy from a particular firm, as in Chen et al. (2001), but also the number of loyal consumers of each firm.

PMGs can have either price collusion or price discrimination effects depending on market conditions such as the number of loyal customers and consumers' valuation of each product. A price collusion effect, however, can be divided into two different types based on the effects on the profit of the firm with fewer loyal customers. When firms have a comparable number of loyal customers, the profits of both firms increase due to a price collusion effect, as in the market with symmetric firms. When the difference is large, the profit of a firm with more loyal customers increases, but the profit of the other firm decreases.

When not only price-sensitive but also some loyal customers take advantage of matching, firms can be worse off due to a competition-enhancing effect, as specified in Chen et al. (2001). More specifically, when not only the number of loyal customers who practice matching but also the difference in the number of customers is large, the firm with more loyal customers never matches. The firm with fewer loyal customers is indifferent to PMGs because it charges a lower price than its rival.

Following this introduction, Section 2 describes the model. Section 3 explains an equilibrium matching policy and pricing strategy when only price-sensitive consumers invoke matching. Section 4 demonstrates how the results change when not only price-sensitive but also loyal customers invoke matching. The final section offers a conclusion with suggestions for future research.

2. Model

Firms play a two-stage game in PMG. All of them first decide whether to offer the guarantees simultaneously and then decide on the prices. This is the usual approach taken in the two-stage game since a policy decision is usually more difficult to change than a price decision.

Two different types of consumers buy either one unit or nothing: price-sensitive consumers and loyal consumers (Png and Hirshleifer, 1987; Corts, 1996; Chen et al., 2001). Matching does not incur any cost to consumers. *Price-sensitive* consumers buy from the firm with a lower price. When the prices net of the rebate are equal, firms equally share these consumers. The demand of price-sensitive consumers is price-elastic in the sense that the number of consumers with reservation price L is $\beta^L-\beta^H$ and the number of consumers with reservation price H is β^H, where $H>L$ and $\beta^H<\beta^L$. Thus, when a price is equal to L, total sales from price-sensitive consumers is β^l. This section analyzes the market where the following condition holds (PMGs incur more various effects when Eq. (1) holds than when Eq. (1) does not hold):

$$L\beta^L > H\beta^H. \tag{1}$$

Meanwhile, loyal consumers with a reservation price H keep buying from their loyal firm even though the rival's price is lower (Kim et al. (2000), Koo and Kang (2004), and Suh et al. (2004) discuss the factors affecting firm loyalty). Allowing for the possibility that firms are asymmetric is reasonable because firms can differ in several aspects such as size, location, quality, and so forth (e.g., Corts, 1996; Hviid and Shaffer, 1999; Jain and Srivastava, 2000). This paper assumes that firms have a different number of loyal customers, but the same marginal cost, which is equal to zero. α_i is the number of firm i's loyal customers where $\alpha_1>\alpha_2$. Let p_i be firm i's price and (p_1,p_2) the outcome when Firm 1 charges p_1 and Firm 2 charges p_2. Since $p_i=H$ or L, four different outcomes are possible in the second stage; (H, H), (H, L), (L, H) and (L, L). $\prod_i^{+-}(p_1,p_2)$ is a profit of firm i when each firm charges p_1 and p_2, respectively, in the market where only Firm 1 offers to match. For simplicity, let $\prod_i=\prod_i^{+-}$. Table 1 summarizes the model and notation.

This paper derives a subgame perfect equilibrium, thus analyzing the pricing decision of the second stage first, then the matching decision. When more than one pure strategy equilibrium exists, firms choose an equilibrium which gives higher profits for both firms if it exists. If not, firms randomize. (This assumption does not change any result.)

3. When only price-sensitive consumers invoke matching

When only price-sensitive consumers practice matching, four subgames are possible in the second stage depending on the decision about an offer to match: (a) neither firm offers PMGs, (b) both firms offer PMGs, (c) only Firm 1 offers PMGs, and (d) only Firm 2 offers PMGs.

3.1. When neither firm offers PMGs (subgame (a))

Table 2 shows the second stage normal form when neither firm offers PMG, where

$$\prod_1(H,H)=H*\left(\alpha_1+\frac{\beta^H}{2}\right)\quad(=A),\quad \prod_2(H,H)=H*\left(\alpha_2+\frac{\beta^H}{2}\right)\quad(=a)$$

$$\prod_1(H,L)=H*(\alpha_1)\quad(=B),\quad \prod_2(H,L)=L*\left(\alpha_2+\beta^L\right)\quad(=b)$$

$$\prod_1(L,H)=L*\left(\alpha_1+\beta^L\right)\quad(=C),\quad \prod_2(L,H)=H*(\alpha_2)\quad(=c)$$

$$\prod_1(L,L)=L*\left(\alpha_1+\frac{\beta^L}{2}\right)\quad(=D),\quad \prod_2(L,L)=L*\left(\alpha_2+\frac{\beta^L}{2}\right)\quad(=d)$$

Table 1
Summary of model and notation.

(1) *Consumers* (2 types: loyal vs. price-sensitive)
- loyal consumers
  - H: reservation price
  - α_i: number of Firm i's loyal consumers where $i=1, 2$ and $\alpha_1>\alpha_2$
- Price-sensitive consumers
  - H, L: reservation prices where $H>L$
  - β^j: number of price-sensitive consumers with reservation price j where $j=H, L$ and $\beta^H<\beta^L$

(2) *Firms* (Firm 1 has more loyal consumers than Firm 2)
- p_i: Firm i's price where $i=1, 2$
- π_i^{+-}: Firm i's profit when Firm 1 offers PMGs and Firm 2 does not offer PMGs