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Low-price guarantees and pricing behavior: evidence from hypermarkets in Korea

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Abstract

This study examines the relationship between a low-price guarantee and the price competition among three leading hypermarkets in Korea. Using retail price data for individual products, we find that after the guarantee, the price-matching store and its mentioned rival increase their prices while the non-mentioned competitor decreases its prices. The reason for such pricing patterns is discussed as well.

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1. Introduction

In the Korean retail industry, E-mart, Homeplus (Tesco), and Lotte Mart are the three major discount store chains.[1] As of 2014, they account for approximately 70% of overall hypermarket sales, with E-mart, Homeplus, and Lotte Mart's market shares being respectively 28.3%, 25.4%, and 15.9%. In June 2013, Homeplus promised to match lower prices of E-mart by announcing as follows:

> *If more expensive than at E-mart, we will offer coupons that amount to the difference on the spot.*

According to the theoretical literature on price-matching guarantees (PMGs), they can be adopted to perform three different functions. First, PMGs can support monopoly pricing by reducing firms' incentives to undercut rivals (Hay, 1982; Salop, 1986; Liu, 2013). Second, PMGs allow firms to price discriminate between consumers with high and low hassle (search) costs (Png and Hirshleifer, 1987; Corts, 1997). Third, PMGs serve as a means of signaling low prices to consumers (Jain and Srivastava, 2000; Moorthy and Winter, 2006; Moorthy and Zhang, 2006).

In regard to the signaling theory, Jain and Srivastava (2000) experimentally show that consumers' confidence of finding low prices at the store with a price-matching policy is higher. Moorthy and Winter (2006) prove that for a large cost difference and a small fraction of uninformed consumers, only a low-cost firm adopts price matching and that the effect of price matching is to decrease (resp. increase) the price of a non-price-matching (resp. price-matching) firm.

Despite the extensive studies on PMGs, empirical work of their effects is scarce. Using price data collected from grocery stores in North Carolina, Hess and Gerstner (1991) provide evidence that PMGs are used to mitigate price competition. Arbatskaya et al. (2004) use data of 515 low-price guarantees (LPGs) obtained from newspaper advertisements in the US and find that the majority of LPGs are inconsistent with facilitating high prices. Mañez (2006) analyzes the effects of an LPG on pricing patterns of three UK supermarkets. He concludes that Tesco's low-price guarantee serves as an advertising device to signal low prices.

The purpose of this note is to analyze the impacts of the price-matching policy based on the hypermarkets' experience in Korea. The novelty of our case is twofold: (i) when introducing the LPG, Homeplus explicitly mentions E-mart as its rival, but not Lotte Mart, which may affect pricing behavior of E-mart and Lotte Mart; (ii) the issue of hassle costs that can limit the ability of LPGs to support monopoly pricing becomes irrelevant as Homeplus' price comparison system automatically matches E-mart's lower prices at the counter (Hviid and Shaffer, 1999). The empirical evidence suggests that Homeplus' LPG could have been

[1] In September 2015, Tesco sold Homeplus, its South Korean business, to a group led by private equity firm MBK Partners.

adopted for a collusive device in relation to E-mart, but at the same time have functioned as a signal of low prices in relation to Lotte Mart.

2. Data and empirical model

To investigate the relationship between Homeplus' LPG and pricing behavior of the three hypermarkets, we use retailers' price information provided by the Korea National Council of Consumer Organizations (KNCCO).[2] KNCCO surveys monthly consumer prices for 47-93 products sold at about 50 hypermarkets located in Seoul, South Korea. They visit each store on the 3rd Thursday and Friday of each month and record selling prices of products that consumers often purchase. As of April 2014, for example, prices of products sold at 13 Homeplus, 18 E-mart, and 7 Lotte Mart stores are available from KNCCO.

The dataset of KNCCO is an unbalanced panel with surveyed products varing across stores. Thus, in order to construct balanced panel data, we use the following data selection criteria: (i) both E-mart and Lotte Mart should be located within 3-kilometer distance from Homeplus; (ii) each store should sell at least 10 common products for a given period of time. As a result, the three hypermarkets located in Nowon-gu, Seoul are selected and 18 price observations for 10 products taken from November 2012 to April 2014 are collected.[3] The list of the 10 products and their mean prices can be found in Appendix.

We begin the analysis by observing prices of the basket of the 10 products. The basket price at each hypermarket is calculated as

$$P_t^k = \sum_{i=1}^{10} P_{it}^k,$$

where P_{it}^k is the price set by hypermarket $k \in$\{Homeplus, E-mart, Lotte Mart\} in month t for product i.

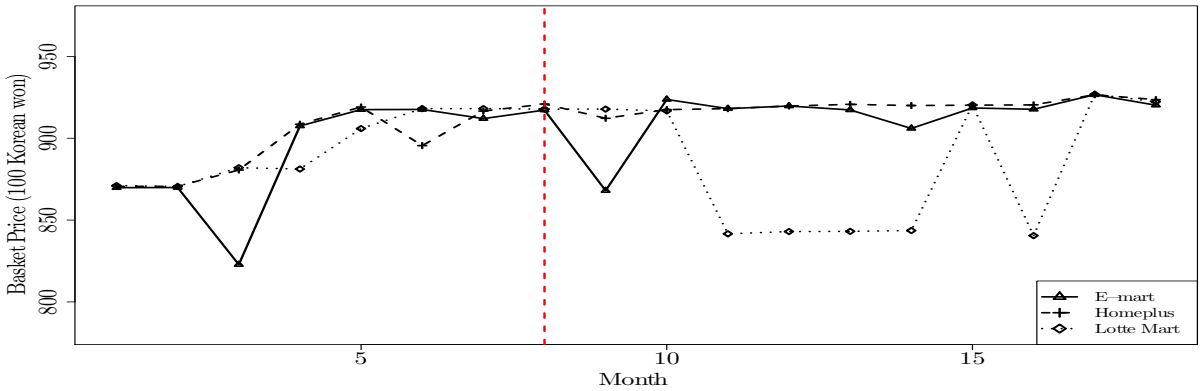
Figure 1 depicts each hypermarket's basket price of the products during the sample periods. The vertical dotted line indicates the month in which Homeplus started matching lower prices of E-mart. Two patterns are shown in the figure. First, the basket price of Homeplus becomes less volatile after the implementation of the guarantee. Second, the average basket price of E-mart increases, while that of Lotte Mart decreases with the price-matching policy.

To see how Homeplus' price matching affects hypermarket prices and between-hypermarkets

[2] www.consumer.or.kr

[3] A "gu" is a district of a city. In Nowon-gu, E-mart and Lotte Mart are located 2.6 and 1.3 kilometers away from Homeplus, respectively.

Figure 1. Series of the basket price at each hypermarket



Note: 100 Korean won is roughly equivalent to 0.1 US dollar.

price differentials, we now employ the following reduced-form equation (Mañez, 2006):

$$P_{it}^{k} = \beta_0 + \beta_1 D_E + \beta_2 D_L + \beta_3 D_P + \beta_4 D_E D_P + \beta_5 D_L D_P + \mu_{it}, \tag{1}$$

where D_E (resp. D_L) is a dummy variable set equal to 1 for E-mart (resp. Lotte Mart) prices, D_P is a dummy variable set equal to 1 for post-guarantee prices, and $\mu_{it} = \alpha_i + \epsilon_{it}$ with α_i and ϵ_{it} being respectively the product fixed effect and the error term. β_0 is the mean price of the products at Homeplus in the pre-guarantee period, and β_3 is the average change in this price after Homeplus' price-matching policy. In addition, β_1 and β_2 are the pre-guarantee average price differentials between E-mart and Homeplus, and Lotte Mart and Homeplus, respectively. Similarly, $(\beta_1 + \beta_4)$ and $(\beta_2 + \beta_5)$ capture the post-guarantee price differentials between E-mart and Homeplus, and Lotte Mart and Homeplus, respectively. The average changes in E-mart's and Lotte Mart's prices after the start of the LPG are $(\beta_3 + \beta_4)$ and $(\beta_3 + \beta_5)$, respectively.

The cartel theory predicts that both the price-matching store (Homeplus) and the non-price-matching stores (E-mart and Lotte Mart) increase their prices after the LPG. The signaling theory, by contrast, predicts that the non-price-matching stores respond to the LPG by reducing their prices. Table I shows the signs of parameters that the theories predict.

Table I. Parameter signs predicted by theories

	β_3	$\beta_3 + \beta_4$	$\beta_3 + \beta_5$
Cartel-facilitating device	+	+	+
Low-price signal	+	–	–

3. Results

The panel data estimates of (1) for the products are presented in Table II. There are no price differences between the three hypermarkets in the pre-guarantee period because the pre-guarantee mean price differentials between E-mart–Homeplus (β_1) and Lotte Mart–Homeplus (β_2) are not statistically significant. In the post-guarantee period, the mean price differential between E-mart and Homeplus ($\beta_1 + \beta_4$) is not statistically significant, while Lotte Mart's average price is 3.51 hundred Korean won ($\approx$ \$0.351) lower than Homeplus' price ($\beta_2 + \beta_5$) and this difference is statistically significant. Homeplus' average price increase (β_3) is 2.55 hundred Korean won ($\approx$ \$0.255) and E-mart's average price increase ($\beta_3 + \beta_4$) is 2.58 hundred Korean won ($\approx$ \$0.258) after the guarantee starts, and both increases are statistically significant. These results suggest that Homeplus' price-matching policy reduces E-mart's incentives to compete in prices. On the other hand, Lotte Mart's average price reduction ($\beta_3 + \beta_5$) is 0.75 hundred Korean won ($\approx$ \$0.075) and this reduction is statistically significant, which implies that the guarantee may serve as a signal of low prices between Homeplus and Lotte Mart.

Table II. Tests for price differentials (Nowon-gu)

	Estimated coefficient	SE	p-value
Constant	120.851	1.177	0.000
D_E	−0.636	1.131	0.574
D_L	−0.210	1.131	0.853
D_P	2.548	1.023	0.013
$D_E D_P$	0.028	1.447	0.985
$D_L D_P$	−3.302	1.447	0.023
Number of obs.	540		
Adjusted R^2	0.994		

Finally, by relaxing the criteria of data selection, we examine other cases where either E-mart or Lotte Mart is located within 3-kilometer distance from Homeplus and they are selling at least 9 common products. Table III shows the estimation results for the cases of other districts of Seoul: Guro-gu (Homeplus & E-mart with 10 products), Songpa-gu (Homeplus & Lotte Mart with 9 products), Jungnang-gu I (Homeplus & E-mart with 10 products), and Jungnang-gu II (Homeplus & E-mart with 9 products).[4] As in the case of Nowon-gu, the results provide evidence that, except for the case of Guro-gu, Homeplus and E-mart raise their prices after the LPG ($\beta_3 > 0, \beta_3 + \beta_4 > 0$) whereas Lotte Mart lowers its prices ($\beta_3 + \beta_5 < 0$).

[4]See Appendix for the lists of the products and their mean prices.

Table III. Tests for price differnetials (other districts)

	Guro-gu	Songpa-gu	Jungnang-gu I	Jungnang-gu II
Constant	25.151***	27.609***	245.250***	245.117***
	(2.031)	(1.692)	(0.962)	(1.021)
D_E	−2.188		−0.377	−0.463
	(1.732)		(0.821)	(0.903)
D_L		0.181		
		(1.497)		
D_P	0.681	3.134**	1.318*	1.599*
	(1.567)	(1.354)	(0.742)	(0.817)
$D_E D_P$	−1.521		−0.200	−0.186
	(2.216)		(1.050)	(1.155)
$D_L D_P$		−7.148***		
		(1.915)		
Number of obs.	360	324	360	324
Adjusted R^2	0.984	0.993	0.997	0.997

Note: Standard errors in parentheses; ∗ significant at 10%; ∗∗ significant at 5%; ∗ ∗ ∗ significant at 1%.

4. Discussion

Our empirical findings suggest that Homeplus' LPG eliminated E-mart's incentives to cut prices, while in relation to Lotte Mart, it sent a signal of low prices so that Lotte Mart reduced its prices. In other words, it is likely that the LPG facilitated collusive pricing between Homeplus and E-mart, but functioned as a competitive tool between Homeplus and Lotte Mart.

The different impacts of Homeplus' LPG on pricing of E-mart and Lotte Mart may stem from the way of matching lower prices and the context of the announcement. When securing matching lower prices from Homeplus, consumers did not incur hassle costs due to Homeplus' price comparison system that automatically matches lower prices of E-mart on the spot. Thus, in the sense of Hviid and Shaffer (1999), we can see that through the LPG, Homeplus and E-mart were in favorable situations for sustaining higher prices. Meanwhile, when announcing the LPG, Homeplus targeted E-mart only as a price competitor. Then, consumers could perceive Homeplus and E-mart as most likely to offer lower prices so that Lotte Mart responded by reducing prices (Jain and Srivastava, 2000). In the same vein, Lotte Mart was likely to interpret the LPG as an advertisement that Homeplus has lower costs and prices than E-mart, which leads it to decrease prices (Moorthy and Winter, 2006).

In future research, it would be interesting to study the conditions under which a firm

matches prices of specific competitors instead of all.[5]

Appendix: Products included in the sample and mean prices

Product / District	N	G	S	J-I	J-II
Beksul Soybean Oil 1800ml (Cooking oil)		65.99			
		(7.15)			
Beksul White Sugar 1000g (Sugar)	16.14		16.34	16.11	16.09
	(0.54)		(0.99)	(0.47)	(0.39)
Chungjungwon Red Pepper Paste 1000g (Sauce)	111.16				
	(10.20)				
Gompyo All-Purpose Wheat Flour 1000g (Flour)		12.74		12.55	
		(1.38)		(1.37)	
Haechandle Red Pepper Paste 1000g (Sauce)	121.46				
	(4.66)				
Maeil Absolute Myung-Jak Step 3 800g (Baby formula)	255.69		249.71	259.21	259.21
	(14.54)		(16.97)	(10.69)	(10.69)
Maeil ESL Milk 1000ml (Whole milk)		24.01			
		(0.69)			
Maxim Mocha Gold Instant Coffee Mix 180 (Instant coffee)			232.44		
			(10.15)		
Namyang GT Milk 1000ml (Whole milk)		23.90	24.14		
		(1.11)	(1.36)		
Namyang Imperial Dream XO Step 3 800g (Baby formula)	242.29	245.47	233.11	245.81	245.81
	(10.88)	(2.02)	(17.37)	(1.17)	(1.17)
Nongshim Shin Noodle Ramyun 600g (Asian noodle soup)	31.69	32.29		31.68	31.68
	(0.06)	(2.93)		(0.07)	(0.07)
Nongshim Shrimp Cracker 90g (Dessert)			7.60		
			(0.60)		
Orion Chocopie 420g (Dessert)	32.57	32.34		32.40	32.67
	(2.24)	(3.39)		(2.68)	(2.06)
Ottogi Jin Noodle Ramyun 600g (Asian noodle soup)	27.28		27.43	27.27	27.28
	(0.38)		(0.53)	(0.37)	(0.36)
Sajo Haepyo Soybean Oil 1800ml (Cooking oil)				61.86	61.86
				(10.52)	(10.52)
Samyang Noodle Ramyun 600g (Asian noodle soup)	30.35	29.77	30.28	30.48	30.30
	(1.15)	(2.94)	(1.10)	(1.03)	(1.62)
Seoul Milk 1000ml (Whole milk)	23.97	24.10	23.98	23.98	23.98
	(1.11)	(1.18)	(1.08)	(1.11)	(1.11)
Yuhan Kimberly Kleenex Deco & Soft 840m (Toilet paper)		215.53			
		(31.29)			

Note: Standard deviations in parentheses; Nowon (N), Guro (G), Songpa (S), J-I (Jungnang I) and J-II (Jungnang II).

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[5]Another example is that Dell matches lower prices of HP, Lenovo and Apple only. See http://dell.com/pricematch.

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