

Why do some prices in the retail sector drop when demand rises?

Evidence from the Chilean Case

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ABSTRACT

Internationally, the prices of retail products have been seen to drop during periods of exogenous increases in demand. The purpose of this paper is to investigate whether this behavior takes place in Chile. The monthly prices of a set of retail products with a positive seasonality of demand have been used. The prices of these products show a drop during their peak idiosyncratic demand. Moreover, the results are consistent with the loss leaders model, according to which prices are proactively reduced by retailers in order to attract buyers to stores.

Key words: retailing, prices, loss leaders.

JEL classification: L81, L11, L21.

I. Introduction

There is growing empirical international evidence that the prices of retail products tend to drop temporarily during seasons of high demand. Once the demand returns to its original level, prices rise. According to the perfect competition models, a positive demand shock helps keep prices the same or raise them, but not reduce them. So, this price trend must be explained by imperfect competition models.

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The purpose of this article is to investigate whether this effect takes place in the retail sector in Chile and identify which of the imperfect competition models better adapts to the results. The investigation took into account some mass consumer retail products for which there is a clear positive seasonality during the course of the year. The data were taken from monthly price series of the National Statistics Bureau (INE) for Santiago and from the Wholesale Price Index (IPM).

According to Chevalier, Kashyap and Rossi (2003), there are three imperfect competition models that explain this countercycle in prices: the implicitly colluded oligopoly model of Rotemberg and Saloner (1986), where the equilibriums in the industry oscillate between cooperative and uncooperative trends, depending on whether demand is high or low; the procyclical demand elasticity model of Warner and Barsky (1995), based on the existence of economies of scale in the cost of searching for information; and the theory of the loss leaders according to which retailers offer significant discounts on specific products in order to attract buyers to the store, and thus increase their profits.

The results obtained in this study indicate that like internationally, there are, effectively, price reductions in products for which there are seasonal rises in demand. When comparing theories, we found that the results are more consistent with the loss leader theory than with the other two above.

This article is organized as follows: Section II contains a review of literature, Section III describes the methodology and data used, Section IV presents the results and Section V the conclusion.

II. **Review of Literature**

International empirical evidence on the existence of countercycles is growing and cannot be explained by perfect competition models when a positive demand shock is associated with increases in, or the continuation of, prices, but not with their reductions, unless there are economies of scale in production.

Although there are several theories on price discounts, none is capable alone of explaining all the phenomena seen. Varian (1980) holds that discounts are a sort of price discrimination among consumers who are more informed or for whom the cost

of finding information is lower than those who are less informed or for whom the cost of being informed is higher. Lazear (1986) studied the behavior of prices in fashion products and sustains that retailers face an uncertain demand in that case. Since retailers have the choice of changing the prices of their products, this focus concludes that it is optimal for them to set high prices in the early part of the season and lower them if the product has not been selling. This strategy maximizes the expected profits of the retailer and assumes that a price that drops will not again rise. Pashigian and Bowen (1991) found evidence of the existence of a countercycle trend in prices when they measured discounts for seasonal sales using the uncertain demand model of Lazear (1986), which is outside of that theory.

Price discounts in countercyclical movements in demand cannot be easily explained either by the theory of price discrimination or by the theory of uncertain demand. There are three imperfect competition models capable of explaining this phenomenon.

One of them is the theory of the price war in boom periods developed by Rotemberg and Saloner (1986). This theory suggests that companies alternate between being cooperative and uncooperative depending on whether demand is low or high. In periods of high demand, companies tend to steer away from implicit oligopolistic agreements and behave more competitively, with the consequent reduction in prices and margins. This is because in those periods, it is more costly to maintain an agreement as the benefits of moving away from the oligopoly increase. Companies that break implicit commitments are willing to face the future penalties since they know that those penalties will be imposed at a time when demand has already fallen to its original level and, therefore, what they are risking losing is less than what they gain by breaking free. The authors hold that this behavior is specially valid in situations where prices are a strategic variable and production costs are constant. They find moderate empirical support for their theory.

Another model of imperfect competition is that of Warner and Barsky (1995), who hold that the elasticity of demand is procyclical given the existence of economies of scale in the search for information. In periods of intense buying activity (positive demand shocks), consumers are more interested in looking for better prices or discounts than normal as the investment in time and other costs of the search must be distributed among a higher total purchase. Hence, the unit cost of the search

falls. In this context, when consumers are more informed, vigilant and more sensitive to price, retailers tend to lower their prices as they envisage a more elastic demand for their products. Once the positive demand shock is over, the elasticities of the products fall to their original value and prices rise until returning to previous levels. They studied the daily prices of 8 products from November to February in a zone in Michigan, which were measured in 17 different stores. They found important discounts in the pre-Christmas period, during week-ends, and on holidays (Thanksgiving). They concluded that discounts are offered in periods when demand is unusually high.

The third model, the loss leaders model, consists of the retailer choosing to offer some products at a low price (close or even below the marginal cost) in order to attract buyers to the store. It assumes that consumers enter a store attracted by specific discounts and once inside, they buy other additional products, thus increasing the overall profits of the retailer. This theory is sustained on the existence of multiproduct enterprise competition, imperfect information on prices, and a complementarity of goods in the purchase by consumers. This latter is grounded on the fact that buying is costly to them given the time this activity involves. The “one-stop” shopping is benefited since there are economies of scale in buying more than one product at a time (Betancourt and Gautschi (1990)). Lal and Matutes (1994) formalize the loss leader argument as traffic generators in a model of two companies each offering the same two products. They assume that consumers do not know the prices of the products unless they are advertised and that there are economies of scale in buying more than one product at the same time even if they are unrelated. They concluded that in equilibrium, both firms opt to offer the same product at a price equal or lower their marginal cost (loss leader) and to advertise this product, and that consumers have a positive surplus from it even knowing that the unadvertised product will be sold at a higher price.

The countercyclical movement in prices can be associated with the loss leader concept. Retailers have heavy incentives to select products that have a demand peak as loss leaders. Hence, when sales volumes are high, product prices fall because of the proactive effect of the distributor reducing margins. The logic of this selection lies in that products with high demand are very good candidates for generating traffic to the store and increasing the company’s profits.

Chevalier, Kashyap and Rossi (2003) analyzed the movements in the prices of supermarket products in order to detect potential countercyclical variations and test the three alternative models of imperfect competition. They measured prices weekly for 29 types of products, representing close to 30% of total sales in the Dominick's Finer Food supermarket chain (the second most important chain in Chicago, with 100 stores and a 25% market share) for a period of 7 and one-half years. They took into account final prices, retailer purchase prices and their margins. They proved the existence of reductions in product prices during periods of seasonal increases in demand. In order to compare the three models empirically, the authors consider the specific implications of each. Although the three predict a drop in prices when there is a generalized increase in demand towards the store, these predictions differ when there are specific increases in demand for certain products and aggregate demand remains low. Only the loss leader theory supposes that the prices of products will drop when there are idiosyncratic increases in demand for those products in particular. It also assumes that the retailer margins for those specific products will fall as well. The price war theory and procyclical demand elasticity theory predict generalized reductions in prices and in retailer margins in periods of a boom in aggregate demand, but not a specific boom for specific products. Both the price war theory as well as the procyclical demand elasticity theory suppose that wholesalers or manufacturers will reduce their prices for specific products in this type of seasonality. The procyclical elasticity of demand model stems from the fact that the greater sensitivity of consumers to prices is transferred from retailers to them. The price war theory supposes that manufacturers of products with seasonal peaks in demand will be encouraged to abandon their collusive agreements temporarily as long as this increase in demand persists, which means that they reduce their margins and, therefore, the sale prices of their products. This does not occur in the loss leader theory, where the retailers are the ones who proactively reduce their margins for select products (in this case, the margins for products with seasonal peaks in demand) such that no reduction in manufacturers' price or margins should be expected. The results show that the prices of products with a positive seasonality in demand fall more because of reductions in the sale margins for those products than because of the reductions in purchase prices. This is clearly consistent with the loss leader theory and not with the other two theories, where a manufacturer price reduction would be expected. Furthermore, the authors consider the periods of Thanksgiving and Christmas to be a generalized seasonality of high demand. During those periods, no generalized reductions in the prices of all

products studied were seen but rather a slight rise in the average price. This result does not adjust to the theories of a temporary break of collusive agreements nor of procyclical elasticity in demand, even though the authors do say that their results do not allow them to outright reject these theories since they are considering just a subset of all the products sold by the supermarket and not all of them.

MacDonald (2000) also records countercyclical movements in the prices of food products in supermarkets, noting reductions in periods when there is an increase in demand and rises once that demand falls. In turn, falls in prices do not appear to be linked to reductions in the prices of inputs but rather more to decreases in the margins of supermarkets. A price drop is seen to coincide with an increase in promotional activity during demand peaks.

III. Data and Methodology

III.1 Data

The prices of the products studied were taken from monthly price series of the INE for Santiago and from the IPM. The period analyzed ran from January 1999 to December 2005.

III.2 Methodology

Products were selected from the monthly price series of the Santiago INE for which there was a clear seasonality of positive demand throughout the year. The products chosen under this criteria were: one liter of ice cream with summer seasonality (from November to February), tempera, cardboard and drawing paper with high seasonality during March because of the start of the school year, a doll highly demanded in August for Children's Day, empanada (type of meat pastry) that is popular in September because of the Independence Day holidays, and wine that is popular in September for the same reason and in December for Christmas and New Year's. For control purposes, a group of products was also selected for which there is no clear seasonal pattern. The products selected for control were: a broom, milk fortifier, laundry detergent, cereal, regular bread and toothpaste. The IPM was considered representative of the retail purchase prices.

Table 1 contains the products selected and their associated seasonality and control products.

Table 1

List of Selected Products					
I. Seasonal Products					
	Seasonality				
	March Start of School Year	August Children's Day	September Independence Holidays	December Christmas & New Years	Nov. to Feb. Summer
Ice cream					X
Tempera	X				
Cardboard	X				
Drawing paper	X				
Doll		X			
Wine			X	X	
Empanada			X		
II. Non-Seasonal Products					
Broom					
Milk fortifier					
Laundry Detergent					
Cereal					
Regular bread					
Tooth paste					

The method used by Chevalier et al. (2003) was followed and the equation below was estimated for each product selected:

$$P_{i,t} = \alpha + \beta P_{i,t-1} + \gamma D_t + \mu_{i,t} \quad \forall i$$

Where $P_{i,t}$ is the real monthly price of product i in period t deflated by the CPI, $P_{i,t-1}$ is the same price with a lag of one month, and D_t is the dummy matrix that includes the seasonal effects it considered and uses a value = 1 for periods when demand is seasonally high and a value = 0 for months when demand is low.

Analogously, the same equations were estimated for each of the products, but using the IPM prices. The wholesale price was not available for all products studied.

The hypothesis is that seasonal products experience consumer price reductions during their demand peak. According to Chevalier et al. (2003), the results are consistent with the loss leader theory if the prices fall when there are idiosyncratic increases in demand for those specific products but no generalized reductions in price for the rest of the products. This theory is reinforced when the retail purchase prices do not fall because of specific demand shocks. Absent any of these conditions, the results could be adapted to the Rotemberg and Saloner (1986) or Warner and Barsky (1995) theories. Strictly speaking, there is a need to study all products sold by the retailer to test these latter two theories since both suppose more generalized price reductions, which goes beyond the scope of this paper.

IV. Results and Comments

Consumer Prices

Table 2 contains the results obtained from the end product prices.

Table 2

RESULTS							
Consumer Prices							
I.- Seasonal Products							
Dependent variable	Ice Cream	Tempera	Cardboard	Drawing paper	Doll	Wine	Empanada
Independent variables							
Constant	928,54 (103,10)***	1,01 (0,14)	0,80 (0,26)	10,76 (0,90)	52,44 (0,50)	37,81 (1,35)	14,85 (1,64)
Lagged dependent variable							
		1,00 (58,60)***	0,99 (42,61)***	0,98 (50,95)***	0,99 (47,08)***	0,97 (46,3)***	0,96 (38,13)***
Time							
	-3,58 (-21,54)***						
March							
Start of school year	-24,12 (-1,62)	-5,04 (-3,69)***	-1,06 (-2,94)***	-8,73 (-4,65)***	-24,42 (-1,40)	7,39 (0,75)	-1,04 (-0,55)
August							
Children's Day	17,45 (1,17)	-0,65 (-0,48)	-0,24 (-0,67)	-0,85 (-0,45)	-29,79 (-1,71)*	-4,54 (-0,46)	-0,56 (-0,29)
September							
Independence Holidays	8,68 (0,58)	-1,72 (-1,26)	-0,28 (-0,79)	-3,45 (-1,84)*	-22,83 (-1,31)	-22,14 (-2,26)**	-10,00 (-5,23)***
December							
Christmas and New Year		1,93 (1,41)	0,84 (2,34)**	2,98 (1,59)	20,15 (1,15)	-22,35 (-2,28)**	1,40 (0,73)
November to February							
Summer Season	-18,92 (-2,03)**						
R ²							
	0,86	0,98	0,96	0,97	0,98	0,97	0,95
Adjusted R ²							
	0,85	0,98	0,96	0,97	0,97	0,96	0,95
II.- Non-Seasonal Products							
Dependent variable	Broom	Milk Fortifier	Detergent	Cereal	Regular Bread	Tooth paste	
Independent variables							
Constant	9,98 (1,18)	81,89 (1,87)	58,41 (1,38)	6,58 (0,31)	23,94 (1,79)	59,75 (2,27)	
Lagged dependent variable							
	0,99 (123,41)***	0,91 (18,69)***	0,96 (36,85)***	0,99 (60,46)***	0,95 (34,94)***	0,88 (17,26)***	
March							
Start of school year	-0,48 (0,14)	-2,75 (-0,71)	-8,24 (-1,44)	-7,62 (-0,93)	-1,60 (-1,26)	-1,47 (-1,06)	
August							
Children's Day	-2,65 (-0,76)	-0,42 (-0,11)	-1,93 (-0,34)	-11,25 (-1,38)	0,62 (0,49)	-0,73 (-0,53)	
September							
Independence Holidays	-10,20 (-2,90)**	-2,10 (-0,54)	-8,70 (-1,52)	-7,19 (-0,88)	1,46 (1,15)	-1,67 (-1,20)	
December							
Christmas and New Year	8,52 (2,42)**	7,96 (2,05)**	9,60 (1,67)*	6,09 (0,75)	0,82 (0,64)	0,83 (0,60)	
R ²							
	0,995	0,82	0,95	0,98	0,94	0,80	
Adjusted R ²							
	0,995	0,81	0,94	0,98	0,94	0,78	

t-statistics between parenthesis

*significant at 10%, **significant at 5%, ***significant at 1%.

Note: parameters are stable and co-integrate.

The results show the existence of countercyclical movements in the prices of products when there are exogenous increases in their respective demands. The price of ice cream fell in the summer (November to February) by CH\$18.92. Tempera dropped by CH\$5.04, cardboard by CH\$1.06, and drawing paper by CH\$8.73 in March, which corresponds to the start of the school year. The doll price decreased in August (month of the Child), by CH\$29.79. In September, the Independence Holiday month, the empanada price fell by CH\$10 and wine by CH\$22.14. In December, wine dropped by CH\$22.35. All are statistically significant. The prices of products considered unseasonable (brooms, milk fortifier, laundry detergent, cereal, regular bread and tooth paste) did not show any significant price variations except for milk and detergent, where there was a significant seasonal rise during December. The results indicate that seasonal products do not significantly drop in price during any of the idiosyncratic peaks in demand tested other than those directly associated with them. Ice cream showed no significant variations in March, August or September. Tempera and drawing paper did not vary in price in August, September or December. The cardboard price rose in December and did not change in August or in September. There were no changes in the price of wine in either March or August while the empanada did not vary in price in March, August or December. These results reinforce the evidence that price reductions in products are directly related to exogenous increases in their respective demands.

The price behavior of products considered to be seasonal in this study cannot be explained by perfect competition theories where the peaks in demand mean that prices remain the same or rise but do not fall unless there is a cost reduction simultaneous to that rise that more than offsets the effect of the rise, which is unlikely. Opinions can be expressed regarding the different theories based on the results of the end prices of the products selected, following the line of Chevalier et al. (2003). According to the authors, neither the theory of the procyclical elasticity of demand nor the theory of the break of collusive agreements are consistent with the fact that specific prices fall in periods of high specific demand for those products since both theories implicitly entail a more generalized reduction in the prices of products that is not focalized during specific rises in demand for some products in particular. The specific drops in prices better fit the loss leader model where the retailer proactively reduces the prices of the relevant products since he selects them as an anchor for the purpose of bringing consumers into the store. The

specific drops in the prices of ice cream in the summer, empanada and wine in September, cardboard, drawing paper and tempera in March and the doll in August better adapt to the loss leader theory than the other two. This is supported by the fact that non-seasonal products experience no price reductions in the peak months of exogenous demand for the different products selected. The same occurs with the prices of seasonal products in the peak periods of demand not associated with them. However, strictly speaking, following the above-mentioned authors, the behavior of all prices should be tested in periods of generalized rises in demand in order to reject the theories of procyclical demand and a temporary breach of collusive agreements, which goes beyond the scope of the study.

Wholesale Prices

Table 3 contains the wholesale prices of products as a proxy of the retailer purchase prices. The IPM data were not available for all the products selected so a subset had to be used. In the case of the empanada, since there is no wholesale price, the wholesale prices of flour and meat were used to indicate their direct cost.

Table 3

RESULTS				
Wholesale Prices				
Dependent Variable	I.- Seasonal Products			
	Wine	Flour	Meat	Ice Cream
Independent variables				
Constant	36,01 (1,76)	21,01 (2,13)**	94,31 (2,10)**	598,04 (107,42)***
Lagged independent variable	0,95 (-33,10)***	0,89 (19,49)***	0,87 (16,08)***	
Time				-2,48 (-24,08)***
March Start of school year	-8,66 (-1,41)	-2,36 (-0,43)	13,90 (0,85)	-5,05 (-0,06)
August Children´s Day	-5,63 (-0,92)	-1,03 (-0,19)	14,61 (0,90)	-7,00 (-0,76)
September Independence Holidays	-8,80 (-1,43)	-1,31 (-0,24)	17,28 (1,07)	-11,75 (-1,27)
December Christmas and New Year	20,18 (3,28)***	6,28 (1,14)	-6,64 (-0,40)	
November to February Summer Season				-8,54 (-1,48)
R ²	0,94	0,83	0,78	0,89
Adjusted R ²	0,93	0,82	0,76	0,88
II.- Non-Seasonal Products				
Dependent Variable	Broom	Detergent	Regular Bread	Tooth paste
Independent variables				
Constant	64,30 (2,19)**	136,56 (2,46)**	40,04 (2,59)**	dientes 19,71 (2,09)**
Lagged independent variable	0,91 (23,19)***	0,87 (16,88)***	0,89 (21,98)***	0,95 (40,87)***
March Start of school year	-6,83 (-1,06)	-8,68 (-0,88)	-0,49 (-0,13)	-1,12 (-0,32)
August Children´s Day	-7,71 (-1,20)	-13,12 (-1,32)	-1,07 (-0,28)	-0,32 (-0,09)
September Independence Holidays	-6,70 (-1,04)	-7,71 (0,77)	-2,08 (-0,55)	-3,68 (-1,05)
December Christmas and New Year	20,75 (3,23)***	27,94 (2,82)***	11,62 (3,07)***	12,66 (3,62)***
R ²	0,88	0,80	0,87	0,96
Adjusted R ²	0,87	0,78	0,86	0,95

t-statistics between parenthesis

*significant at 10%, **significant at 5%, ***significant at 1%.

Note: parameters are stable and co-integrate.

Table 3 shows that the wholesale prices of seasonal products or their direct inputs do not fall during peaks in idiosyncratic demand. The wholesale price of ice cream showed no significant change during its seasonal peak (summer). Flour and meat (both empanada materials) and wine recorded no significant variations in September. The wholesale price of wine rose significantly in December. The prices of non-seasonal products all climbed at Christmas time, with a 99% level of significance, but showed no significant variations in the other periods.

The results indicate that there is no correlation between wholesale prices and peaks in exogenous demand for ice cream, empanada and wine. This is consistent with the loss leader theory since reductions in end prices come from promotional efforts of retailers and not supplier price reductions. This is more evident yet in the case of wine, since its wholesale price rises in December and the consumer price falls that month. These results do not fit either with the theory of procyclical demand or of a temporary breach of collusive agreements since the supplier prices should tend to fall according to both of those theories.

The wholesale prices of non-seasonal products (brooms, detergent, regular bread and tooth paste) rose in December. This seasonal increase in retailer costs can explain the rises in the consumer prices of brooms and detergent in December.

V. **Conclusions**

The principal conclusion from this study is that consumer prices for a set of retail products in Chile fall when their demands experiment a positive shock. Internationally, there is empirical evidence that detects this price behavior. This behavior is not consistent with theories of perfect competition, where positive demand shocks are associated with prices increasing or remaining the same, but not falling. Of the three models of imperfect competition capable of explaining this phenomenon, the loss leader theory is the one that best fits the data. According to this theory, retailers proactively reduce the prices of products when their demand is seasonally high in order to attract consumers to the store. Once they are inside, it is convenient for consumers to buy more than one product since they are making use of economies of scale in the purchase.

A future challenge that this study could not undertake because of a lack of information is a better identification of the idiosyncratic demand shocks.

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