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# Food Retailers' Pricing and Marketing Strategies, with Implications for Producers

Lan Li, Richard J. Sexton, and Tian Xia

This paper examines grocery retailers' ability to influence prices charged to consumers and paid to suppliers. We discuss how retailer market power manifests itself in terms of pricing and marketing strategies by setting forth and offering evidence in support of eight "stylized facts" of retailer pricing and brand decisions. We argue that little, if any, of this behavior can be explained by a model of a competitive, price-taking retailer, but that most of the indicated behavior was also inconsistent with traditional models of market power. Finally, we discuss the impacts of aspects of this retailer behavior on the upstream farm sector.

**Key Words:** grocery retailer, market power, price spread, sales

The relationship between commodity prices at the farm and the prices consumers pay at retail is a topic of obvious importance and longstanding interest in agricultural economics. The relationship, known as the farm-retail price spread or the marketing margin, has been studied and measured extensively through the years.<sup>1</sup> In many cases the relationship has been depicted as a simple markup function. For example, George and King (1971) suggested that the margin,  $M_j$ , for commodity  $j$  could be expressed as  $M_j = \alpha_j + \beta_j P_j^r$ , where  $P_j^r$  is the price at retail of the finished product.

Grocery retailing has changed dramatically in the 35 years since the seminal George and King study. Traditional corner grocery stores have been mostly replaced by large supermarket chains, and now the dominance of the chains is being threat-

ened by the remarkable growth of Wal-Mart as a grocery retailer (Hausman and Leibtag 2004). Further, the way grocery retailers do business has changed. Traditional terminal markets for fresh produce commodities have declined in importance and have been replaced by direct procurement from grower-shippers via contracts. Retailers through marketing contracts exercise considerable vertical market control over upstream suppliers and utilize their own store or private label brands to compete for sales with the brands they procure from independent manufacturers and shippers. Retailers also use a variety of strategies to differentiate themselves from their competitors.

The growth of large grocery retail chains, fueled in large part through a wave of mergers, has caused increasing concentration in the retail food sector. Rising concentration, in turn, has heightened concerns about retailers' ability to influence prices charged to consumers through possible exercise of oligopoly power, and prices paid to suppliers through possible exercise of oligopsony power.<sup>2</sup>

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<sup>1</sup> Notable studies include Waugh (1964), George and King (1971), Gardner (1975), Heien (1980), Brorsen et al. (1985), Wohlgenant (1989), and Holloway (1991).

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<sup>2</sup> See Kaufman (2000), Kaufman et al. (2000), and Harris et al. (2002) for recent summaries of merger and acquisition activities in U.S. grocery retailing. See Cooper (2003) and Dobson, Waterson, and Davies (2003) for summaries of concentration issues in European food retailing. International mergers and acquisitions have also been increasing significantly in the retail sector. For example, EU-based retailers such as Royal Ahold and Sainsbury have expanded into U.S. markets, and Wal-Mart has expanded into the European Union. As a

Understanding retailer market power, pricing practices, and marketing strategies is critical for many reasons. Most obvious is the impacts that retailer behavior can have on consumer and producer welfare.<sup>3</sup> Assessment of various practices in grocery retailing, such as use of slotting fees, depends upon whether such fees have a basis in efficiency or are a manifestation of retailer market power. Further, the impacts of various policies and strategies intended to increase farm prices and incomes hinge critically upon the competitiveness of the market chain.<sup>4</sup> For example, little is known about how the effectiveness of farm-sector programs, such as mandatory commodity promotion, is enhanced or impeded by retailers' market power and the pricing strategies they utilize. If retailers respond to a commodity advertising campaign by raising retail margins to absorb any demand increase induced by the promotion, the higher sales needed to induce an increase in the producer price will not materialize. On the other hand, if retailers respond to a positive demand shock by reducing price, and some evidence supports this outcome (Warner and Barsky 1995, Chevalier, Kashyap, and Rossi 2003, and Li 2006), the effect would be to enhance the impact of the promotion.

This paper examines grocery retailers' ability to influence prices charged to consumers and paid to suppliers through exercise of oligopoly and oligopsony power. We then ask how retailer power manifests itself in terms of the pricing and marketing strategies that food retailers undertake. Specifically, we set forth eight features of retailer pricing and brand decisions that we argue are documented sufficiently to merit status as "stylized facts." The stylized facts are illustrated with results from our own work, together and with various co-authors, but in almost all cases the evi-

dence is broader, as citations indicate. We then ask to what extent these observed practices are consistent with traditional notions of farm-retail price spreads, or, for that matter, can be explained at all by the existing economic theory. Finally, we discuss the impacts of aspects of this retailer behavior on the upstream farm sector.

### Evidence on Grocery Retailer Market Power

The hypothesis that large grocery retailers possess some degree of market power in the sense of being able to influence the prices they pay to suppliers and charge to consumers rests on solid conceptual foundations. Consumers are distributed geographically and incur nontrivial transaction costs in traveling to and from stores. This condition leads to a spatial distribution of grocery stores, and gives a typical store market power over those consumers located in close proximity to the store and, hence, the ability to influence prices (Faminow and Benson 1985, Benson and Faminow 1985, Walden 1990, and Azzam 1999). Other considerations that enhance retailers' power to influence consumer prices include imperfect information among consumers (e.g., as to the prices that are being offered), and differentiation among retailers based upon the services they emphasize, advertising they conduct, and marketing strategies they pursue.<sup>5</sup>

From the perspective of retailer buying power, it seems likely that large food manufacturers with prominent brands are able to countervail any retailer buying power, but produce grower-shippers and private-label manufacturers lack similar bargaining power. The imbalance of bargaining power is exacerbated in industries where the farm product is highly perishable.

### Evidence on Grocery Retailer Oligopoly Power

Oligopoly power in food retailing is not amenable to the application of most methods used by economists to investigate market power because modern

result, food retailing is becoming increasingly multinational, with three food retailers—Wal-Mart, Carrefour, and Royal Ahold—now appearing in the world's top 100 multinational corporations.

<sup>3</sup> Estimates of consumer welfare loss due to market power in the food system, such as Parker and Connor (1979) and Bhuyan and Lopez (1995), emphasized the market power of food manufacturers and focused exclusively on oligopoly power.

<sup>4</sup> Alston, Sexton, and Zhang (1997) demonstrated that even modest levels of oligopoly or oligopsony power in the downstream processing-retailing sector could enable it to capture large shares of the market surplus that otherwise would go to producers and final consumers. Zhang and Sexton (2002) demonstrated that downstream market power can both distort producer incentives to undertake investments such as R&D and commodity promotion and enable the downstream sector to capture a large share of the benefits generated by such investments.

<sup>5</sup> For discussions of imperfect information in retail markets, see Salop and Stiglitz (1977, 1982), Varian (1980), Sobel (1984), Lal and Matutes (1994), Hosken and Reiffen (2001, 2004b), and Pesendorfer (2002); for discussions of differentiation of pricing and marketing strategies among retailers, see Salop and Stiglitz (1977), Varian (1980), Lal and Rao (1997), Pesendorfer (2002), Sexton, Zhang, and Chalfant (2003), and Boatwright, Dhar, and Rossi (2004).

groceries sell a vast number of different products—an average of 40,000 or more distinct product codes for U.S. supermarkets (Dimitri, Tegene, and Kaufman 2003), and issues of oligopoly power must address mark-ups over cost for a broad cross section of those commodities, not just one or a few. Further, retailers' costs are usually impossible to know or to apportion among individual commodities.

Structure-conduct-performance studies have sought to explain grocery prices as a function of demand, cost, and market structure variables and can be useful because prices are observed readily and can be aggregated into meaningful indices. These studies have generally found that concentration variables were positively associated with price and were statistically significant.<sup>6</sup> The positive correlation between pricing and concentration found in the majority of studies lends credence to the aforementioned concerns that rising concentration among grocery retailers is likely to cause higher prices to consumers, and, due to reduced sales, adverse price effects on producers as well.

Some evidence suggests that the astounding rise of Wal-Mart in food retailing may represent a countervailing force to the tendency of rising concentration to result in higher prices. Wal-Mart aggressively pursues an "everyday-low-pricing" (EDLP) strategy, and Wal-Mart Supercenters may set price on average 14 percent lower than competing supermarkets (Bianco and Zellner 2003). Wal-Mart may also act as a "yardstick of competition" and reduce the prices of conventional supermarkets that compete directly with Supercenters. Woo et al. (2001) indicate that entry of a Supercenter in the Athens, Georgia, area caused supermarkets to reduce prices significantly prior to entry, but that prices gradually rose back to their original levels following the entry. The only supermarkets showing lasting price effects were those with the highest prices at the beginning of the study. Volpe (2005) found that conventional supermarkets in the northeastern United States that competed with a Wal-Mart charged prices that were 6 to 7 percent lower for national brands and 3 to 7 percent lower for private label products compared to a control group of stores which did not face competition from Wal-Mart.

<sup>6</sup> Cotterill (1993) contains a debate on the issue of oligopoly power in grocery retailing, and Connor (1999) and Wright (2001) provide relatively recent critiques of research into the concentration-price relationship in grocery retailing.

### *Evidence on Grocery Retailer Oligopsony Power*

Retailers' role as buyers from commodity shippers and food manufacturers has received comparatively little attention. However, interest in the issue has increased in recent years in response to rising retailer concentration and concerns over slotting and related fees charged by retailers. Retailer oligopsony power is difficult to investigate empirically because prices paid by retailers to shippers or manufacturers are typically not revealed. Confidentiality of retailers' selling costs and difficulties in apportioning them to individual products further complicates analysis.

Produce commodities provide some of the better opportunities to examine retailer buying power because farm prices are typically reported publicly, as are shipping costs to major consuming centers, and sales are often direct from grower-shippers to retailers. Sexton and Zhang (1996) examined pricing for California-Arizona iceberg lettuce and concluded that retailers were able to capture most of the market surplus generated, essentially consigning grower-shippers to near zero economic profits over the time period analyzed. More recently, Sexton, Zhang, and Chalfant (SZC) (2003) and Richards and Patterson (2003) investigated retailer pricing for a wide range of produce commodities as part of a USDA investigation of U.S. fresh produce markets (Dimitri, Tegene, and Kaufman 2003). SZC also found that retailers captured about 80 percent of the market surplus for iceberg lettuce, but found less evidence of oligopsony power for California vine-ripe and mature-green tomatoes and Florida mature-green tomatoes. Richards and Patterson (2003) found little ability for retailers to influence farm prices for fresh grapes and oranges, but concluded that retailers held shipper prices below the competitive level for Washington apples and Florida grapefruits.

### **Retailer Price Dispersion and the Farm-Retail Price Link**

In this section, we present four stylized facts about grocery retailer pricing and the link between prices at farm and retail. Following presentation of the stylized facts and empirical evidence in support of them, we ask to what extent the indicated behavior can be explained by the

extant economic theory and, finally, investigate the impact of some of the behavior on upstream producer markets.

Our work focuses primarily on fresh foods—fluid milk and produce commodities. In many ways, these products are ideal for examining retailer pricing behavior because they undergo relatively little transformation in moving from farm to retail, have public data on farm prices, and are perishable, ensuring timely movement of product from farm to retail and making it easier to generate appropriate comparisons between farm and retail prices.

*Stylized fact 1:* Prices among retailers in a given city for a given commodity exhibit wide dispersion.

*Stylized fact 2:* Retail price changes are at most loosely related to price changes for the farm commodity, and, thus, acquisition costs play a comparatively minor role in the retail pricing decision.

Empirical studies document a remarkable degree of cross-sectional price dispersion among food retailers within a city and intertemporal price variations for a given retailer (Pesendorfer 2002, SZC 2003, Li and Sexton 2005). A basic source of price dispersion among retailers is the adoption of EDLP by some and “high-low pricing” (HLP) by others.

Evidence that variations in retail prices are not closely correlated with changes in the prices in the upstream market also abounds [MacDonald 2000, Chevalier, Kashyap, and Rossi (CKR) 2003, SZC 2003, Hosken and Reiffen 2004a, 2004b, Li 2006], suggesting that most retail price changes are strategic and not due to random shocks in the primary product market. Tables 1 and 2 illustrate these points for California Hass avocados and iceberg lettuce salad products, respectively. Table 1 reports correlation coefficients of prices for large and small Hass avocados among retail chains in Los Angeles and also the correlations between retail prices and contemporaneous and lagged shipping-point prices.<sup>7</sup> These basic statistics demonstrate both the heterogeneity

in retailers’ pricing and the tenuous linkage between farm and retail prices. Even though acquisition costs should be very similar for retailers within a city, correlations of prices among the Los Angeles chains are rarely higher than 0.5 and are negative in some cases. Although shipping-point prices for large and small avocados are highly correlated, the correlation of prices between large and small avocados even within the same retail account is typically low and sometimes even negative, even though these prices are subject to the same shipping-point price shocks and cost shocks at the retail account level.

Because avocados are a perishable fruit, shipment to retail and sale to consumers must occur quickly,<sup>8</sup> meaning that long lags in price response are unlikely. Further, because avocados are sold directly from grower-shippers to retailers, we might anticipate a strong link between shipping-point and retail prices. However, nearly all of the correlations are below 0.5, many are below 0.2, and some are negative, regardless of whether current or lagged shipping-point prices are used.

Results for iceberg lettuce and iceberg-blend salad (IBBS) products for Los Angeles area chains in Table 2 tell a similar story. Price correlations among chains for the leading Dole brand of IBBS salads are low and often negative. Even price correlations within a store for alternative sizes of IBBS are low. Although the main ingredient in IBBS is iceberg head lettuce, there is almost no correlation between retail prices for IBBS and shipping-point prices for iceberg head lettuce.

*Stylized fact 3:* Transmission of farm price changes to retail is (i) delayed, (ii) incomplete, and (iii) asymmetric.

The transmission of price changes at the farm level to retail is a longstanding issue in agricultural marketing. Under competitive retailing, price changes at the farm transmit fully and quickly, based upon shipping time to retail, but the empirical evidence mostly supports delayed, incomplete, and asymmetric price transmission, with farm price increases often transmitting more quickly to retail than farm price decreases. Pick, Karrenbrock, and

<sup>7</sup> Los Angeles is located proximate to the major growing regions for avocados, limiting the opportunity for unexplained cost shocks in marketing to introduce variation into the farm-retail price relationship. Li (2006) demonstrates similar pricing patterns for avocados for a broad cross section of U.S. cities.

<sup>8</sup> Avocados can be stored less than 10 days at room temperature and less than two weeks under cooling.

**Table 1. Shipping-Point and Retail Price Correlations for California Hass Avocados—Los Angeles Area Chains**

	LA-1-L	LA-1-S	LA-2-L	LA-2-S	LA-3-L	LA-3-S	LA-4-L	LA-5-L	LA-5-S
LA-1-L	1.00								
LA-1-S	0.53	1.00							
LA-2-L	0.31	0.16	1.00						
LA-2-S	0.09	0.11	0.19	1.00					
LA-3-L	0.12	0.32	0.16	0.01	1.00				
LA-3-S	-0.09	0.30	0.04	0.35	0.33	1.00			
LA-4-L	-0.20	0.32	0.43	0.09	0.17	-0.05	1.00		
LA-5-L	0.51	0.55	0.31	0.24	0.22	0.38	0.34	1.00	
LA-5-S	0.31	-0.15	0.23	0.02	0.08	-0.26	0.25	0.04	1.00
fob-L	0.13	0.27	0.13	0.34	0.14	0.13	0.36	0.35	0.32
fob-L(-1)	0.16	0.29	0.15	0.33	0.17	0.15	0.34	0.35	0.31
fob-S	0.28	0.35	0.26	0.45	0.10	0.16	0.40	0.43	0.35
fob-S(-1)	0.28	0.38	0.27	0.48	0.12	0.18	0.34	0.44	0.33

Note: LA-1-L (LA-1-S) denotes large (small) avocados sold at retail chain 1 in Los Angeles. Fob-L and fob-L(-1) denote contemporaneous and one-week lagged shipping-point prices for large avocados shipped from production region to Los Angeles, respectively.

**Table 2. Correlations of Retail Prices in Los Angeles for Iceberg Lettuce and Iceberg-Blend Salad**

Retailer	Retailer 1		Retailer 2				Retailer 3			
Brand	Dole	Iceberg	Dole	Dole	Dole	Iceberg	Dole	Dole	Dole	Iceberg
Size	12 oz	Head	12 oz	16 oz	32 oz	head	12 oz	16 oz	32 oz	head
1-Dole-12 oz	1.00									
1-Iceberg-head	-1.10	1.00								
2-Dole-12 oz	0.05	0.04	1.00							
2-Dole-16 oz	0.19	-0.01	0.80	1.00						
2-Dole-32 oz	0.37	-0.36	0.23	0.43	1.00					
2-Iceberg-head	-0.05	0.60	-0.12	-0.01	-0.23	1.00				
3-Dole-12 oz	0.15	-0.08	0.08	0.06	-0.18	-0.12	1.00			
3-Dole-16 oz	0.26	-0.46	0.09	0.25	0.51	-0.21	-0.28	1.00		
3-Dole-32 oz	0.09	0.01	-0.10	-0.11	-0.17	0.01	0.10	-0.08	1.00	
3-Iceberg-head	-0.20	0.76	-0.19	-0.16	-0.54	0.72	0.02	-0.42	0.09	1.00
Shipping-point iceberg	-0.07	0.59	-0.11	-0.06	-0.21	0.36	-0.08	-0.31	-0.02	0.45

Carman (1990) for citrus, Zhang, Fletcher, and Carley (1995) for peanuts, Richards and Patterson (2003) for semiperishable fresh fruits, and Kinnucan and Forker (1987), Carman (1998), Frigon, Doyon, and Romain (1999), and Carman and Sexton (2005) for dairy all found asymmetric response in retail prices and margins to farm price changes, with the speed of retail price changes being faster

for farm price increases than for farm price decreases.<sup>9</sup>

For example, Carman and Sexton (2005) studied fluid milk pricing by fat content in five west-

<sup>9</sup> Powers and Powers (2001) reached the opposite conclusion, finding no asymmetry in the magnitude or frequency of price increases, relative to price decreases, for California-Arizona lettuce.

ern U.S. cities (Denver, Phoenix, Portland, Salt Lake City, and Seattle) and found price transmission that was consistent with predictions of the prototype competitive model (full and symmetric transmission) in only three of 40 possible instances. In general, price transmission was delayed, incomplete, and asymmetric, with price increases transmitting more quickly than price decreases (Table 3). Conclusions were less definitive for four California cities, except for the clear result that price increases transmitted more quickly than price decreases. For California avocados, Li (2006) found that on average only about one-third of a change in the shipping-point price was transmitted over time to retail.

It follows from stylized facts 1 through 3 that farm-retail price spreads computed at the level of the individual retail chain (i) exhibit wide variability over time, (ii) differ widely across chains with respect to mean and variance, and (iii) exhibit little correlation across chains (SZC 2003).

*Stylized fact 4:* Farm-retail price spreads for perishable produce commodities increase in the volume of the commodity shipped.

Sexton and Zhang (1996) noted this phenomenon for California iceberg lettuce. The result was confirmed by SZC (2003) for several California-Arizona produce commodities and by Li (2006) for California avocados. Table 4, adapted from

the SZC study for California-Arizona fresh produce commodities, illustrates the point. The elasticity of the margin with respect to the volume of sales is positive in 29 of 32 cases and is based upon a significant coefficient in 18 of those cases. Specifying the margin to allow a one-week lag in transmission of farm prices to retail tended to weaken but not eliminate the impact of shipment volume on the margin.

#### *Can Economic Theory Help to Explain the Stylized Facts?*

A model of competitive food retailers and simple, cost-based margins cannot explain any of these stylized facts. Under perfect competition and cost-based, mark-up pricing, product prices for stores within a city should be highly correlated with each other and also with the price for the farm commodity. Further, price changes at the farm should transmit quickly and fully to retail. A model of perfect competition also predicts no asymmetries in response to price increases versus price decreases, and seems incapable of explaining increasing margins as a function of farm-product volume. Instead, Sexton and Zhang (1996)

**Table 3. Lags in Months for Transmission of Farm Price Changes to Retail for Fluid Milk: Western U.S. Cities**

City	Price $\Delta$ direction	Whole milk	2% milk	1% milk	Skim milk
Seattle	increase	0	1	1	1
	decrease	1	1	1	1
Portland	increase	0	0	0	0
	decrease	0	0	0	0
Salt Lake City	increase	1	0	0	0
	decrease	3	0	3	3
Denver	increase	1	1	1	2
	decrease	0	1	0	2
Phoenix	increase	0	0	1	0
	decrease	1	3	3	0

**Table 4. Elasticities of the Farm-Retail Price Spread with Respect to Shipment Volume for California Produce Commodities**

City	CA Iceberg Lettuce	CA Vine-Ripe Tomatoes	CA Mature-Green Tomatoes
Atlanta 1	0.672*		0.303*
Atlanta 2		0.429	0.474*
Chicago 1	0.422*	0.052	
Albany 1	0.232	-0.307	
Dallas 1	-0.011		0.358*
Dallas 2	0.215	0.437*	0.619*
Dallas 3	0.285		0.217
Dallas 4		-0.285	0.203*
Miami 1	0.692*		0.592*
Miami 2	0.091	0.252	
Los Angeles 1	0.353*		0.305*
Los Angeles 2	0.739*	0.229	0.229
Los Angeles 3	0.879*	1.378*	0.230
Los Angeles 4	0.501*	0.226*	0.201*

Note: \* indicates that the elasticity was computed from a coefficient that was statistically significant at the 90 percent level.

offer an explanation based upon the attenuation of grower-shippers' bargaining power during periods of high supply of a non-storable commodity.

However, the stylized facts are also mostly inconsistent with traditional models of market power. For example, the low correlation of prices among retailers is inconsistent with retailer market power generated through collusion. Under a typical collusive agreement, prices would be highly correlated. Thus, the relative independence of retailers' price movements indicates that any selling-market power exercised by retailers is due to unilateral market power.

Models of seller market power can explain the result that retail prices respond only partially or not at all to changes in price at the farm level. Rotemberg and Saloner (1987) showed that sellers with market power are more likely to maintain stable prices in response to changing costs than are competitive firms. The incentives are reversed for price changes due to demand shifts, but Rotemberg and Saloner showed that the cost effect dominates, when both cost and demand are subject to fluctuations.<sup>10</sup> In general, sellers with market power rationally absorb a portion of any cost shock through their pricing to consumers, providing an explanation for only partial transmission of prices. Partial absorption of a farm price increase represents a balancing of the marginal impact of a lower profit per unit from not fully transmitting the cost shock with lower profit from reduced sales if the cost increase is transmitted fully. For example, a monopolist facing a linear demand schedule will transmit exactly half of a cost shock forward to consumers.

Although price rigidity is consistent with seller market power, it can also be explained by re-pricing or menu costs within a competitive market framework (Levy et al. 1997), or by some retailers' use of EDLP as an overarching marketing strategy in a differentiated oligopoly framework. Lal and Rao (1997) showed that adoption of EDLP by one firm and HLP by the other can be an equilibrium outcome of duopoly competition among retailers. However, EDLP would not be sustainable in competitive retail markets because

an EDLP retailer who did not reduce retail prices in response to decreases in farm prices would be undercut by retailers who transmitted farm price changes fully.

When changing prices is costly for retailers, a product's price will be fixed unless its marginal cost or demand changes by a sufficient amount to justify incurring the cost of re-pricing (Carlton 1989, Azzam 1999). However, menu and other costs associated with adjusting prices should cause prices to not adjust at all to minor shocks and to adjust fully to major shocks. The empirical evidence showing partial adjustment to shocks in the farm price is consistent with a market-power model, but not an adjustment-cost model.

Asymmetry of price transmission, wherein farm price increases are passed on to consumers more quickly than farm price decreases, is also not readily explained within a competitive framework or by conventional models of monopoly or oligopoly. In a standard model of monopoly or oligopoly pricing, the optimal price change in response to a given increase or decrease in marginal costs may not be symmetric, and depends upon the convexity/concavity of consumer demand (Azzam 1999). However, because most demand curves are more elastic at higher prices, demand curvature considerations ordinarily call for retailers to absorb a greater share of a cost increase than a cost decrease (Bettendorf and Verboven 2000), which, as noted, is not what the evidence tends to show. Demand curvature considerations, moreover, cannot explain a delay in responding to a price decrease, relative to a price increase.

Levy et al. (2005) offer an interesting explanation for asymmetry of price adjustments based upon theories of rational consumer inattention. They present empirical evidence that small price increases among grocery retailers occur more frequently than small price decreases but that no asymmetry exists for large price changes. They posit that rational inattention among consumers makes demand for individual products in stores very inelastic around the region of the current price, thus making price increases profitable but providing little benefit to decreasing price.

Seminal papers by Salop and Stiglitz (1977) and Varian (1980) offer explanations for the existence and persistence of price dispersion at retail based upon imperfect consumer information. Salop and Stiglitz show the existence of equilibria

<sup>10</sup> The fundamental intuition is that as the extent of competition increases, individual sellers perceive an increasingly elastic demand. This makes price changes more beneficial because some of the benefits are derived at the expense of competitors.



where some stores sell at the perfectly competitive (minimum-average-cost) price to fully informed consumers, and the rest sell only to uninformed consumers at a higher price. The lower volume of the high-price stores exactly compensates for the higher profit per sale.

Varian (1980) argues that persistence of price dispersion due to imperfect consumer information seems implausible if consumers can learn from experience. He instead proposes a model where each retailer randomly chooses a price from a continuous distribution (i.e., mixed strategies) in each period, and decides between setting a high price and selling only to uninformed consumers, and charging a low price and selling to informed consumers as well.

#### *How Does Retailers' Pricing Behavior Affect the Farm Product Market?*

Retail prices that respond more quickly and fully to farm price increases than to farm price decreases are harmful to producer interests. Retail prices that adjust only partially, or not at all, to shocks in the farm market are also harmful to producers. We demonstrate this point by investigating the implications for producers of an extreme form of incomplete price transmission, namely the case of EDLP—a retailer holds price constant despite shifts in production and prices at the farm level. The fundamental point is that, if some share of the final sellers of a commodity hold price constant, despite shifts in supply and/or aggregate demand, then price must fluctuate more widely for all other sellers, in order for the market to clear. The logic of the argument applies equally to situations where some sellers do not maintain a fixed price *per se*, but instead stabilize it relative to market conditions and thus only partially transmit farm price changes.

Figure 1 demonstrates the basic point for the case of two market outlets. The left quadrant depicts the aggregate retail market, and the right quadrant depicts the aggregate of all other market outlets, and is referred to as “food service.”  $D_1^F(H_1)$  is final demand in the food service market, less all shipping and marketing costs, and  $D_2^F(H_2)$  is final demand in the retail market, less all shipping and marketing costs. For simplicity,  $D_1^F(H_1)$  and  $D_2^F(H_2)$  are assumed to be identi-

cal, and the initial harvest level,  $H_0$ , is divided equally between the two markets. Under perfect competition in procurement,  $D_1^F(H_1)$  and  $D_2^F(H_2)$  are demand curves for the farm product in the respective sectors. Given total harvest  $H_0$ , farm price would be  $P_0$  in each market under perfect competition. Under buyer power in procurement, farm price would be less than  $P_0$ .

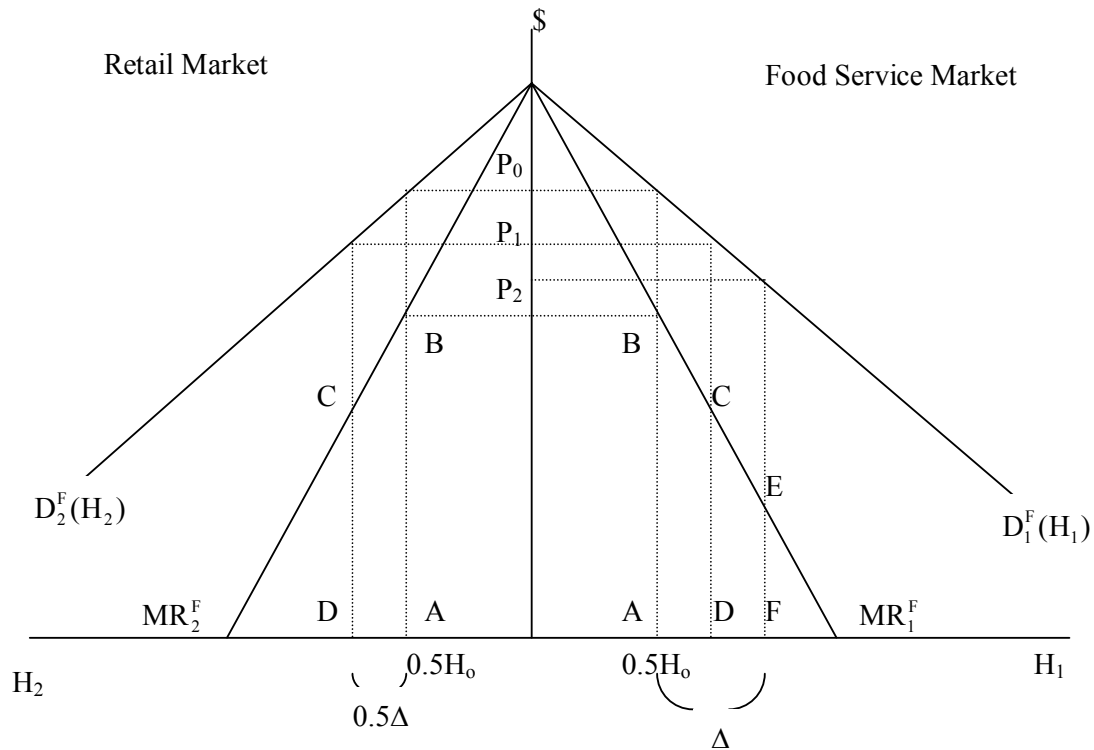
Suppose that production increases to  $H_0 + \Delta$ , while demand remains unchanged. If both markets allow price to change in response to the increase in production, each sells  $0.5(H_0 + \Delta)$  and price in each market falls to  $P_1$ . The increase in producer revenue in each market is the area, ABCD. However, if the retail market maintains a fixed selling price despite the change in production, sales at retail remain at  $0.5H_0$ , and the per-unit farm value remains  $P_0$  in the retail sector. For the increase in production to clear the market, it must move entirely through the food service market, which now sells  $0.5H_0 + \Delta$ , with farm value in the food service market falling to  $P_2$ .<sup>11</sup> The marginal revenue from the new production is now illustrated by the area ABEF in Figure 1, where  $ABEF < 2(ABCD)$ .<sup>12</sup>

The result illustrated in Figure 1 holds broadly. A sufficient condition for fixed prices to be harmful to producer welfare is that marginal revenue is a decreasing function of sales for all market outlets.<sup>13</sup> Although Figure 1 illustrates a situation with elastic demands and positive marginal revenue, the conclusion applies to markets with inelastic demands. The logic also applies equally to decreases in production. Finally, the presence of

<sup>11</sup> Because  $P_0 > P_2$ , standard arbitrage would call for product to move from food service to retail, but these forces are frustrated if retailers insist on holding price at  $P_0$ . Only  $0.5H_0$  can be sold at retail for price  $P_0$ .

<sup>12</sup> To gauge the importance of this effect for producer revenue, SZC (2003) conducted a simulation with parameter values chosen to roughly approximate conditions for iceberg lettuce in the United States. Depending on the specific parameterizations chosen, stabilized prices at retail reduced revenues to grower-shippers in a range from 0.6 to 3.5 percent. The adverse effect of fixed/stabilized prices on revenue is greater (i) the more volatile is periodic supply, (b) the greater the share of the market represented by sellers who adopt stable prices, and (c) the more price inelastic is the farm demand.

<sup>13</sup> Let inverse demand in a market  $j$  be denoted as  $P_j(H_j)$ , where  $H_j$  denotes sales in market  $j$ . Total revenue in market  $j$  is  $TR_j = P_j(H_j)H_j$ . Marginal revenue is  $MR_j = dTR_j/dH_j = P_j'(H_j)H_j + P_j(H_j)$ , and  $dMR_j/dH_j = P_j''(H_j)H_j + P_j'(H_j) + P_j'(H_j)$ . Thus,  $dMR_j/dH_j < 0$  whenever  $2P_j'(H_j) < -P_j''(H_j)H_j$ . This condition holds for all concave demand curves, including linear, and also mildly convex demands.



**Figure 1. Impact of Constant Selling Prices on Producer Welfare**

imperfect competition in any of the procurement markets does not alter the fundamental conclusion. Farm sector income will be lower due to fixed prices, even if the farm sector captures only a portion of the market surplus due to retailer market power.<sup>14</sup>

### Retailer Pricing and Marketing Strategies

*Stylized fact 5:* Retail food prices often have a well-defined mode, and most deviations from the mode are downward, reflecting temporary sales.

*Stylized fact 6:* For a given product category, retailers who choose to hold sales also exhibit considerable heterogeneity in (i) choices of brands to

feature on sale, (ii) frequency of sales, and (iii) magnitude of discounts.

Considerable empirical evidence suggests that retailers' price reductions are often attributable to sales strategies, which are the result of decreases in margins rather than decreases in costs (MacDonald 2000, CKR 2003, Hosken and Reiffen 2004a, 2004b, Li and Sexton 2005). Hosken and Reiffen (2004a) analyzed retail prices for twenty categories of grocery goods in thirty geographic areas. They showed that a typical product has a "regular" or modal price, and that most deviations from the regular price are downward and short-lived. Temporary price reductions account for 20 to 50 percent of annual variations in retail prices for the grocery products in their study. Li and Sexton (2005) and Li (2006) found similar price patterns for U.S. packaged salad products and avocados, respectively.

Table 5 and Figure 2 illustrate these patterns of variations in retail prices for California Hass avocados. In Table 5, quarterly and annual modal

<sup>14</sup> It might be argued that consumers prefer stable prices, so retailers who hold prices constant despite fluctuations in market conditions actually increase demand for the product (Okun 1981). Indeed, this logic is presumably the basis for EDLP. However, as noted, stabilizing prices in one sector of the market implies even greater price instability in the other sectors, which, under the same logic, would have an adverse effect on demand in those sectors.

**Table 5. Variations in Retail Prices for Hass Avocados**

The average frequencies of retail prices			
Size	= mode	> mode	< mode
large	21.71 (13.98)	15.01 (24.77)	63.28 (61.25)
small	20.43 (12.84)	17.29 (31.58)	62.28 (55.58)
The average frequencies of retail prices > mode, by			
	10%	20%	30%
large	6.02 (13.37)	3.97 (9.21)	2.69 (6.70)
small	7.42 (17.71)	5.53 (12.10)	3.62 (7.99)
The average frequencies of retail prices < mode, by			
	10%	20%	30%
large	33.78 (35.73)	21.82 (23.29)	14.19 (12.26)
small	33.27 (32.66)	20.92 (21.66)	12.26 (12.44)

Note: The numbers outside and to the left of the parentheses are calculated according to annual modal prices, and the numbers in the parentheses are calculated according to quarterly modal prices.

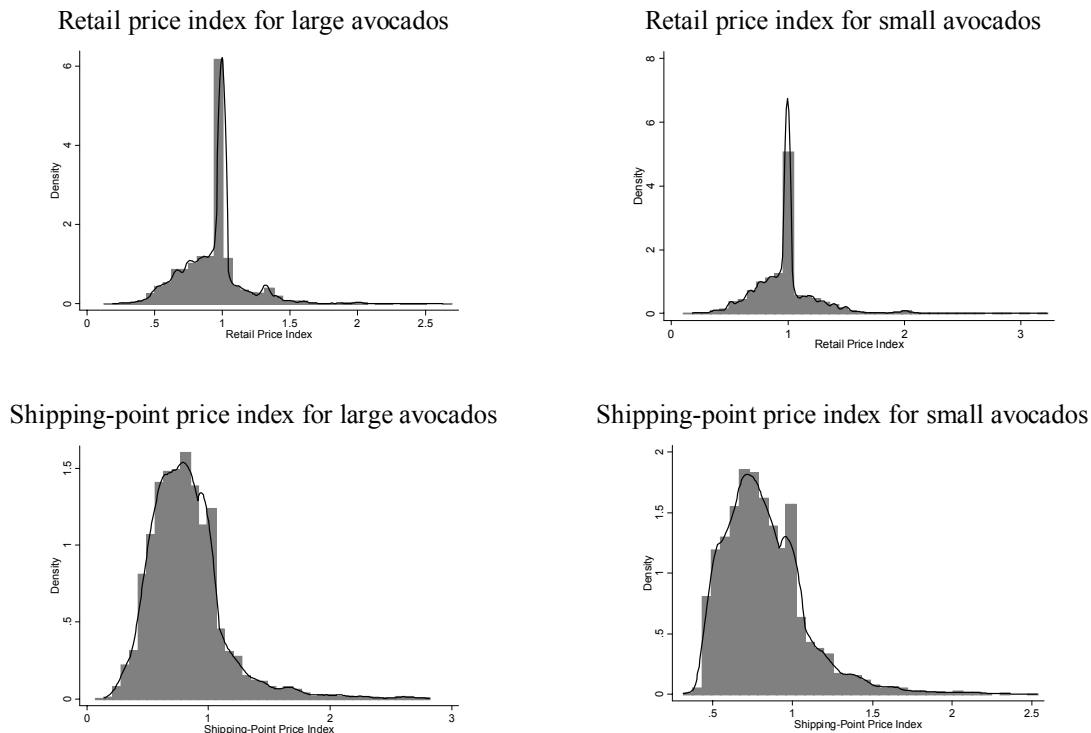
prices were computed for each size of Hass avocado sold by each retail account. Then the average frequencies of retail prices equal to, greater than, or less than the quarterly (annual) modes across all retail accounts and over time for each size of Hass avocados were computed. The frequencies computed by the quarterly modal prices are reported to the left of the parentheses, and those computed by the annual modal prices are reported in the parentheses. Retail prices were at the quarterly (annual) modes for 21 (13) percent of the observations, and were below the quarterly (annual) mode for 62 (58) percent of observations. Overall, temporary price reductions defined as decrease in retail price from its quarterly mode by at least 20 percent accounted for 26 and 28 percent of quarterly variations in retail prices for small and large Hass avocados, respectively.

Figure 2 displays histograms for retail price indices and the shipping-point price indices computed by dividing the observed price by its quarterly modal price for each size of Hass avocados. The kernel density is estimated by the Epanechnikov kernel function. The density estimations fit the histograms in lines. Because there are multiple modes for shipping-point prices, we used the highest quarterly modes. The retail price indices

equal to one were realized with positive probability mass, but the shipping-point price indices did not have any dominant value with significantly high probability. The distributions of the shipping-point price indices are symmetric compared with the distributions of the retail price indices, which are evidently asymmetric, flatter to the right of the modes than to the left.

*Stylized fact 7:* Retail prices are often lower during periods of high demand.

A growing body of evidence indicates that retail prices often fall in periods of high demand (e.g., Warner and Barsky 1995, MacDonald 2000, CKR 2003, Hosken and Reiffen 2004b). Li (2006) identified six holidays/events—Christmas/New Year, Super Bowl Sunday, Cinco de Mayo, Memorial Day, Independence Day, and Labor Day—that saw significantly higher demands for avocados in the shopping week(s) preceding and/or during the holiday (see Table 6). Among the six, Christmas/New Year, Super Bowl Sunday, and Cinco de Mayo were associated with significantly lower prices, lower retail margins, and higher incidence of temporary price reductions. Prices were significantly higher in the



**Figure 2. Histogram with Kernel Density Estimation for Retail Prices and Shipping-Point Prices for California Avocados**

Note: Epanechnikov kernel function is utilized for kernel density estimation.

weeks associated with Memorial Day. Independence Day and Labor Day had no significant effects on retail pricing. Temporary price reductions were more likely to take place in association with each holiday, but in the cases of Memorial Day, Independence Day, and Labor Day the effects were not significant.

*Stylized fact 8:* For a given product category, retailers exhibit considerable heterogeneity in the (i) number of brands carried, (ii) choices of which brands to carry, (iii) decision whether or not to carry a private label brand.

Dhar and Hoch (1997) documented variability in private label share among chains for dairy and edible grocery products for five U.S. cities. Table 7, adapted from SZC (2003), illustrates the stylized fact for IBBS. Among the 20 sample retail chains, only the Los Angeles chains carried Ready Pac IBBS, and none carried minor brands outside of the top three. Only Los Angeles 2 carried all

three leading brands of IBBS. Seven chains carried two brands—Fresh Express and Dole in five of those cases, with Dole and Ready Pac and Fresh Express and Ready Pac comprising the other two. Six chains carried a private label brand. Among those chains, three carried only their private label brand, two carried their private label and one other brand (Dole, in each case), while the other carried both Dole and Fresh Express. Finally, three chains carried Fresh Express IBBS exclusively, while two carried Dole IBBS exclusively.

#### *Can Economic Theory Explain the Stylized Facts?*

Lal and Matutes (LM) (1994) explain retail sales in terms of the multiproduct nature of retailing and the need for retailers to credibly commit to provide surplus to consumers. In their two-product model, advertising conveys price information

**Table 6. Effects of Holidays and Events on Retail Pricing**

	Retail Sales	Retail Price	Price Spread
Christmas/New Year's	4.347** (2.010)	-0.040** (0.016)	-0.041** (0.019)
Super Bowl Sunday	15.040*** (2.735)	-0.093*** (0.018)	-0.104*** (0.021)
Cinco de Mayo	5.077* (2.776)	-0.046** (0.023)	-0.034 (0.027)
Easter Sunday	2.662 (2.031)	0.033** (0.017)	0.031 (0.020)
Memorial Day	6.044** (2.712)	0.048** (0.022)	0.017 (0.026)
Independence Day	7.303*** (2.510)	0.010 (0.021)	-0.006 (0.025)
Labor Day	3.536* (1.976)	-0.010 (0.017)	0.002 (0.020)
Halloween	1.531 (2.068)	0.012 (0.078)	-0.052** (0.201)
Thanksgiving	-1.763 (1.606)	0.024*** (0.008)	0.043*** (0.008)

Note: Standard errors are reported in parentheses. One, two, and three asterisks indicate statistical significance at the 90 percent, 95 percent, and 99 percent level, respectively.

to consumers, who believe correctly that any product whose price is not advertised will yield them zero surplus. Given this expectation, a consumer's decision on which store to visit is based on the surplus derived from the purchase of an assortment of goods. LM show that one of the two equilibria results in both firms advertising the same good, and for a wide range of parameters the advertised good is sold below marginal cost.

A typical supermarket carries thousands of products and offers a bundle of goods on sale each week. LM's (1994) static model cannot explain why the goods chosen to be advertised often change weekly. Nor does the model provide any predictions for the dynamics of retail pricing. It is reasonable that retailers differentiate themselves by advertising different items each period and promoting a product at different periods of time. Hosken and Reiffen (2001, 2004b) extended the LM multiple-product analysis to a dynamic setting. Their model predicts considerable variation in the frequency and magnitude of sales across products.

Both the Varian (1980) and LM (1994) models show that retailers have incentives to cut retail

price even though there are no changes in costs or demand. Therefore, both theories offer explanations for a weak relationship between retail and farm prices (stylized fact 2). LM's model predicts that retailers are likely to have popular, high-demand products on sale, in order to compete for consumers' store patronage—by committing *ex ante* to provide surplus. Therefore, their model offers an explanation for putting a product on sale during its peak demand periods (stylized fact 7).

Warner and Barsky (1995) offer an alternative explanation for countercyclical price movements in the spirit of Salop and Stiglitz's (1977) imperfect information model based on economies of scale in consumer search. Consumers engage in more searching and traveling between stores during peak demand periods, such as Thanksgiving and Christmas holidays, than at the other times. Consumers thus are more informed during these times and, accordingly, their demands are more price elastic when the overall demand is high. Consequently, retailers rationally offer lower prices when the overall demand is high.

One distinction between the explanations by LM (1994) and Warner and Barsky (1995) is

**Table 7. Retailer Brand Selection, Mean Price, and Variance of Iceberg-Blend Packaged Salads**

	Private Label	Fresh Express	Dole	Ready Pac
Los Angeles 1	1.404 (0.050)			
Los Angeles 2		1.526 (0.063)	1.416 (0.029)	1.356 (0.049)
Los Angeles 3			1.486 (0.008)	1.490 (0.007)
Los Angeles 4		1.685(0.005)		1.490 (0.011)
Dallas 1	1.652 (0.023)			
Dallas 2			1.354 (0.015)	
Dallas 3		1.410 (0.053)		
Dallas 4		1.901 (0.032)		
Dallas 5		1.331 (0.038)	1.943 (0.115)	
Atlanta 1		1.702 (0.041)		
Atlanta 2		1.724 (0.122)		
Atlanta 3	1.636 (0.042)	1.685 (0.121)		
Chicago 1		1.625 (0.044)	1.977 (0.146)	
Chicago 2		1.896 (0.028)	1.931 (0.019)	
Chicago 3		2.035 (0.147)		
Miami 1	1.487 (0.052)			
Miami 2		1.668 (0.080)	1.605 (0.049)	
Miami 3	1.394 (0.003)	1.882 (0.023)	1.520 (0.002)	
Albany 1	1.630 (0.038)		1.619 (0.068)	
Albany 2			1.430 (0.079)	

Note: Variances are indicated in parentheses.

that the latter predict lower retail prices during aggregate demand peaks, but not during the idiosyncratic demand peaks. Retailers in LM's model are more likely to put a product on sale during its high-demand periods even if they do not coincide with aggregate demand peaks. Second, LM suggest that retailers will put a product on sale under ordinary demand conditions as long as it is a "popular" product, whereas Warner and Barskey's model implies that retailers have no motivation to reduce retail prices or retail mark-ups when the aggregate consumer demand is low.

Xia and Sexton (2006) provide an explanation for the heterogeneity of retailer behavior regarding carrying multiple brands of a product and holding promotional sales. Their model shows that carrying multiple brands and holding promotional sales are substitute tools that can be used by retailers with market power as instruments to conduct price discrimination when they face heterogeneous consumers. The optimal combination of brands and sales for a retailer depends on various factors including the quality range of product,

degree of consumer heterogeneity, relative magnitudes of sales cost and brand-carrying cost, and the number of available brands. Thus, optimizing retailers may exhibit heterogeneous behavior in terms of carrying brands and holding promotional sales because the aforementioned factors associated with them are different.

Most explanations for retailers' use of private labels focus on the opportunity of retailers to increase bargaining power relative to sellers of national brands (e.g., Mills 1995, Raju, Sethuraman, and Dhar 1995). The equilibrium depends on the quality level of the private label, whether the retailer has a cost disadvantage relative to the national-brand manufacturer (Bontems, Monier, and Requillart 1999), and the substitutability (i.e., intensity of competition) among national brands and between national brands and the private label (Raju, Sethuraman, and Dhar 1995). In general, these explanations seem useful in explaining why some products feature private labels and others do not, but less suited to explaining heterogeneity among retailers in terms of use of private labels.

### How Do Retailers' Sales Strategies Affect the Farm Product Market?

We focus on the pricing strategies of (i) holding periodic sales irrespective of conditions in the upstream market (stylized fact 5), and (ii) reducing price during peak demand periods for the product (stylized fact 7). First, consider a scenario based upon stylized fact 5 where retailers either use a no-sales (i.e., mark-up) strategy or a promotional strategy where the product is placed on sale at the end of an  $N+1$  ( $N \geq 1$ ) period horizon. In the no-sales strategy, retailers set the retail price for each period (e.g., week) based on the market condition of farm supply and consumer demand. For simplicity, we assume that the market conditions do not change during the  $N+1$  periods under study so that retailers using mark-up pricing charge the same price for all periods. In the sales strategy, retailers charge regular prices for  $N$  periods and hold a sale in period  $N+1$  by charging a lower price. We analyze and compare the impact of the sales strategy and the basic no-sales strategy on the farm market and producer welfare for the  $N+1$  periods.

$D^F(H)$  in Figure 3 is the demand curve in the farm market in the case of perfect competition, and  $MR^F(H)$  is the marginal revenue curve. In the first scenario, retailers set the same price for all  $N+1$  weeks so that retail and farm quantity demanded are also the same. The farm demand in each of the  $N+1$  weeks is  $H_0$ , and the farm price is  $P_0$  (assuming competitive procurement). In the second scenario, retailers set a high regular price in the first  $N$  weeks and a low sales price for the  $(N+1)^{\text{th}}$  week so that the quantity demanded is low in the first  $N$  weeks and high in the  $(N+1)^{\text{th}}$  week. Ignoring the possible lag between the demand pattern at retail and the similar pattern at the farm level, this implies that quantity demanded at the farm is low in the first  $N$  weeks and high in the  $(N+1)^{\text{th}}$  week. The low farm demand in the first  $N$  weeks is  $H_r$  and the high farm demand in the  $(N+1)^{\text{th}}$  week is  $H_s$ . The farm prices in the first  $N$  weeks and the  $(N+1)^{\text{th}}$  week are  $P_r$  and  $P_s$ , respectively.

Compared to the base, no-sales scenario, producer revenue changes by the area CDEF –  $N^*ABCD$  in the scenario when retailers use promotional sales. The key question is whether

CDEF –  $N^*ABCD$  is negative. The answer depends on the difference of total farm quantity demanded under two scenarios. With different selling strategies, the distribution of consumer and farm demand over the whole time horizon is different but the total demand is very likely to be similar. When the total retail and farm demand over the  $N+1$  weeks are similar for the two strategies so  $H_s - H_0 \approx N^*(H_0 - H_r)$ , it can be shown that CDEF –  $N^*ABCD < 0$ , i.e., producer revenue is lower under the sales strategy. Similar to the case of constant retail prices (Figure 1), this result holds broadly. A sufficient condition for CDEF –  $N^*ABCD < 0$  is also that marginal revenue is a decreasing function of sales (see footnote 13).

Producer revenue and surplus with the sales strategy will also decrease even if total retail and farm demand with the sales strategy is mildly larger than the demand with the no-sales strategy because CDEF –  $N^*ABCD < 0$  is possible even if  $H_s - H_0 > N^*(H_0 - H_r)$  as long as

$$H_s - H_0 < \frac{(MR^F(H_r) + MR^F(H_0))}{(MR^F(H_0) + MR^F(H_s))} * N^*(H_0 - H_r).^{15}$$

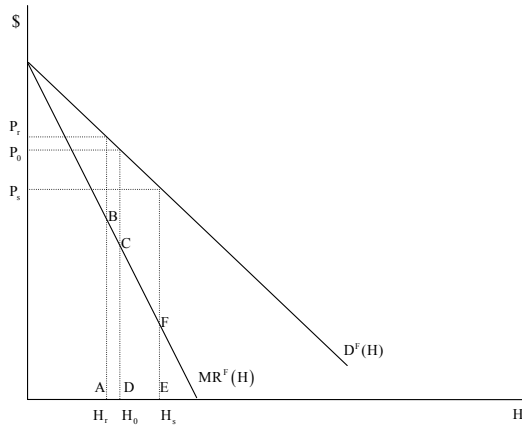
Producer revenue with the sales strategy will increase only if the total demand with the sales strategy is sufficiently larger than the total demand with the no-sales strategy. However, in this case production costs are also higher due to the larger volume sold, so the producer surplus with the sales strategy may still not increase. Thus, we conclude that producer revenue and surplus likely decrease when retailers use promotional sales as a selling strategy. The intuition is that the decrease in producer revenue due to selling less during the  $N$  non-sale periods when the farm price and marginal revenue is relatively high is more than the

<sup>15</sup> We use a linear functional form of the demand function to derive the inequality condition,

$$H_s - H_0 < \frac{(MR^F(H_r) + MR^F(H_0))}{(MR^F(H_0) + MR^F(H_s))} * N^*(H_0 - H_r),$$

and we obtain

$$(MR^F(H_r) + MR^F(H_0)) / (MR^F(H_0) + MR^F(H_s)) > 1.$$



**Figure 3. Impact of Promotional Sales on Producer Welfare**

increase of producer revenue from selling more during the sale week when the farm price and marginal revenue are relatively low.<sup>16</sup>

To analyze the impact on producer welfare of holding sales during peak-demand periods (stylized fact 7), we consider two scenarios: (i) retailers use a no-sales strategy during peak demands, and (ii) retailers conduct sales during peak demands, in a time horizon that includes one period of peak demand and  $N$  ( $N \geq 1$ ) equal period(s) of normal demand after the period of peak demand. The total consumer demand in the entire time horizon is assumed to be the same under the two scenarios.

To facilitate exposition, we use a simple specification by assuming that consumers purchase the same amount of the product under study in each of the  $N$  period(s) of normal demands after the period of peak demands. Panels (a) and (b), respectively, of Figure 4 describe the farm market during the period of peak demand and each period of normal demand.  $D_k^F(H) = \alpha * D_u^F(H)$ ,  $\alpha > 1$ , is the demand curve in the farm market during the period of peak demand (subscript  $k$ ).  $D_u^F(H)$  is the demand curve in the farm market during each period of normal demand (subscript  $u$ ).  $MR_k^F(H)$  and  $MR_u^F(H)$  are the marginal revenue curves.

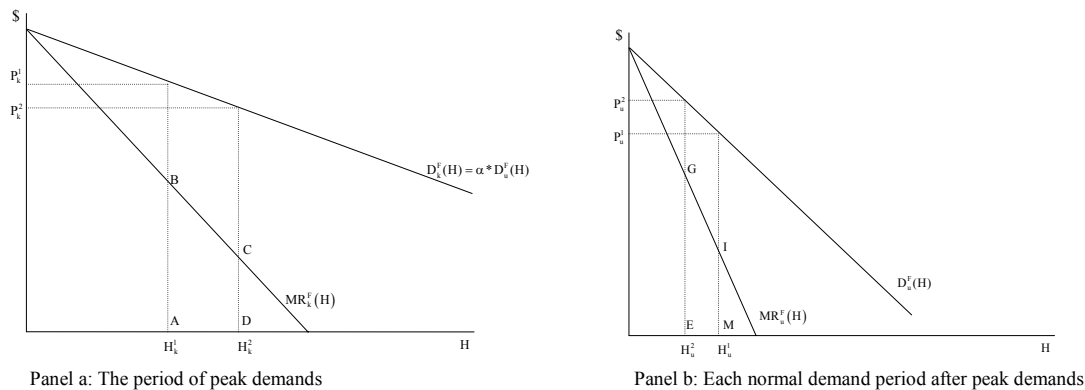
The superscripts 1 and 2 denote the no-sales and sales scenarios, respectively.

In the no-sales scenario, the retail and farm demand is  $H_k^1$  for the period of peak demand and  $H_u^1$  for each period of normal demand. In the second scenario when retailers hold sales during the peak demands, the retail and farm peak-period demand is  $H_k^2$  and is  $H_u^2$  for each period of normal demands. We obtain  $H_k^2 - H_k^1 = N * (H_u^1 - H_u^2)$  based on  $H_k^1 + N * H_u^1 = H_k^2 + N * H_u^2$ , which means that total consumer demand in the entire time horizon is the same under the two scenarios.

Compared to the no-sales scenario, producer revenue will increase by the area ABCD during the period of peak demand and decrease by the area EGIM during each period of normal demand when retailers hold sales during the peak demand. The net change in producer revenue is the area  $ABCD - N * EGIM$ . The sign of this net change depends on the relative magnitude of the areas ABCD and  $N * EGIM$ . Because we have  $H_k^2 - H_k^1 = N * (H_u^1 - H_u^2)$ , the relative magnitude of the two areas will depend on (i) the demand difference between the period of peak demand and each period of normal demands, which is represented by the parameter  $\alpha$ , and (ii) how quickly the consumer demand in the normal periods after the peak demand absorbs the impact of the sales strategy, which is represented by the parameter  $N$ . As the value of  $\alpha$  decreases, the area ABCD becomes smaller and the sign of the net change of producer revenue is more likely to be negative. As the values of  $N$  decrease, the area  $N * EGIM$  becomes larger with the value of  $N * (H_u^1 - H_u^2)$  held constant, and the sign of the net change of producer revenue is also more likely to be negative. Sales during peak demands are more likely to reduce producer revenue and surplus if the difference between the peak and normal-period demands is small and/or the consumer demand in the normal periods after the peak demand needs to absorb the impact of the sales strategy in a shorter time interval.

<sup>16</sup>Retailers' promotional offers may also reduce producer welfare by introducing quantity and price fluctuations into the farm market, which increases the risk faced by producers.





**Figure 4. Impact of Sales During Peak Demands on Producer Welfare**

## Conclusions

Retail grocery chains are the dominant players in the vertical market channel for many commodities in many regions of the world, including the United States, Europe, and parts of Asia and South America (Coyle 2006). Retailers, through mechanisms of vertical control, can exert a strong influence on the behavior of upstream suppliers, and play a major role in determining the characteristics of the products offered in their stores. Although the extent of retailers' market power as sellers to consumers or as buyers from suppliers is controversial and surely depends on the specifics of the various market settings, retailers, based upon their demonstrated behavior, clearly have the power to influence prices and thus to impact the welfare of both producers and consumers.

Despite their unquestionably important, if not dominant, role in the food system, we know rather little about retailers' behavior in terms of choices of products and brands carried, pricing strategies, and strategies concerning sales and promotions. The goal of this paper has been to lend some insight on these dimensions of retailer behavior and to analyze the impacts of various aspects of retailer behavior on the upstream farm markets. In this regard, we offered evidence in support of eight stylized facts regarding retailer pricing, retail price dispersion, the farm-retail price linkage, and retailers' marketing strategies. We then argued that little, if any, of this behavior could be explained by a model of a competitive,

price-taking retailer, but that most of the indicated behavior was also inconsistent with traditional models of market power. Although theory does provide cogent explanations for aspects of the behavior summarized here, much more needs to be done. An area of particular neglect is analysis of the implications of retailer behavior for the upstream markets. Using simple models, we showed that some typical retailer pricing strategies were likely to be detrimental to producer welfare.

The revolution in food retailing toward larger and more dominant chains is unlikely to abate and, indeed, seems destined to spread worldwide. The implications of the revolution for consumers and producers are not clear and deserve further study. Although large retailers most likely possess some degree of oligopoly power, a strong argument can be made that consumers benefit on net from the revolution due to lower prices caused by economies of size and scope generated by large chains and by the access they offer to a vast array of products. The impact on producers, especially small-scale producers, is probably less favorable. There is little evidence that economies of size and scope generated by large food retailers are reflected in higher prices at the farm level.

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