

## **Retailer Pricing Practices for Fresh Avocados**

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*Retailers' pricing practices for Hass avocados depart considerably from the behavior predicted by a model of competitive pricing. Retail prices within a market area exhibit considerable heterogeneity and little correlation with the farm price. Further, only about a third of farm price changes are transmitted to consumers. Retail prices for avocados tend to be lower during peak-demand periods. Finally, evidence suggests that outdoor and radio promotions by the California Avocado Commission have been effective in raising demand for avocados in the cities where the campaigns have been conducted.*

Retailers are becoming the dominant player in the food distribution networks of the United States and other countries as a result of continuing growth and consolidation. While market power in the retail food sector is a fact of life, detailed information on the use of this power is not. Understanding pricing behavior is an important factor in assessing retailer market power. In addition, retailers' pricing practices for fresh produce are a critically important determinant of producers' and handlers' incomes. This article presents results on retailers' pricing practices for fresh avocados in the United States.

The characteristics of fresh avocados and many other produce items are important in pricing decisions and in the results of these decisions. Production is seasonal, as is demand, avocados are perishable and can only be stored for short periods, weather can cause supply shocks, industry promotion is concentrated in particular markets and at particular times, and imports have been increasing significantly over time. A few large retailers are buying from many smaller handlers/growers and in markets that are separated in time and space, considerations that suggest the opportunity for retailers to exercise market power in procurement of avocados. We focus on how retailers adjust avocado prices in response to changes in demand and cost factors, especially producer-sponsored promotion programs and seasonal demand cycles, and how these adjustments impact retail margins. We were particularly interested in the reactions of retailers to industry promotions.

### **The Data and Analysis**

The California Avocado Commission (CAC) provided access to a unique micro-level dataset that included weekly retailer-scanner data for 82 major U.S. retail accounts across 38 markets for avocados from November 1998 to October 2004. The CAC also provided weekly shipment data, including shipping-point prices and shipment volumes of Hass avocados from California to each of the 38 destination markets during the study period. These data were supplemented with monthly import data from the United States International Trade Commission. Finally, we obtained information on the media types, geographic locations, and the timing of the CAC’s advertising programs during the study period.

The full data set pools retail accounts, large and small avocados, and all time periods, generating 19,072 observations in total. There are 124 account-size combinations with 140 to 157 weeks for each account-size combination. The sample averages for the retail price of Hass avocados and the shipping point—retail-price spread were \$1.30 and \$0.73 per unit, respectively. A retail-pricing model was estimated to examine how retail prices vary in response to changes in cost and demand variables, such as contemporaneous and lagged shipping-point prices. Retail prices had a statistically significant positive correlation with the contemporaneous shipping-point price and its one period lag. The coefficients, however, indicate that only about 34 percent of a change in shipping-point price per unit is transmitted to the retail price within the two-week period. The partial response of retail prices to cost changes at the shipper level is a key indicator of retailer market power being exercised in the pricing decision.

The estimated coefficient of shipment volumes in the model of shipper- retail price spreads indicates that the retail markup increased significantly, by \$0.04 per unit, when weekly shipments to a market increased by one million units. This result is consistent with prior work conducted at UC Davis that found retailers paid lower prices to grower-shippers when there was a larger supply of a perishable commodity, while maintaining retail prices and enjoying a larger profit margin. Competitive or “pricetaking” retailers would be unable to capture larger margins in these settings, so this result is also consistent with retailers exercising market power over grower-shippers in procurement of avocados.

Table 1. Descriptive Statistics of Retail Prices and Shipping-Point Prices for Hass Avocados for Los Angeles Retail Chains.

	Price Ranges				Price Ranges			
	Mean	Std. Dev.	25-75 pct	Min-Max	Mean	Std. Dev.	25-75 pct	Min-Max
Panel (a) Retail Prices								
Account	Large Size				Small Size			
Los Angeles 1	1.70	0.48	0.58	2.48	1.14	0.34	0.44	2.02
Los Angeles 2	1.33	0.33	0.28	1.64	0.50	0.16	0.19	0.88
Los Angeles 3	1.87	0.22	0.18	1.30	0.68	0.22	0.42	1.18
Los Angeles 4	1.33	0.27	0.43	1.25	-	-	-	-
Los Angeles 5	1.66	0.36	0.61	1.51	1.16	0.28	0.50	1.12
Panel (b) Shipping-Point Prices								
Market	Large Size				Small Size			
Los Angeles	0.72	0.15	0.16	0.72	0.37	0.08	0.12	0.50

The data also reveal considerable heterogeneity among retailers in their pricing decisions for Hass avocados. Tables 1 and 2 illustrate this point for retail chains in the Los Angeles area. Table 1 provides mean prices, standard deviation of prices, range in price for the 25th and 75th percentile observations, and range between minimum and maximum price for both large and small Hass avocados for five Los Angeles chains. Acquisition and transportation costs for these chains should be very similar; yet we see that average prices vary considerably among the chains, especially for small avocados, as does the variability of prices, as measured by the standard deviation and the price ranges. Note that the variability of retail prices is much higher than variability of the shipping-point prices for the Los Angeles market.

Table 2 presents correlations between the retail prices for Hass avocados set by the chains and between retail prices and shipping-point prices—both in the current period and lagged one period (–1). Recall that correlation coefficients range from –1.0 to 1.0, with negative correlations indicating movements of prices in opposite directions, correlations near zero indicating little or no relationship in price movements, and positive correlations indicating prices that move together. Because acquisition costs for Hass avocados must be very similar among Los Angeles retailers, we would expect to see high correlations among the retail prices and between retail and shipping-point prices if retailers are pricing avocados competitively by imposing a markup to acquisition costs that is based upon their selling costs. Instead, however, we see that the correlations of retail prices are in general near zero and in some cases are negative. Further, correlations of retail prices with the shipping-point prices, whether contemporaneous or lagged one period, are also near zero, indicating that changes in the shipping-point price have little effect on prices charged at retail. On balance, our results indicate that procurement costs are not a primary factor in determining retail prices for avocados.

Table 2. Price correlations for Hass avocado for Los Angeles retail chains.

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

## Characteristics of Demand for Hass Avocados

An estimated retail-sales response model provides basic information on the retail demand for Hass avocados. The average retail account in the database had average weekly sales of just over 34,669 units of Hass avocados for each size. The estimated own-price elasticity of demand for Hass avocados evaluated at the sample means is  $-2.2$  and is highly significant, suggesting that demand for Hass avocados at the individual-retailer level is quite elastic (responsive to price). We did not find any evidence of consumer stocking of avocados in response to low-price specials, which is consistent with the perishability of fresh avocados. The estimated models reveal evidence of rising retail prices and sales for avocados, with prices and sales slightly higher in marketing year 2003 and significantly higher in marketing year 2004 than in the base 2002 marketing year. This result is consistent with other research conducted at UC Davis that found annual U.S. demand for avocados increasing significantly over time in response to increased consumer income, industry funded promotion programs, growth in Hispanic population, and other factors such as the increased popularity of Mexican foods.

Monthly demand for avocados varies seasonally. Demand was high during the summer months, May through September, with June having the highest monthly demand. Although retail prices in the high demand summer months were not significantly different from other months, the farm:retail price spreads were significantly lower in May and June, and the probability of temporary price reductions (i.e., sales) was significantly higher in May, July, August, and September. Retail prices were significantly lower as a function of the amount of avocados imported from Chile and Mexico, meaning that consumers have benefited from imports and trade liberalization for avocados.

Figure 1. Effects of Holidays/Events on Retail Sales and Prices for Hass avocados.



We also see evidence of price effects for some events and holidays. Six holidays events: Christmas/New Year, Super Bowl Sunday, Cinco de Mayo, Memorial Day, Independence Day, and Labor Day, had significantly higher demands in the shopping week(s) preceding and/or during the holiday/event (Figure 1). Among the six holidays/events associated with significantly higher avocado sales, Christmas/New Year, Super Bowl Sunday, and Cinco de Mayo are associated with significantly lower prices

(Figure 1), lower retail margins, and higher incidence of temporary price reductions. Super Bowl Sunday had the strongest effect on sales and retail pricing among holidays/events. Although prices were significantly higher in the weeks associated with

Memorial Day, retail markups were not significantly higher, and temporary price reductions were more likely to take place, but not significantly. Independence Day and Labor Day had no significant effects on retail pricing.

The estimation results thus offer some evidence that retail prices and retail markups are lower, and the probability of sales is higher during high demand periods for avocados. First, retailers were more likely to conduct temporary price reductions during almost all the summer months when demand for avocados was high. The retail price for avocados was significantly lower in May, and the retail margin was significantly lower in May and June relative to the January base. Second, the retail price and markup were significantly lower, and the probability of temporary price reductions was significantly higher during holidays and events associated with significantly higher demand for avocados, in particular Super Bowl Sunday and Cinco de Mayo. We normally think that higher demand is associated with higher prices, but these results for avocados are consistent with results obtained by other researchers for different products.

### **CAC Promotion Programs**

The fact that the CAC selected a set of markets for its promotions during particular times of a year enables us to construct treatment and control groups and a before-and-after design for program evaluation. The approach of “difference-indifference” is employed to estimate the counterfactual retail demand for the selected markets that received the CAC’s promotion programs. Unobserved temporary factors and idiosyncratic retailer and market characteristics that might contribute to changes in demand are isolated to achieve a “clean” identification of the effects of the CAC’s promotion programs.

The analysis demonstrates that the CAC’s radio campaign and outdoor advertisements were successful in raising avocado sales in the 11-12 major markets where the CAC conducted its promotions during the time period of our analysis. The presence of the radio (outdoor) campaign in the treated market was associated on average with 7,058 (8,822) more units sold for each size of Hass avocados at a retail account in one week. Neither the radio nor outdoor campaigns had a significant impact on retail price, or on retail markup on average. The retail price and markup were lower (higher) during the radio (outdoor) campaigns, but the effect was negligible and insignificant. However, retailers were more likely to hold temporary price reductions during the CAC’s promotion programs. In particular, retailers tended to conduct significantly more temporary price reductions during the radio promotions. Lower retail price and markup, and more frequent temporary price reductions during the radio promotions suggest that retailers responded more actively to the radio advertising than to the outdoor promotions, and that their response was at least mildly supportive of the CAC’s programs. In particular, there is no evidence that retailers raised price to choke off the promotion-induced demand expansion.

### **Concluding Comments**

Our results regarding retailers’ pricing for avocados are probably applicable to other produce products with similar characteristics. We would not be surprised, for example, to find for other specialized perishable products with moderate sales that (i) the product is priced lower when demand is high, (ii) changing procurement costs are not a major

determinant of retail prices, (iii) retailers increase their margins when weekly shipments are increasing, and (iv) retailers' pricing practices mildly support, or at least do not offset, industry-advertising programs.

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