Can Improved Market Information Benefit Both Producers and Consumers? Evidence from the Hass Avocado Board's Internet Information Program

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We estimate benefits to consumers and avocado producers of the Hass Avocado Board's market-information program. Evidence suggests that the program stabilized shipping point prices, reduced the farm-retail marketing margin, and conferred benefits to both consumers and producers.

Retail margins for avocados will tend to increase with larger and more frequent price changes, and decrease with smaller and less frequent price changes.

The Hass Avocado Board (HAB) is a U.S. government-sponsored marketing program funded by a producer assessment of 2.5 cents per pound on all domestically produced and imported Hass avocados sold in the U.S. market. While the HAB allocates the majority of its funds to advertising and promotion programs, it also conducts an innovative Internet information program through its Network Marketing Center. Growers, packers, shippers, and wholesalers in the United States, Chile, Mexico, Dominican Republic, and New Zealand, as well as U.S. retailers, have access to the HAB web site where they share marketing information, including harvest, shipment, and price data. The "orderly marketing" goal of information exchange is to smooth shipments to major U.S. markets, prevent seasonal surplus and shortage situations, and promote stable shipping-point and retail prices.

Government market-information programs have been justified based on their contributions to improved market outcomes, especially when there are significant differences in market power between buyers and sellers. However, the availability of timely information has decreased over time as marketing channels for agricultural products have become more direct, replacing central wholesale markets. Government budget issues and a lack of reliable estimates of the benefits of market-information programs have also contributed to their elimination. Now, however, advances in communications and information technology provide a framework for innovative and effective market-information programs.

The HAB information program is an example of one such program. In this article we estimate the impact of the HAB program on shipping-point price variability and avocado marketing margins. Costs and benefits of the program to both consumers and Hass avocado producers are estimated.
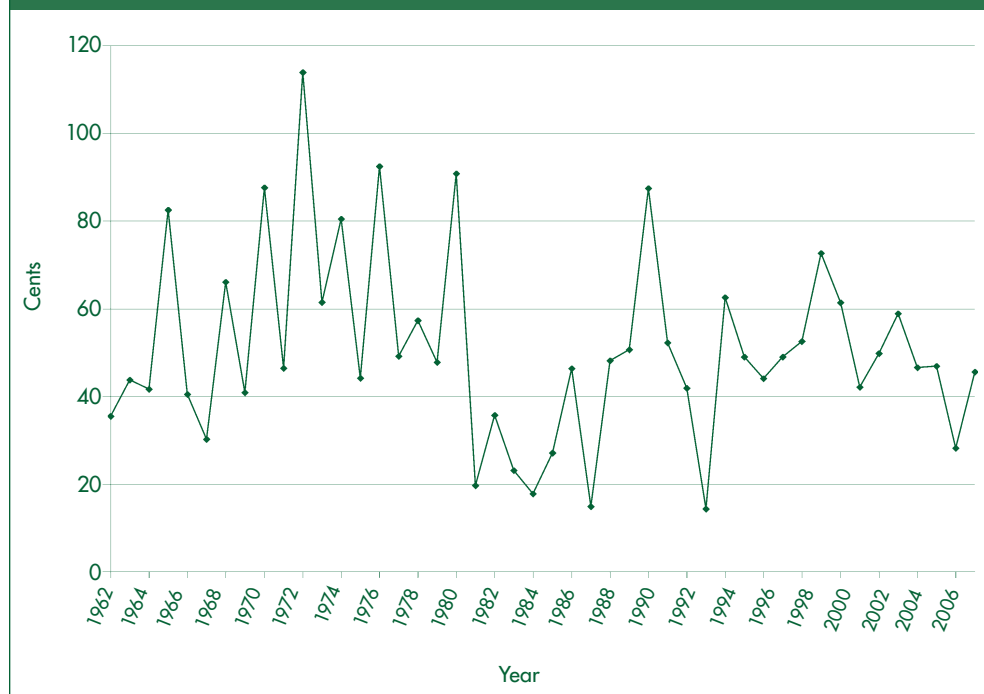
Analytical Framework

U.S. supermarkets have market power that is evident in their pricing practices. An analysis of price transmission for avocados found that retail prices for avocados respond more fully to shipping-point price increases than to shipping-point price decreases. Specifically, Li estimated that, on average, 76% of an increase in shipping-point price is passed on to retail, compared to only 29% of a decrease in the shipping-point price. As a result, retail margins for avocados will tend to increase with larger and more frequent price changes, and decrease with smaller and less frequent price changes.

Price instability thus promotes higher retailer margins, and increased price stability will tend to decrease annual average retailer margins. Information programs that smooth the flow-to-market of avocados, stabilize prices, and reduce marketing margins can benefit both producers and consumers through higher average shipping-point prices and lower average retail prices.

To estimate the impact of price variability on avocado marketing margins, we proceeded as follows: (1) the variance and standard deviation of weekly shipping-point prices before and after initiation of the HAB information program were calculated and compared;

The variance and standard deviation of weekly California shipping-point avocado prices were calculated for each year of the ten-year period 1998 through 2007. This period was selected to include the five years before (1998 through 2002) and the five years after (2003 through 2007) initiation of the HAB information program.

The real (inflation-adjusted) annual average California shipping-point price for avocados is shown in figure 1 for 1962–2007. Annual average prices

mask considerable intrayear variability in prices. The standard deviation of weekly average prices for the most recent five years, 2003–07, averaged 0.2045, a decrease from the weekly average standard deviation of 0.2843 for the prior five years. Thus, the average annual standard deviation of weekly prices decreased 28% from the five years immediately before initiation of the HAB information program to the first five years after initiation of the information program. At the same time, the annual average standard deviation of California weekly shipments increased from the first five years (1998 through 2002) to the most recent five years (2003 through 2007), while the standard deviation of total weekly shipments (California plus all imports) decreased.

This indicates that coordination of imports with California shipments has smoothed total weekly avocado shipments and prices during the marketing year. While growing imports had the potential to introduce additional quantity and price variability into the U.S. market, the opposite has occurred. Imports have been timed to maintain a rather steady flow of avocados to retail markets, which tends to stabilize prices at both the shipping-point and retail levels. A portion of the smoothing of quantity and prices

(2) using Li's estimates of marketing margin adjustments to shipping-point price changes, the estimated average annual change in the standard deviation of weekly prices after program initiation was used to simulate weekly changes in estimated marketing margins; and, (3) using estimated price elasticities of demand, the changes in estimated marketing margins were allocated between the retail and shipping-point levels in the marketing channel.

Results

Information for the analysis is from the Avocado Marketing Research and Information Center (AMRIC) system. AMRIC, created by California law in 1985, provides the California avocado industry with daily inventory and shipment information to guide harvest/market strategies. AMRIC has developed a strong database on avocado prices and inventories by variety and size, as well as shipments by major market destination, variety, and size. *Avocado Price Variability:* The HAB information program was initiated during the 2002–2003 marketing year.

Table 1. Estimated Total Annual Changes in Gross Margins for Hass Avocados, Average Shipments, Standard Deviation of Price, and Average Price, 2003-2007					
	Year				
Item estimate	**2003**	**2004**	**2005**	**2006**	**2007**
Margin change ($)	6,533,780	2,889,059	8,133,135	4,033,952	10,070,172
Ave. weekly shipments (lbs.)	8,512,807	11,771,751	12,484,837	15,194,896	13,361,154
Std. deviation of price ($/lb.)	0.271	0.128	0.216	0.058	0.263
Average weighted shipping point price ($/lb.)	1.136	1.018	0.955	0.761	0.993

Source: Calculated from weekly price and shipment data provided by the California Avocado Commission Avocado Marketing Research and Information Center (AMRIC).

as imports increased significantly can, and should be, attributed to the active HAB information programs.
Marketing Margin Adjustments: The results from Li's research on price transmission in the marketing channel were used to estimate weekly changes in gross marketing margins between the shipping-point price and the retail price of avocados. We assumed that 76% of the increase in shipping-point prices was passed on in the form of higher retail prices and 29% of a decrease in shipping-point prices was passed on to consumers in the form of lower retail prices. The changes in estimated gross marketing margins from week to week are based on total weekly shipments, the change in average weighted shipping-point price per pound for all Hass avocados, and Li's estimated adjustment ratios.

Annual estimated gross changes in marketing margins, based on each marketing year's weekly total Hass avocado shipments and weighted weekly average Hass avocado shipping-point prices, are shown in table 1. The actual annual standard deviations of weekly Hass avocado shipping-point prices both decrease and increase from year to year, ranging from a high of 0.271 in 2003, the first year of the information program, to a low of 0.058 in 2006, a year of record weekly shipments due to a very large California crop. Estimated total changes in marketing margins associated with shipping-point price changes vary from $2,889,059 in 2004 to just over $10 million in 2007. Note that the total changes in marketing margins are positively related to average weekly shipments and the standard deviation of weekly prices during the marketing year.
Estimated Information Program Benefits: The simulated changes in marketing margins due to actual week-to-week changes in shipping-point prices are shown in table 1. To estimate the benefits of the information

Table 2: Annual and Total Costs of HAB Information Programs by Cost Category, 2003–2007						
	Year					Grand
Cost Category	2003	2004	2005	2006	2007	Total ($)
Information ($)	28,619	219,553	71,104	123,434	94,226	536,936
Analysis ($)	0	44,843	168,976	197,375	120,281	531,475
Interaction ($)	286,560	658,956	378,566	404,241	397,592	2,125,915
Network Marketing Center ($)	0	166,876	66,163	179,052	118,423	530,514
Total Information($)	340,179	1,090,228	684,809	904,102	730,522	3,749,840

Source: HAB Annual Reports, 2003–2007.

program, we must estimate what the price variability would have been without the HAB information program. Our approach is to compare the variability of prices immediately before initiation of the information program with variability of prices after beginning the information program. A limitation of this approach is that the entire change in price variability is attributed to the information program, even if there were other factors contributing to more stable prices.

As noted, the standard deviation of annual California Hass avocado prices decreased from an annual average of 0.2843 during the five-year period 1998–2002 to an annual average of 0.2045 from 2003–2007. This decrease of 28% in price variability is used as the maximum reduction in price variability due to the HAB information program. The estimated total five-year increase in avocado marketing margins due to price variability from table 1 is $31,661,000. Thus, a reduction of 28% in margins would have been worth a five-year (undiscounted) total of $12.3 million. This savings is reflected in both lower retail prices paid by consumers and higher prices to growers at the shipping point.
HAB Information Program Costs: The annual costs of HAB information

programs are listed by category in each HAB annual report and are summarized in table 2. Annual expenditures for the information programs ranged from $340,179 to $1,090,228 over the five years, with an average annual cost of just under $750,000. Total five-year costs for the categories of information, analysis, and the Network Marketing Center were in a rather tight range of $530,514 to $536,936. Almost 57% of total costs for the first five years ($2,125,915) were in the interaction category.
Allocation of Net Benefits: The division of the total benefit, as well as the assessment cost to fund the information program, between consumers and producers depends upon the value of consumers' price elasticity of demand, E_D, relative to producers' price elasticity of supply, E_S, of avocados to the U.S. market. The share of a change in margin going to consumers in terms of lower price is

$$\Delta P = \frac{E_S}{E_S - E_D}$$

Carman, Li and Sexton (2010) estimated demand relationships for avocados using various combinations of functional forms and variables. Estimates of the relationship between per capita quantity and real price were

very stable regardless of the variables included. Using the estimated price coefficients, we evaluated E_D at the average of price and quantity for the past ten years. Regardless of the specific model estimated, we obtained a value of $E_D \approx -0.25$ during this ten-year period, meaning that a 4% increase in price would be associated with about a 1% decrease in consumption.

There are no recent studies of the price elasticity of supply for avocados. Supply functions are difficult to estimate empirically and the elasticity of supply varies by the length of run (time frame) under consideration—e.g., supply becomes more elastic (responsive to price) in the long run as productive inputs become variable to producers.

Supply analysis is particularly difficult for perennial crops because the analyst must normally specify a dynamic model containing equations for plantings, removals, bearing acreage as a function of plantings and removals, and yield. An alternative approach to studying the supply relationship is to estimate a range of plausible values for elasticity of supply. If conclusions are robust across the range of supply elasticity values chosen, there is little need to worry about choosing among the plausible alternative values.

In considering a range of plausible values for elasticity of supply, note that short-run supply of a perennial crop is highly inelastic because it is the product of bearing acreage and yield, neither of which is likely to be influenced much by current price. Thus, the supply of avocados from California is likely to be highly inelastic. The supply of imports to the United States emanating from Chile and Mexico, however, is apt to be more elastic because the total supply in each country can be allocated to domestic consumption or to various export markets. Thus, an increase in price in the United States due to factors such as successful promotions, is

likely to cause Chilean and Mexican shippers to increase supply into the United States. Based on these considerations, we specified three alternative values for E_S: 0.5, 1.0, and 2.0.

Using $E_D = -0.25$ and values of E_S ranging from 0.5 to 1.0 to 2.0, we calculated the estimated consumer and producer shares of costs and benefits from the information program. Estimated consumer shares ranged from 67–89%, with producer shares ranging from 33–11%, depending upon the value assumed for E_S. Assuming that the entire margin reduction can be attributed to the HAB information program, the total net benefit is $12.3 million gross benefit minus $3.75 million program cost, or $8.55 million net benefit. Producers' share of this net benefit is then in the range of $0.94–$2.82 million dollars, with the remainder of the net benefit going to U.S. avocado consumers.

Concluding Comments

Publicly available market information has costs and benefits, but the costs of obtaining and disseminating information are typically much easier to estimate than the benefits or returns from having the information available to market participants. The present study attempts to measure the value of an information program designed to foster orderly marketing in the U.S. avocado market, with the value of information stemming from reduced price variability leading to reduced marketing margins. The HAB reported five-year information program expenditures of $3.75 million. Based on a 28% reduction in price variability, we estimated a five-year reduction in avocado marketing margins of $12.3 million, with net benefits totaling $8.55 million. With an inelastic demand at recent prices and quantities, the majority of estimated benefits flow to consumers, although producers still receive an attractive return for their share of expenditures.

Public market-information programs for agricultural commodities have been under pressure for several decades as a result of changing channels of distribution and decreased government funding. Terminal market price and arrival data have decreased as these markets have been by-passed by the movement to direct purchase programs by large-scale food retailers, and market reports have been reduced and suspended in response to government budget reductions.

In light of the significant consumer benefits estimated for the HAB information program, we believe that new and innovative market-information programs based on advanced information technology and rapidly evolving information delivery systems should be seriously considered for implementation.

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For further information, the authors recommend:

Carman, Hoy F., Lan Li, and Richard J. Sexton. "An Economic Evaluation of the Hass Avocado Promotion Order's First Five Years." Giannini Foundation Research Report 351. http://giannini.ucop.edu/researchreports.htm.

Li, Lan. "Retailer Pricing Behavior for a Fresh Produce Commodity: The Case of Avocados." Ph.D. Dissertation, University of California, Davis, 2007.