Impact of Sequential and Partial Trade Liberalization for Mexican Hass Avocado Imports to the U.S. during 1998-2004

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Introduction

Trade barriers for Hass avocados from Mexico have been in place due to stated concerns about invasive pests and diseases. Mexican Hass avocado (MHA) could only enter the U.S. only in Alaska prior to November 1997. Subsequently there has been progressive elimination of import restrictions on MHA. Seasonal MHA imports were intended originally to complement the domestic supply and fill the natural void caused by lower domestic production in the late fall and winter, while minimizing risks of introducing pests and diseases from Mexico. California produces over ninety percent of avocados in the U.S, but California's avocado industry is facing increasing pressure from trade liberalization for Mexican avocados. It is critical to assess whether and how trade liberalization with Mexico benefited U.S. consumers and affected prices for avocados.

This study utilizes a micro dataset to evaluate the impact of MHA imports and changes in U.S. import policies on retail prices and demand for avocados during 1998-2004. The data at the disaggregate level provides a unique opportunity to discern effects of MHA imports during different months of import season, in different markets, and under different policy regimes. MHA imports were allowed to particular markets during certain periods of the year and the import policies varied for different time periods. The sequential and partial liberalization of the trade restrictions enable us to utilize the econometric approach of Difference-in-Difference to assess the impacts of trade liberalization for avocados. One key question is the impact of the trade liberalization on those markets where MHA imports have been allowed versus those markets where it has been prohibited.

The effects of MHA imports are decomposed into three categories: (i) the effects of increasing competition among avocado imports to the U.S., (i) the effects of complementary supply when domestic production and imports from other countries are low, and (iii) effects of competition between MHA and Californian avocados. This paper focuses on the first two kinds of effects, because MHA imports were allowed primarily during the low season of Californian avocados during the study period.

We found that the first trade liberalization during 1998-2001 for MHA had larger effects on retail price and demand for avocados than the second trade liberalization taken place during 2001-2004. Seasonal MHA imports had a greater impact on the markets under the first policy regime than the markets under the second policy regime. Overall, retail prices decreased when MHA were available and as MHA imports increased. Introducing MHA imports did not intensify competition among avocado imports significantly during 1998-2004, although MHA had negative effects on retail prices due to increase in competition among exporters. Complementary effects of MHA to fill in void in avocado supply in the U.S. in January and February dominated the effects of MHA on retail prices during 1998-2001. Both complementary effects and the effects of increasing competition with Californian avocados of MHA were evidence during 2001-2004. Avocado demand increased as a result of decrease in retail price for avocados due to MHA imports. MHA imports also generate positive shifts in demand that may casued by increasing year-round availability of avocados in the U.S. Although the positive demand shifts are generally present in our estimation results, most of them are not statistically significant.

The finding suggests that the effects of MHA imports are different during different times of the year, for different markets, and under different policy regimes. A simple extrapolation for the impact of future trade liberalization for MHA imports from what has occurred under previous trade policies may generate erroneous conclusions, and mostly likely underestimate the impact of MHA imports.

The paper is organized as follows. The next section gives an overview of avocado consumption and production in the U.S. Avocado imports and associated trade policies are discussed in the third section. The fourth section analyzes the effects of MHA imports and presents the general DID approach for evaluating the effects of MHA imports and changes in the U.S. import policies. The following section presents empirical models for retail price and demand. Complications in identification and empirical strategies that tackle the identification issues are also discussed in this section. The sixth section reports and discusses the results and the last section concludes.

California Avocado Industry and Demand for Avocados

Demand for Avocados in the U.S.

Demand for avocados in the U.S. has grown over time (Figure 1). Per capita consumption for fresh avocados was 1.3 pounds per year on average during 1970s, experienced much fluctuation in the next decade and reached 1.71 pounds per year on average during 1980s, and has gained steady growth since early 1990s. An average consumer in the U.S. consumed 1.65 pounds fresh avocados a year during 1990s and 2.6 pounds a year since 2001. Increase in avocado consumption in recent year may be explained by the growing health concerns about food consumption, increasing Hispanic population, diversified

food choices including Mexican food, industry advertising and promotion campaigns, and expanding avocado imports to the U.S.

Avocado Production in the U.S.

Avocado is an important cash crop in California, ranking the 18th among all agricultural commodities and the fourth among all fruit crops produced in California in 2004 with a value of production of $380 million. California produced 88 percent of U.S. domestic crop on average during 1980/81—2004/05, with Florida accounting for the reminder.

Figure 2 demonstrates the trend of avocado bearing, non-bearing, and total acreage from 1970/71 to 2004/05. Avocado acreage expanded significantly throughout 1970s and until early 1980s. As a result, avocado bearing acreage increased dramatically during this period and reached its peak in mid and late 1980s. Since then bearing acreage declined gradually until early 1990s. Both bearing and non-bearing acreages were stabilized in the past ten years with annual averages of 60,000 acres and 1616 acres during 1994/95- 2004/05. Nonbearing acreage has been stabilized at a relative low level during 1984/85-2004/05, with an average of 1641 acres per crop year. There were slight increases in non-bearing acreage in 1987/88, 2002/03, and 2003/04.

Avocado is a perennial crop with a production cycle of four to five years. It takes about one year to develop a baby tree from seedling in nursery, and four or more years after a baby tree is planted in grove to become mature and develop fruits. Bearing acreage in a given year is mostly predetermined. Further, bearing acreage did not vary much from year to year since mid 1980s and has been stabilized since mid 1990s. However, avocado production fluctuated to a large extent during this period. As shown in figure 3, variations in avocado production from year to year were mostly explained by changes in yield, which may be influenced by weather, water, and pests and diseases.

Avocado production, farm price for avocados, and crop value for avocados trended upward since 1970/71 and in the past decade (Figure 4). Avocado production and crop value reached 336 million pounds and $300 million per year on average during 1994/95-2004/05. Figure 4 also shows that farm price for avocados moved to the opposite direction of avocado production, which is consistent with demand theory.

Most avocados produced in the U.S. are consumed domestically. Avocado exports decreased from 14% of total production in 1996 to 4% in recent five years. While the primary markets for U.S. avocados were Canada and European countries in the past, over 85 percent of U.S. avocado exports were sold to Canada in the recent five years.

Avocado Varieties and Production Seasonality

Although there are close to 50 varieties of avocados, seven varieties are grown commercially in California. Because Hass variety has the merits of higher cash returns, higher yields and longer production season, it dominates avocado crops in California. Hass accounted for 91% of annual production and 96% of annual crop value for avocados in the past ten years.

Although Hass avocados are available throughout the year, Hass production still reveals an evident seasonal pattern, which is low in late fall and winter and high in late spring and peaks in summer (Figure 5). Except for Reed, all the other varieties, Bacon, Gwen, Fuerte, Pinkerton, Zutano, and avocados produced in Florida, have production seasons complementary to some extent to those of Hass variety. Other avocado varieties are usually available in late fall and until spring (Figure 5)[1].

[1] Production of varieties other than Hass does not include production in Florida in Figure 5.

Seasonality of Hass production and production for other varieties is estimated by the following regressions. Monthly pack quantities for Hass and other varieties produced in California are estimated as a function of trend or year dummies, and monthly dummies. The California Avocado Commission publishes pack and value statistics per month for Hass and other avocado varieties based on the commission's assessment records. Regressions are conducted for periods of 1995/96-2004/05 and 2000/01-2004/05 respectively, and trend and year dummies are incorporated separately. Estimation results are consistent across different specifications. We report the estimation results with trend variable during 1995/96-2004/05 in table 1.Hass production begins to increase in March and gradually reaches its peak in summer months, begins to decline in August and September, and stays at low levels through out October and February. Seasonal patterns of other varieties produced in California are similar to those produced in Florida.

U.S. Avocado Imports and Its Trade Policy

Avocado Imports to the U.S.

Seasonality of Hass avocado production in California generates a natural void of avocado supply in the U.S. during late fall and early spring, especially during September and February. Avocado supply in the U.S., therefore, is supplemented by avocado imports. Figure 6 illustrates trends of avocado consumption and imports and supplies by California, and figure 7 shows the changes in composition of avocado supplies in the U.S. during 1989-2005. Avocado consumption has increased over time, in particular it revealed evident growth since 1999. Whereas supplies by California fluctuated in recent five years, the rapid growth in avocado consumption was much explained by marked increase in avocado imports during this period.

Chile and Mexico supplied 90% of avocado imports and 96% of Hass avocado imports to the U.S. in the past five years. Chile was the number one avocado exporter to the U.S. before 2005. Chilean avocados comprised approximately 65% of avocado imports to the U.S. during 1989-2005. Mexican Hass avocados were not allowed to enter the U.S. continent market until November 1997, and since then there has been progressive elimination of trade restrictions on Mexican Hass avocados. We will discuss the U.S. import policy on MHA imports in the following section. Before 1997, Mexico only exported avocados of non-Hass varieties, which accounted for less 1% to 7% of U.S. avocado imports during 1989-1996. Mexican avocado imports have increased dramatically since 1997, with import shares increasing from 15% in 1997 to 27% in 2004. Mexico supplied 51% avocado imports to the U.S. in 2005, and took over Chile and became the number one avocado supplier to the U.S.

Chile maintained a share of 65% of total imports to the U.S. during 1997-2004. Gains in import shares of Mexican avocados mainly came at the costs of shares of other exporters and other avocado varieties during this period. Other export countries, such as Dominican, Brazil, and New Zealand, accounted for 29% of U.S. avocado imports, and their share declined to 6% in 2005. More than 70% of imports from these countries are non-Hass varieties of avocados. Hass variety accounted for about 93% of U.S. avocado imports, and comprised close to a hundred percent of imported avocados from Chile and Mexico in recent five years.

Mexico is number one avocado producer in the world, accounting for 32.8% of world production during 2003-2005. U.S. and Chile ranked the third and sixth with 6.4% and 4.9% shares of world production respectively during the same period. Harvested

areas for avocados in Chiles expanded significantly during 1992-1999, with an average annual growth rate of 11.4%. Production has been increasing since then with an average annual growth rate of 13.2% during 1992-2005. Harvested areas and avocado production have been quite stable in Mexico with average annual growth rates of 1.7% and 2.3% respectively during 1992-2005. Exports comprised a considerable proportion of Chilean avocados since 1990s. Approximate 30% Chilean avocado were sold overseas during 1990-1998, and the percentage jumped to 57% in 2002 and reached 71% in 2004. Compared with Chile, Mexico exported only 4.5% of production during 1990-1997, but increased sales overseas since 1998, with about 10% of Mexican avocados exported.

Table 2 reports prices for Mexican and Chilean avocados in the U.S. and world markets and farm price for California Avocados during 1997-2005. Figure 8 plots movements of these price series. Price for Mexican and Chilean avocados in the U.S. are calculated by dividing import volumes by landed duty paid values, which includes all costs occurred before and at U.S. border and is greater than CIF values. The difference in U.S. prices and world market price are 23 cents and 27 cents per pound for Chilean and Mexican avocados respectively, reflecting transportation costs, added values at border, possible difference in net prices, etc. Prices for Mexican and Chilean avocados fluctuated with one exceeding another during 1997-2001, with world and U.S. prices follow similar movements. Prices for Mexican avocados have increased evidently since 2001, exceeding Chilean avocados by 13 and 12 cents per pound on average during 2001-2004 in U.S. and world markets respectively. Prices for Chilean, Mexican, and California avocados were 65 cents, 72 cents and 94 cents per pound on average during 2001-2004.

Trade Restrictions and Liberalization for Mexican Hass Avocados

Trade barriers for Hass avocados from Mexico have been in place due to stated concerns about invasive pests and diseases. MHA could only enter Alaska in the U.S. before November 1997. There has been a progressive elimination of import restrictions on MHA since then. In November 1997, MHA were allowed to enter the continental U.S. for the first time. Nineteen states and Washington D.C. allowed MHA imports during November—February each year, beginning in November 1997. A second trade liberalization occurred in November 2001 when MHA were allowed to enter twelve additional states, and the import season was expanded to a six-month period, from October 15 to April 15 each year. Finally, beginning on January 31, 2005, MHA imports were allowed to enter all U.S. states except California and Florida year around. California, Florida and Hawaii are slated to open their markets to MHA after January 31, 2007.

Seasonality of Avocado Imports and Domestic Production

Not only Hass avocado production exhibits seasonal patterns, avocado imports from Chile and Mexican also reveals clear seasonality. As noted, Hass avocado production in California is low during September and February, increases in March to peak period of April to July, and slides down in August to its low season again. Chilean avocado production peaks from September to January with limited volumes in July, August, February and March, which is complementary to production seasonality of Californian avocados[2]. Because there is no trade restriction placed on Chilean avocado imports to the U.S., Chilean avocado imports would follow the same seasonal pattern of avocado production in Chile if demand conditions are constant. We estimate the seasonality of Chilean avocado imports and report the estimation results in table 1. Seasonal patterns

[2] Information on seasonal availability of avocados by variety and region is available at http://www.indexfresh.com/avocadoavailability.htm and www.avocado.org.

Since it is reasonable to assume demand conditions are less variable during September to February, estimated monthly dummies should reflects seasonality of Chilean avocado supply.

Seasonal MHA imports were intended originally to complement the domestic supply and fill the natural void caused by lower domestic production in the late fall and winter, while minimizing risks of introducing pests and diseases from Mexico. Hass avocado production in Mexico is in general high throughout August and April, in particular during November and March. However, the notion that Mexico is 'out' of Hass avocados in certain months of the year is erroneous[3]. In Michoacan where most Hass avocados are grown in Mexico, there are normally plenty of Hass avocados 365 days of the year. As in any other growing area, Mexico has a peak production period that lasts from August through April, with a significant decline in May through July.

Table 1 also reports the results for estimations for seasonality of Mexican avocado imports. Different from seasonality of Chilean avocado imports which reflects seasonal patterns of Chilean avocado production, seasonality in Mexican Hass imports may mainly formed by trade restrictions placed on them in the U.S.

Market distribution of California and Imported Avocados

More states opened their markets to MHA at each stage of trade liberalization for Mexican avocados. Those states are not selected in random, but are chosen based on market distribution for California and imported avocados. Table 4 reports top 25 markets for California avocados with their market shares based on shipment volumes during 1995-2004. California avocado were shipped to 65 destination markets throughout nation.

[3] Hofshi, Reuben "Hass Cultivation in Mexico," http://www.avocado.org/growers/mexico.php.

Markets for California avocados are rather concentrated, with top 5, 10, 20, 30 markets account for 47%, 69%, 88% and 95% of total California volume sales. Further, 38.4% of California avocados are shipped to Los Angeles, San Francisco, Sacramento and San Diego within the state, with Los Angeles along accounting for approximately 22% of the total shipment.

The first group of 19 states and Washington D.C. that opened MHA imports in November 1997 accounted for 16.1% of California avocado market during 1995-2005. Markets in the first group were largely supplied by avocado imports from Chile prior to the entry of seasonal MHA imports. The second group of 12 states that initiated MHA imports in November 2001 only had a market share of 6.8% during this period. Markets in the third group that allowed all-year-around MHA imports beginning from January 2005 had much higher stake than markets opened previously with a combined market share of 37.2%. These markets are mostly in south west, west and southern states of the U.S., with Arizona, Texas, and New Mexico accounting for 24.5% of market share for California avocados. At last, California that will open its market in January 2007 consumes close to 40% of avocados produced within the state. Only less than 1% of Californian avocados were shipped to markets in Florida.

Mexican Hass Avocado Imports

Seasonality in production and market distribution of California and imported avocados are seemingly key factors in trade policy design for MHA. Trade liberalization for MHA has progressed in both temporal and spatial dimensions. Combining both factors in production and import seasonality and market distribution, we summarize the expected effects of MHA imports on price and demand as follows.

During November 1997 and October 2001, price for avocados in the markets that allowed MHA imports (MHA markets) would decrease, because MHA were relatively cheaper than CHA during 1998-2000 (table 3). However, the effects of MHA imports on price may be limited, because i) MHA were cheaper than CHA only by 1 to 6 cents per pound, and ii) markets in the first group had been supplied by Chilean imports when domestic production was low. Further, we break down the effects over time. Chilean imports usually reach peaks in November and December and decrease quickly in January and February. Therefore, we expect that introduction of MHA imports in these markets in November and December increased competition between Chilean and Mexican imports, while MHA imports in January and February further enhanced complementarities of avocado imports in terms of filling in natural void of domestic supply. Taking prices of MHA and CHA and markets into account, we expect MHA imports would have larger and/or significant impact on price in November and December than on price in January and February.

During November 2001 to December 2004, MHA imports were further extended from four months (from November to February) to six months (from October 15 to April 15) each year, and expanded to additional twelve states. Whereas CHA imports were very low and California Hass production began to boom in March and April, MHA imports competed directly with California avocados. Because MHA imports were cheaper by 19 cents per pound than California avocados, prices for avocados in March and April in markets that allowed MHA imports are expected to decrease. Recall that market shares of California avocados of the first and second groups are 16.1% and 6.8% respectively during 1995-2005. If competition between California avocados and MHA was fiercer in

markets with higher market shares, we expect that MHA would have larger impact on price in these markets. Second, CHA were cheaper than MHA during 2001-2004. Prices for CHA and MHA differed by 3 and 5 cents per pound in 2001 and 2002, and significantly by 10 and 21 cents per pound in 2003 and 2004. Consequently, MHA imports were expected to have little impact on prices in November and December in both the first and second group during 2001-2004. Third, effects of MHA imports in January and February are mixed because CHA imports were increasing including in the early of the year, and CHA imports were cheaper than MHA imports.

Since January 2005, MHA were available to most of the States except California, Florida and Hawaii throughout the year. Whereas avocados were mostly imported during low seasons of California avocados and to markets with relative small shares of California avocados, since 2005 not only California avocado industry confronted the competition from avocado imports during its production peak season, but also in its major markets. What concerns the industry most is the price for avocados and producer incomes. The price for MHA avocados based on landed duty-paid value was 80 cents per pound in 2005 compared with farm price of California avocados at 91 cents per pound. Obviously, MHA imports should have significant negative effects on market price for avocado in the U.S. markets as MHA are cheaper than Californian avocados. The critical question is the magnitude of the impact.

With the last step of trade liberalization for MHA to be taken place in 2007, all the U.S. markets will have access to MHA all year around. Taking both spatial and temporal dimensions of U.S. trade policies for MHA into account, the impacts of MHA imports on consumers and producers might be different substantially and have distinct

implications under different policy regimes. A simple extrapolation for the future impact of MHA imports on U.S. consumers and producers in 2007 from what has occurred in previous policy changes may generate erroneous conclusions, and mostly likely underestimate the impact of MHA imports.

Evaluation for the U.S. Trade Policy on MHA

This study examines the effects of MHA imports on retail prices and demand for avocados during different times of MHA import seasons, in different markets, and under different trade policy schemes during 1997-2004. In this section, we summarize the expected effects of MHA imports on retail price and demand, and introduce the general framework of "Difference-in-Difference" approach that is applied to evaluate the "treatment effects" of restricted seasonal Hass imports from Mexico during 1997-2004. Empirical models for retail price and demand and specific identification issues and strategies are presented and discussed in the next section.

The current paper focuses on the effects of MHA imports on retail price and demand for avocados. Although the effects realized at the retail level have implications for impact of MHA imports on the upstream market, our work continues to incorporate evaluation at the aggregate level.

Competitive and Complementary Effects of MHA Imports

In particular, the effects of MHA imports were decomposed along time horizon: (i) import competition effects in November and December that is reflected in prices and demand for avocados due to introduction of MHA imports; (ii) complementary effects in January and February that is due to low domestic production and limited volumes of avocado imports from Chilean and other countries; and (iii) effects of competition

between MHA and California avocados in March and April when California Hass production increases to its peak season. MHA imports might introduce competition among imports and yield complementarities from November 1997 to October 2001 when MHA imports were allowed during November and February each year. All three effects might be present during November 2001 to October 2004 when MHA entered from October 15 to April 15 for each season.

Markets are divided into four groups, with the first opened markets for MHA imports in November 1997, the second initiated MHA imports in November 2001, the third allowed MHA in January 2005, and the fourth consisting of markets in California and Florida. The expected effects of MHA imports on retail prices are summarized in table 3. The negative sign denotes negative effects of MHA imports on price, and the question mark means that the direction of MHA imports cannot determined. The number of negative signs in each cell indicates the expected magnitude of effects of MHA imports on retail prices compared with the effects of MHA imports in the same row or column and cannot be used to compare effects of MHA imports between any two cells in the table.

The effects of MHA imports on import competition are expected to have negative effects on retail price in markets in Group 1 during 1997-2001 as MHA were somewhat cheaper than CHA imports. However, the negative effects of MHA imports on retail prices are expected to be greater during January and February than during November and December. Effects of MHA imports on retail prices in November and December during 2001-2004 are ambiguous, because MHA were more expensive than CHA on average during this period. As CHA became cheaper and began to increase in January and

February since 2001, complementary effects of MHA are expected to be smaller during 2001-2004 than during 1997-2004. However, MHA imports in March and April are expected to introduce competition with California avocados and cause decrease in retail price during 2001-2004. If competition was more intensive in markets with large market shares, we expect that the effects of MHA on retail prices are larger on Group 1 than on Group 2.

The effects of MHA imports on demand can be realized indirectly through changes in retail price for avocados. In addition, increasing year-around availability of avocados could have positive effects on demand avocados realized in shifts in demand.

Our study hinges on the impact of future trade liberalization for MHA. Because MHA imports were restricted to enter certain markets and mostly during the time when domestic production was low, simple generalization of the effects of MHA imports in the past to future can be misleading. During our study period, impact of MHA imports on Group 1 and 2 markets in March and April during 2001-2004 provides insight on the effects of MHA imports after 2005. Although evaluation during 2005-2007 will certainly provide valuable information for future policy changes, we were not able to obtain data after 2005. Our on-going work is trying obtain recent data and extends to period after 2005.

The Approach of "Difference-in-Difference"

The expected effects of MHA imports summarized in table 3 are the net effects based upon comparison between markets that had access to MHA imports and markets that did not allow MHA imports. The approach of Difference in Difference (DID) is employed to examine how retail prices changed in response to changes in availability and volumes of

MHA imports and whether demand expanded due to increasing year-round availability of avocados. The DID approach has been applied broadly in studies on program and policy evaluations, such as Card's (1990) assessment of the effects of immigration on native wages and employment and Angrist and Levy's (1999) analysis of the effect of class size on student test scores. We present the DID approach in the context of evaluating the effect of MHA on retail prices following Ashenfelter and Card (1985), who evaluate the effect of job training on earnings. The DID approach is also applied to evaluate retail demand for avocados. The empirical models for each of the outcomes are presented in the next section.

The fact that only certain markets allowed MHA imports programs enables us to construct both treatment and control groups for policy evaluation. The DID approach estimates the counterfactual outcomes for the MHA markets. The DID framework for identifying the "treatment effects" of MHA imports on retail prices can be presented by the following linear model:

$$p(a,t) = \delta(t) + \eta(a) + \psi MHA(a,t) + \varepsilon(a,t),$$

where $p(a,t)$ denotes the price of avocados charged by retail account a in market m at time t. Let the pre-treatment period, $t = 0$, be the period when there was no MHA, and let the post-treatment period, $t = 1$, be the period when MHA imports entered selected U.S. markets. MHA(a,t) denotes the import volumes of MHA to the U.S. in $t = 1$.

We refer retail accounts in the markets that were exposed to MHA imports (i.e., MHA$(a,1) = 1$) as the "treated", and those that were not exposed to MHA imports (i.e., MHA$(a,1) = 0$) as the "controls". $MHA(a,0)$ equals zero for both the treated and controls, because there was no MHA entered U.S. markets at $t = 0$. ψ represents the "treatment

effects" of MHA imports. $\delta(t)$ denotes the time-specific component, $\eta(a)$ represents the account-specific effects that incorporates market-specific, retail chain-specific and market-retail chain-specific effects, and $\varepsilon(a,t)$ is the individual transitory error term with zero mean at both $t = 0$ and $t = 1$. The advantage of the panel data utilized in this study enables us to control idiosyncratic characteristics of individual retailers and/or markets and time-specific events by two-way fixed effects.

States that were open to MHA imports were not chosen at random. The selected states are have relative low market shares of California avocados and had been relied on imports from Chile and other countries prior to lifting trade restrictions on MHA. A concern usually arises about selection bias. That is, selection for states in each policy group may be correlated with the individual transitory error term. The set of states that allowed MHA imports does not change from year to year under each policy regime. U.S. government choose the set of states for MHA imports based on its market characteristics that were present far prior to the policy change. Therefore, selection of a state for MHA imports are per-determined.

Under the assumption that selection for treatment is not correlated with the error term, we can obtain the difference in the expected retail prices with and without MHA imports for the retail accounts in the treated and control markets as

$$
\begin{aligned}
&E[p(a,1) \mid MHA(a,1) = 1] - E[p(a,0) \mid MHA(a,1) = 1] \\
&= E[p(a,1) - p(a,0) \mid MHA(a,1) = 1] \\
&= [\delta(1) - \delta(0)] + [\eta(a) - \eta(a)] + \psi[MHA(a,1) - MHA(a,0)] \\
&= \delta(1) - \delta(0) + \psi
\end{aligned}
$$

$$
\begin{aligned}
&E[p(a,1) \mid MHA(a,1) = 0] - E[p(a,0) \mid MHA(a,1) = 0] \\
&= E[p(a,1) - p(a,0) \mid D(a,1) = 0] \\
&= [\delta(1) - \delta(0)] + [\eta(a) - \eta(a)] \\
&= \delta(1) - \delta(0)
\end{aligned}
$$

Notice that the use of a simple comparison of retail prices before and after import season to evaluate the effects of MHA is likely to be biased by temporal trends in retail prices or by factors other than MHA imports that occurred during both periods. The DID approach is applied to construct a counterfactual against which to measure the treatment effects. Therefore, the "treatment effects" of MHA imports, ψ, can be identified in the following form:

$$
\begin{aligned}
\psi = \quad & \{E[p(a,1) \mid MHA(a,1) = 1] - E[p(a,0) \mid MHA(a,1) = 1]\} \\
& - \{E[p(a,1) \mid MHA(a,1) = 0] - E[p(a,0) \mid MHA(a,1) = 0]\}
\end{aligned}
$$

The DID estimator requires a strong assumption that the average outcomes for the treated and controls would have followed parallel paths over time in the absence of the treatment. Further, identification of the total effects of MHA requires that there is no spill-over effect of MHA imports on control markets. However, there are complications in our application to meet both assumptions. Identification issues and strategies to tackle them are discussed in the section for empirical models and identification strategies.

The Data

We are able to assemble a unique dataset at micro level through the cooperation of the California Avocado Commission (CAC). The specific data sources include weekly retailer scanner data provided by Information Resources Inc. (IRI) for 90 major U.S. retail accounts across 38 markets for avocados from November 1998 to October 2004. A "retail account" refers to a particular market-retail chain combination, e.g., Retailer 1 in Chicago. We are not able to reveal the names of retail chains due to the agreement with IRI. The weekly data include volume and dollar sales, and retail prices. Both large and small avocados were carried during most of the retail accounts and accounted for over 90% of the total category sales. Large and small avocados are regarded perfect substitutes for each other and therefore are aggregated into one size. The marketing year for avocados, which runs from Mid-October through Mid-October in the following calendar year, is used in this analysis instead of calendar year.

Second, the CAC 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. The weekly shipping-point prices are the average weekly prices charged by shippers for shipments to each of the destination markets. These prices exceed the farm-gate prices by amounts that reflect shippers' inventory and transactions costs and provide a better reflection of what retailers in each destination market actually paid than do the farm-gate prices. In the case of missing price associated with zero shipment, a shadow price is constructed by replacing the missing value by the average of shipping-prices in the previous and following weeks, or the shipping-point price in the geographically closest market within the same trade policy group.

Third, we obtained data on monthly volumes and values of total avocado imports and Hass avocado imports to the U.S., and imports of avocados and Hass avocados from Chile, Mexico, and other exporters to the U.S. from the United States International Trade Commission (USITC).

Empirical Models and Identification Strategies

Empirical Models for Retail Price and Demand for Avocados

A model for retail price for avocados is applied to capture retail price movements in response to MHA imports. Based on the general DID framework, the model is specified in the following form:

$$p_{a,t} = \alpha + \alpha_t + \alpha_a + \theta_0 w_{m,t} + \theta_1 w_{m,t-1} + \psi MHA_{m,t} + \lambda IMPOTH_t + \varepsilon_{a,t},$$

where $p_{a,t}$ is the retail price measured by \$/unit at retail account a in week t. α is the constant term. α_t is the weekly fixed effects that controls time-specific factors that are common to all markets. $\alpha_{a,s}$ represents retail account fixed effects that are utilized to control for market-specific characteristics and heterogeneity in retailer pricing behavior that did not change with or without MHA imports.

$w_{m,t}$ and $w_{m,t-1}$ are the shipping-point prices measured by \$/unit for California avocados shipped from California to market m in week t and t-1. The shipping-point price and its one-week lag account for the impact of contemporaneous and lagged cost-side shocks on retailers' prices. A two-week period should represent a sufficient time period for changes in the shipping-point price for this highly perishable commodity to reflect fully in retailers' acquisition costs. As noted, validation of DID approach relies on the assumption that market-specific factors that change over time other than MHA imports

move on parallel paths for both treated and controls or can be well controlled in the model. Because shipping-point prices for avocados differ somewhat across market destinations, we incorporate shipping-point price as a co-variable to control the difference in retail price in treated and control markets that may explained by difference in shipping-point price.

$MHA_{m,t}$ represents the average weekly MHA imports to the U.S., which are measured in 1000000 pounds. The weekly import volume is constructed by dividing monthly volumes by the number of weeks in a given month. The import volumes of MHA are the total MHA imports to the U.S., but not market specific. The subscript *m* only indicates whether import volumes of MHA are relevant to market *m* that allowed MHA imports in week t. Although MHA volumes entered each market may vary substantially, we assume that MHA volumes in each market varied parallel to changes in import volumes to the U.S. Therefore, $impMH_{m,t}$ and $impMH_{m,t-1}$, therefore, represent the "treatment on the treated".

IMPOTH represents the average weekly imports of avocados of all varieties from all exporters other than Mexico to the U.S. The variable has the same interpretation but apply to import volumes of avocado varieties from all the other exporters, which are relevant to all markets. IMPOTH does not play a role in identifying the treatment effects of MHA imports, because temporal effects common to all markets and retailers have been well controlled by weekly fixed effects. IMPOTH is introduced to measure the effects of increasing in volumes of avocado imports, mostly avocado imports from Chile, on retail prices.

The model is estimated by OLS with robust standard error and clusters at market level. The errors term are assumed to have a normal distribution with zero mean and heteroskedastic variances for each across sectional unit and are clustered at the market level.

A model for retail demand for avocados is also estimated to examine the effects of MHA in terms of shifting demand by increasing the availability of avocados all year around in the U.S. The retail demand model is specified in the following form:

$$q_{a,t} = \gamma + \gamma_t + \gamma_a + \beta_0 p_{a,t} + \beta_1 p_{a,t-1} + \tau MHA_{m,t} + \kappa IMPOTH_t + e_{a,t},$$

where $q_{a,t}$ is the sales volume for avocados at retail account a in week t in 1000 units. $p_{a,t}$ and $p_{a,t-1}$ are retail prices for avocados at account a in week t and t-1. Both weekly and retail account fixed effects are applied in retail demand model. Other variables have similar interpretation as those in the model for retail price.

Effects of MHA Imports on California Avocado Shipments and in Upstream Markets

The identification of the effects of MHA imports by DID approach also assumes that there is no spillover effects on markets that did not allow MHA imports. However, this assumption is apparently not valid in our application and complicates the estimation. If shipments of California avocados can adjust freely between destination markets, we would expect that shipments to markets supplied by cheaper imported avocados to decrease and shipments to markets supplied mainly by California avocados to increase. It could be the case that efficient arbitrage equalizes prices of California avocados, MHA, and CHA, or the case that grower/shippers stopped shipments to markets with cheaper imported avocados and receive higher price in the markets where MHA imports were not allowed. Changes in wholesale price in both MHA and non-MHA markets would have

impact on retail price in both markets. Changes in prices in upstream markets need to be controlled to measure the total effects of MHA imports on retail prices, and therefore, consumer benefits. This is particularly important during the period of MHA imports when California production is high.

The spillover effects can be controlled and measured by estimating the effects of MHA imports at shipment and farm levels. In particular, the following models for shipment and shipping-point prices can be estimated to capture the effects of MHA imports:

$$Shipment_{m,t} = \omega + \omega_m + \omega_t + \delta Harvest_t + \delta_1 Harvest_{t-1} + \rho MHA_{m,t} + \varsigma IMPOTH_t + v_{m,t}$$
$$w_{m,t} = \varpi + \varpi_m + \varpi_t + \delta Shipment_{m,t} + \delta_1 Shipment_{m,t-1} + \phi MHA_{m,t} + \xi IMPOTH_t + u_{m,t},$$

$Shipment_{m,t}$ indicates shipment volumes of avocados from California to destination market m in week *t*. $Harvest_t$ and $Harvest_{t-1}$ represent the availability of avocados at the farm level for shipment in week *t* and *t-1*, which could be measured by the difference between harvest volume and volume in inventory. Because avocado is a perennial crop, production is pre-determined in a given period. Changes in shipment between MHA market and non-MHA markets, therefore, can be measured by ρ. Subsequently, predicted shipment can be incorporated into the model for shipping-point price and obtain the effects of MHA imports on shipping-point price. Finally, the effects of MHA imports on retail prices due to changes in shipping-point price can be extracted, and the total effects of MHA imports on retail price can be measured.

More importantly, evaluating the effects of MHA imports on upstream market have implications for measure the effects on farm price for California avocados and producer income. The current paper is emphasized on the effects of MHA imports at the retail level, In particular, we measure the net effects of MHA imports on MHA markets

by leveling the average effects on both MHA and non-MHA markets as a benchmark for comparison. We expect that the estimates are close to measure the total effects of MHA imports during the low seasons for California avocados. We are extending the current work by incorporating analysis at the upstream market level.

Effects of MHA Imports during 1997-2001 and during 2001-2002

We analyze the effects of MHA imports on retail prices and demand during 1998-2001. The markets that did not allow MHA imports after November 1997 are used as control markets. One concern is that seasonal patterns are different between treated markets and some of control markets, and may explain the difference in price between import season and non-import season. We tackle this problem in two ways. First, we choose a small set of control markets that are markets have similar seasonal patterns as those treated markets. We choose markets in the second policy group as control markets. In addition, markets in Florida are not included, because the combined market share is relative small and changes in price other varieties of avocados complicates the analysis and are unavailable. Second, we only evaluate two ends of import season separately. The price before and after February was compared between treated and control markets. In this way, difference in seasonality in different markets can be controlled by market fixed effects. That is, we focus on early spring, and the fixed effects control the difference between Chicago's spring and Los Angeles' spring. Similarly, we conduct the analysis for imports in November and December. The first approach yields the difference in retail price during import season and non-import season between MHA and non-MHA markets. The second approach focused on local effects around two ends of import season.

Second, we conducted a similar analysis for the second policy period during November 2001—October 2004. However, we were not able to construct a control group that contains markets with similar seasonal patterns to those in the first two policy groups, because all the remaining markets that did not allow MHA imports are located in the south. However, the second approach can still be applied to achieve a better identification.

Finally, we introduce three slope dummies to MHA variable to capture differential effects of MHA imports on retail price and demand during different periods of import season, which are periods of November and December, January and February, and March and April.

Effects of Trade Policy Change in 2001

Evaluation, so far, has been emphasized on the effects of MHA imports, which addresses the question of how retail price and demand were influenced by MHA imports. However, it is equally important to evaluate the trade policy change in November 2001. The question is, therefore, how retail price and demand were affected by extended period for MHA imports and whether the effects of MHA imports are different for markets in the first and second policy groups and during different periods of import season before and after 2001.

The policy change in 2001 also enables us to construct a framework to achieve "cleaner" identification. We can use markets in Group 1 themselves as both treated and control markets. The treatment is the extension of MHA import period from four months each year to six months each year. Whereas difference in retail price between import season and non-import season before November 2001 are regarded as "controls", difference in retail price between import season and non-import season after November

2001 of the same market are considered as "treated". The difference in price difference between import and non-import season before and after November 2001 is the "treatment effects" on markets in Group 1 of policy change in 2001. Markets themselves serve as both control and treated achieve a better identification. Under a classical DID framework, it is difficult to control market-specific variations over time, however in this case, it is sound to assume that within a reasonable short period of time, seasonal patterns of the same market do not change. We conduct a similar analysis for markets in Group 2.

Results

Effects of MHA imports during 1998-2001

Estimation results of the effects of MHA imports on retail price and demand for avocados are reported in table 4. The estimation results are consistent across estimations using different control group. MHA imports had a significant negative effect on retail price for avocados. When there were 1000 pounds more MHA imports each week, retail price decreased significantly by 7.6 cents per unit compared with retail price in the market that did not allow MHA imports during November and February. Avocado imports from other countries also had significant effects on retail price with much small impact than MHA imports and not statistically significant. MHA imports brought competition among avocado imports and had a negative effect on retail price in November and December in MHA markets, although insignificant. As predicted, MHA imports had major impact on retail price in January and February. Hence, the effects of MHA as a complementary supply to domestic avocado market in January and February dominated the total effects of MHA imports during 1997-2001 in MHA markets.

Next, we focus on the local effects on the right end of import season, i.e. in January and February. Consistent with the previous finding, retail price were significantly lower in January and February than in March and April in MHA markets than in non-MHA markets. Further, we found that the impact of MHA imports on the right end of import period is higher in 1998 and 1999 than in 2001 and 2002. This is consistent with the fact that MHA were more expensive in 1998-99 than in 2000-01, therefore had less impact on retail price during the later years. Finally, MHA imports in initial months of import period had negative but small and not significant effects on retail prices. Therefore, it is consistent with our prediction that impact of MHA was mostly explained by its effects in January and February.

MHA imports generated positive effects on avocado demand in markets in the first policy group, however not statistically significant in general. The impact of MHA imports in November and December were negative, which remain unexplained.

Effects of MHA imports during 2002-2004

Table 5 reports the estimation results for MHA imports during Sep.2001 and Oct. 2004. Overall, MHA imports had much smaller impact on retail price and demand in terms of magnitude and statistic significance under the second policy regime compared with the impact of MHA under the first policy regime. Retail prices decreased by 2.1 cents per unit during Oct.-Apr., and 0.1 cent per unit during Oct.-Dec., 2.2 cents per unit in Jan.-Feb., and 2.25 cents per unit in Mar.-Apr in MHA markets compared with non-MHA markets. None of these effects of MHA imports on retail prices are statistically significant. The comparison between average price during months in import season and non-import season shows that complementary effects of MHA and effects of competition

with California avocados are greater than effects of competition among imports introduced by MHA in early months of import season. However, this is not supported by the local effects of MHA imports on two ends of MHA imports.

Smaller impact of MHA imports during the period of the second policy regime may be explained by the fact that the 12 additional states had much lower demand and smaller market shares of avocados compared with the markets in the first policy group. Second, the effects of MHA imports on markets in the first policy group are smaller because it had already exposed to MHA imports, extending import period would have limited impact on markets in this group.

We further estimate the effects of MHA imports on Group 1 markets and Group 2 markets separately. MHA imports on retail price in Group 2 markets are statistically significant, whereas they are not significant on retail price Group 1 markets. Although statistically significant, the effects of MHA imports on Group 2 markets were not greater in magnitude in general than those on Group 1 markets. Avocados were sold 1.62 cents cheaper during MHA season in Group 2 markets compared with non-MHA markets. The major effects of MHA imports are explained by its effects in January and February, therefore complementary effects of MHA imports. MHA also introduced the effects of competition with California avocados in similar magnitude in March and April in both Group 1 and 2 markets, however not statistically significant.

MHA imports generated positive shifts in demand for avocados in MHA season during Nov.2001-Oct.2004, which were in general greater in later month of MHA season than in early months of MHA season. Counter intuitively, imports from Chile and other

countries had a significantly negative effect on retail demand for avocados. This remains unexplained.

Avocado imports from Chile and other countries had statistically significant impact on both retail price and demand for avocados during the period of the second policy regime, which had no significant effects during the period of the first policy regime. This can be explained by the fact that Chile expanded exports to the U.S. with lower price compared with Mexico during this period.

Conclusions and Discussion

This study evaluates the impact of MHA imports and changes in U.S. import policies on retail prices and demand for avocados during 1998-2004. The findings at the disaggregate level suggests that MHA imports had differential effects during different months in import season, in different markets and under different trade policy regimes. Consumers have benefited from trade liberalization for MHA as retail prices were significantly lower as results of availability and increase volumes of MHA imports. The effects that MHA supplemented U.S. avocado supply in low season dominated the effects of MHA imports on retail price under the first policy regime. The effects of MHA imports under the second policy regime are explained by both complementary effects and competition effects between MHA and Californian avocados. Further, the first trade liberation for MHA during 1997-2001 had a great impact than the second trade liberation during 2001-2004, and MHA imports had larger effects on markets that allowed MHA imports in 1997 than those in 2001.

The current paper is emphasized on the effects of MHA imports on retail price and demand for avocados. Although the effects realized at the retail level have

implications for impact of MHA imports on the upstream market, our work continues to incorporate evaluation at the aggregate level.

This study has implications for the impact of future trade liberalization for MHA. Because MHA imports were restricted to enter certain markets and mostly during the time when domestic production was low, simple generalization of the effects of MHA imports in the past to future can be misleading. During our study period, impact of MHA imports on Group 1 and 2 markets in March and April during 2001-2004 provides insight on the effects of MHA imports after 2005. Although evaluation during 2005-2007 will certainly provide valuable information for future policy changes, we were not able to obtain data after 2005. Our on-going work is trying obtain recent data and extends to period after 2005.

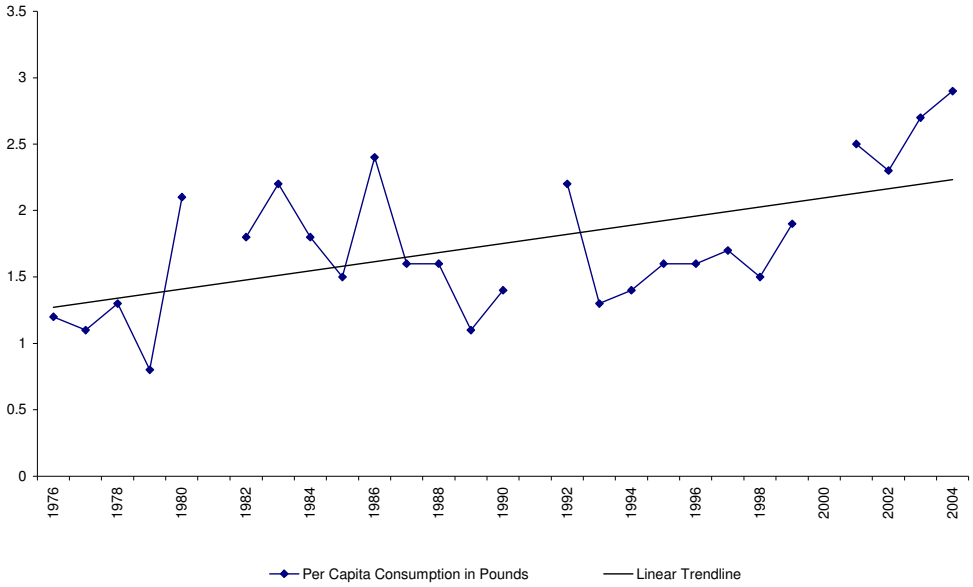
Reference:

Ashenfelter, Orley; and David Card (1985) "Using the Longitudinal Structure of Earning to Estimate the Effects of Training Programs," *Review of Economics and Statistics*, 67:648-660.

Angrist, Joshua; and Victor Levy (1999) "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement," *Quarterly Journal of Economics*, 114(2): 533-575.

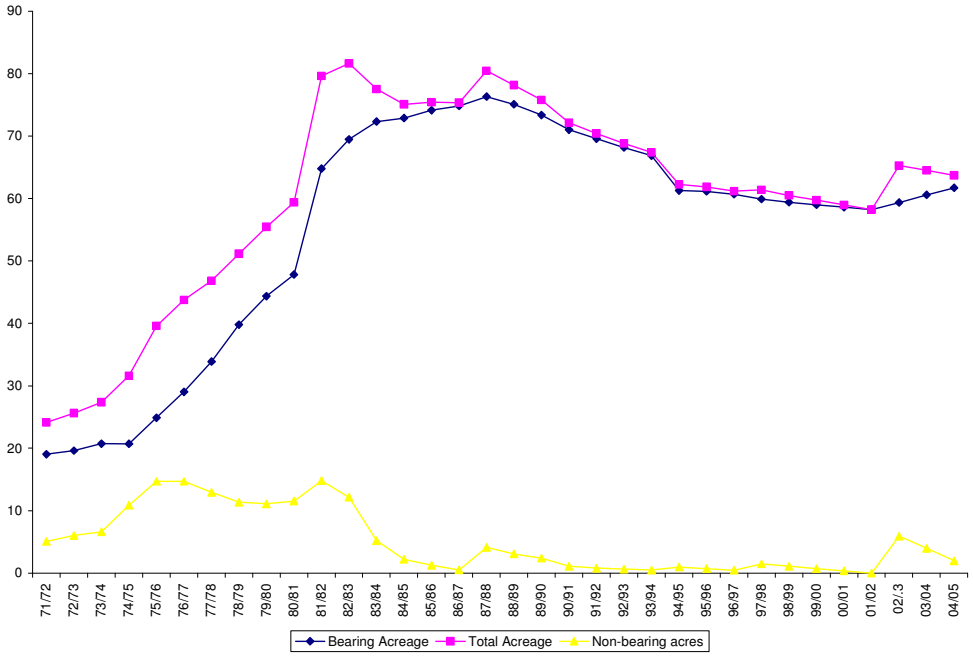
Card, David (1990) "The Impact of the Mariel Boatlift on the Miami Labor Market," *Industrial and Labor Relations Review*, 44: 245-257.

Figure 1 U.S. Per Capita Consumption for Fresh Avocados in Pounds (1976—2004)



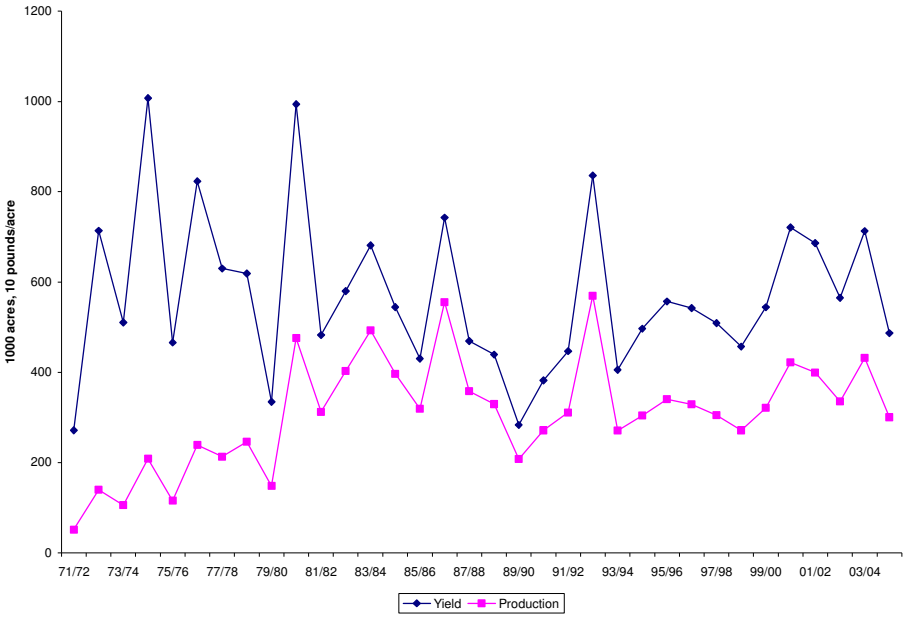
Data Source: Fruit and Tree Nuts Situation and Outlook Yearbook, Economic Research , U.S. Department of Agriculture, October 2005.
Note: Data in 1981, 1991, and 2000 are missing.

Figure 2 Total, Bearing, and Non-bearing Acreages for Avocados in California (1971/72—2004/05)



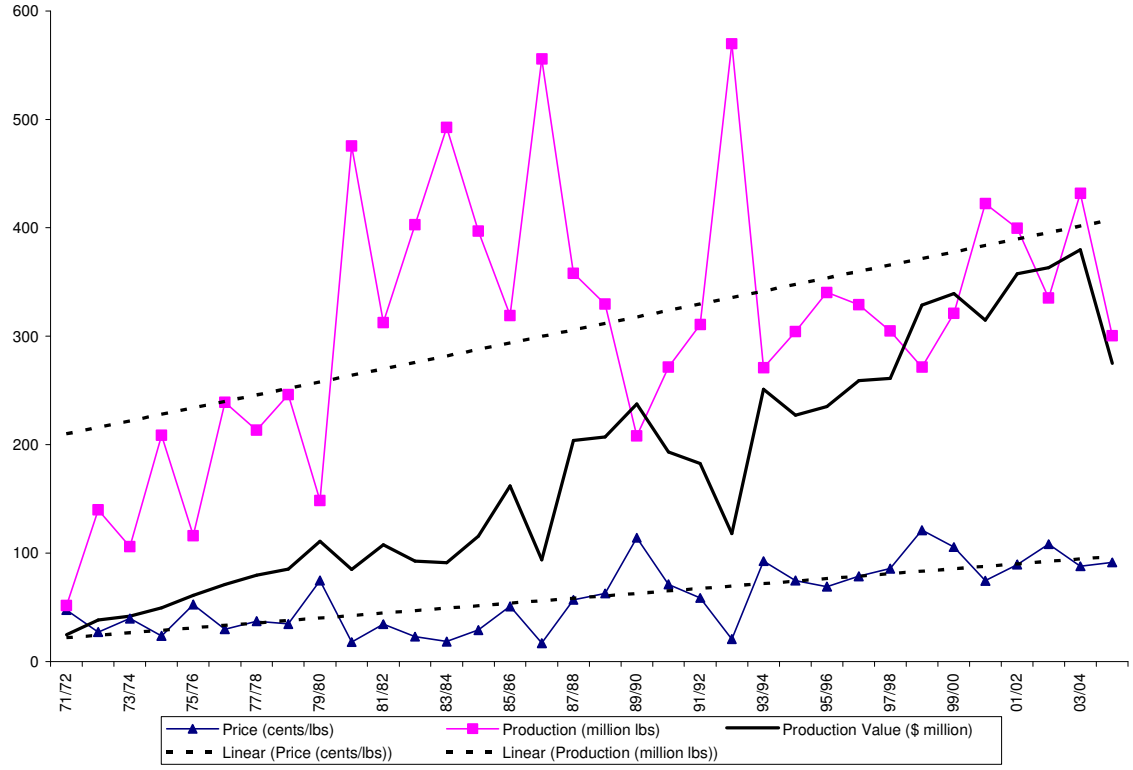
Data Source: The California Avocado Commission (www.avocado.org).

Figure 3 Production and Yield for California Avocados (1971/72—2003/04)



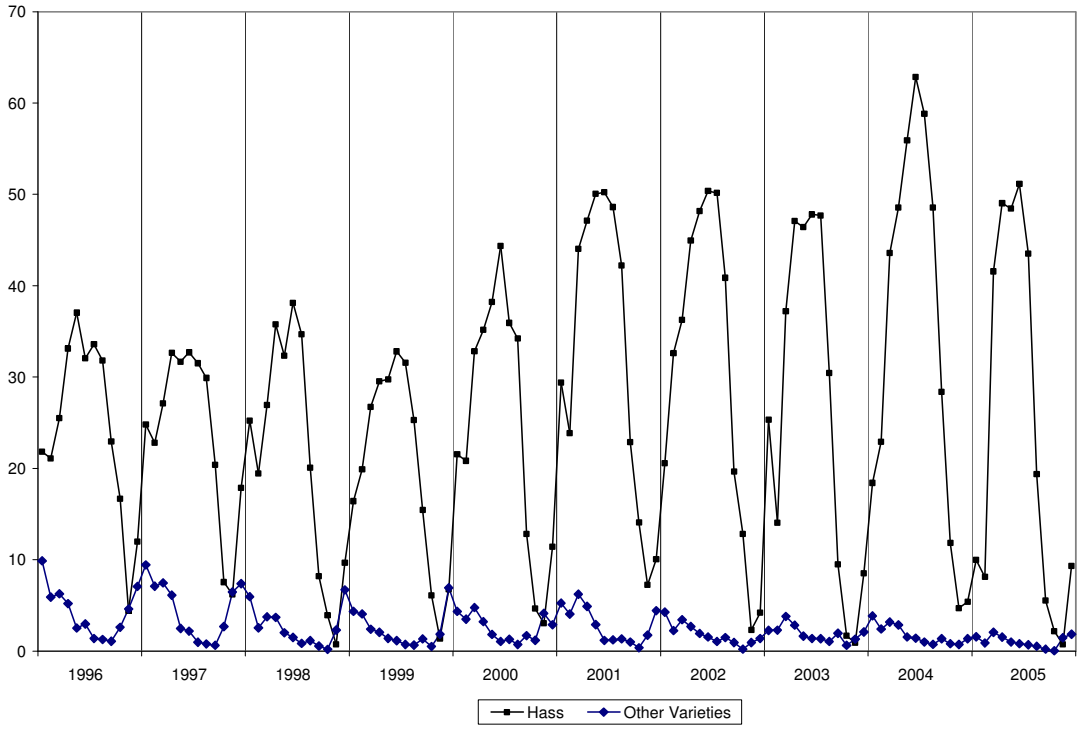
Data Source: The California Avocado Commission (www.avocado.org).

Figure 4 Production, Price and Crop Value for California Avocados (1971/72—2003/04)



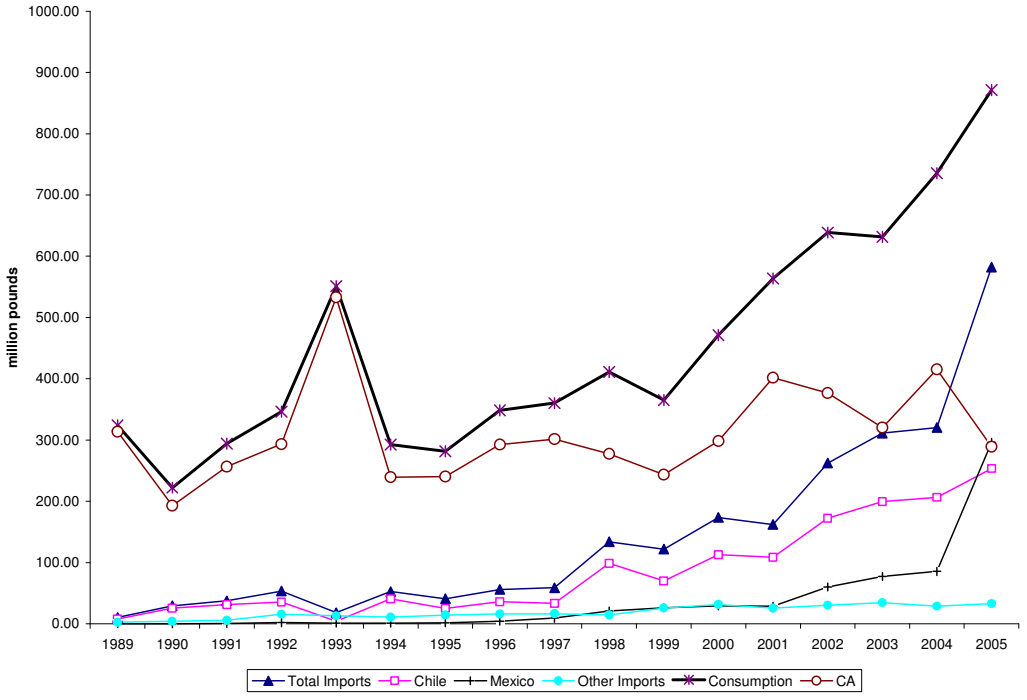
Data Source: The California Avocado Commission (www.avocado.org).

Figure 5 Production Seasonality of Hass and Other Varieties (1996—2005)



Data Source: The California Avocado Commission (www.avocado.org).

Figure 6 Avocado Consumption, Imports, and CA Supply in the U.S. (1989—2005)



Data Source: U.S. International Trade Commission.

Figure 7 Changes in Supplies for Avocados in the U.S. (1989—2005)

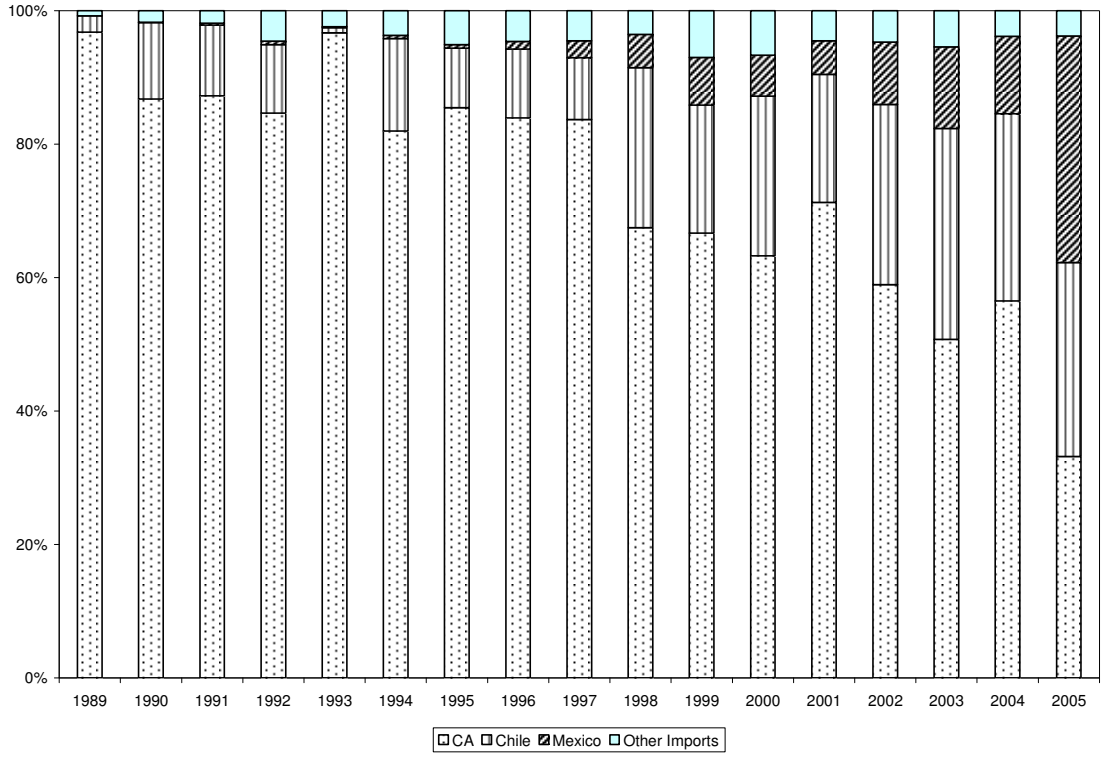
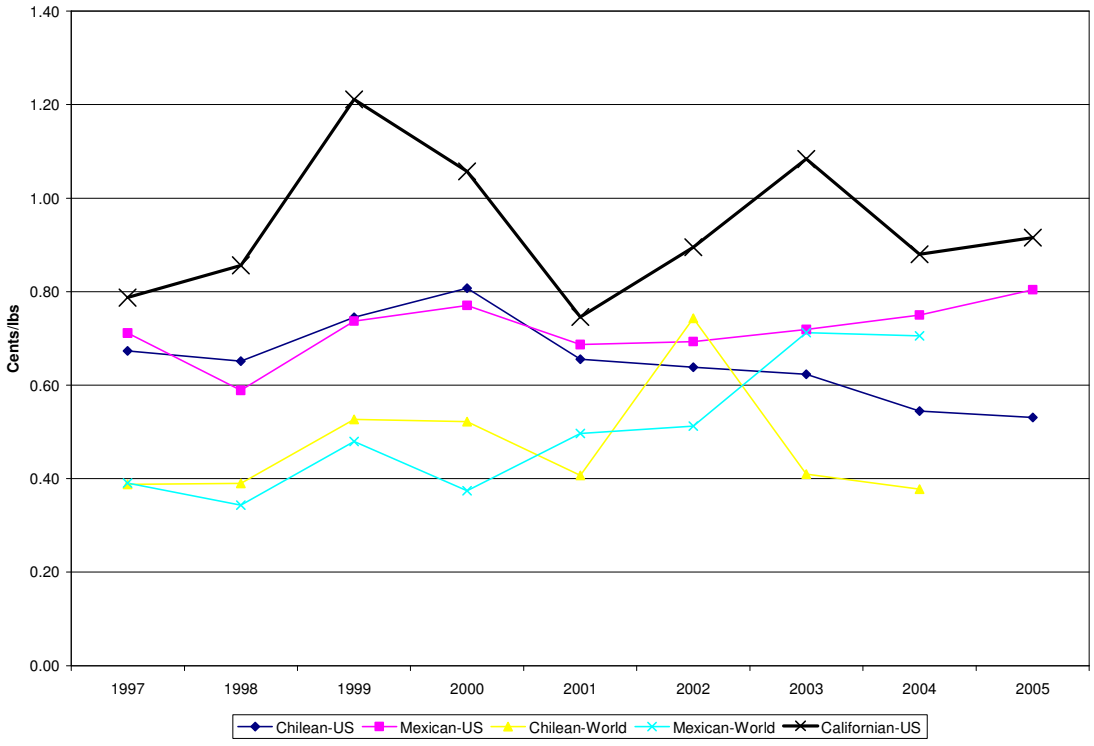


Figure 8 Prices for Chilean, Mexican and Californian Avocados (1989—2005)



Data Source: FAOSTAT, Food and Agricultural Organization.

Table 1 Estimation Results: Seasonality of Avocado Production in California and Avocado Imports

1995-2005	California	Total	Chile	Mexico
	Production	Imports	Imports	Imports
Trend	0.75***	4* (0.30)	2.02***(0.24)	1.80***(0.18)
January	-	-		-
February	-2.07 (3.35)	-8.19* (4.183)	-6.36*(3.417)	-0.102 (2.49)
March	11.88*** (3.35)	-15.06*(4.183)	-11.35***(3.417)	-0.159(2.49)
April	17.9***(3.35)	-16.57***(4.183)	-11.38***(3.417)	-1.11(2.49)
May	16.22***(3.437)	-20.63***(4.183)	-11.45***(3.417)	-5.16**(2.49)
June	18.25***(3.437)	-20.77***(4.183)	-11.23***(3.417)	-5.73**(2.49)
July	15.15***(3.437)	-18.97***(4.183)	-10.17***(3.417)	-5.30**(2.49)
August	5.73*(3.437)	-9.59**(4.183)	-0.65(3.417)	-5.46**(2.49)
September	-9.86***(3.437)	7.01*(4.183)	14.6***(3.417)	-5.14**(2.49)
October	-18.44***(3.437)	15.49***(4.183)	17.53***(3.417)	-2.82(2.49)
November	-21.87***(3.436)	18.24***(4.183)	16.28***(3.417)	0.76(2.49)
December	-13.85***(3.436)	10.73**(4.183)	9.04***(3.417)	1.23(2.49)

Table 2 Prices for Californian, Chilean and Mexican Avocados

	US	US			World		
year	CA	Chile	Mexico	Diff	Chile	Mexico	Diff
1997	0.79	0.67	0.71	0.04	0.39	0.39	0.00
1998	0.86	0.65	0.59	-0.06	0.39	0.34	-0.05
1999	1.21	0.74	0.74	-0.01	0.53	0.48	-0.05
2000	1.06	0.81	0.77	-0.04	0.52	0.37	-0.15
2001	0.75	0.66	0.69	0.03	0.41	0.50	0.09
2002	0.90	0.64	0.69	0.05	0.74	0.51	-0.23
2003	1.08	0.62	0.72	0.10	0.41	0.71	0.30
2004	0.88	0.54	0.75	0.21	0.38	0.71	0.33
2005	0.92	0.53	0.80	0.27			

Table 3 Expected Effects of MHA Imports on Retail Prices during 1997-2004

	Nov.-Dec.	Jan.-Feb.	Mar.-Apr.
	Import Competition	Complementarities	CA Competition
Nov. 1997-Oct. 2001			
Group 1	–	– –	N/A
Nov. 2001-Oct. 2004			
Group 1	?	–	– –
Group 2	?	–	–

Table 4 Estimation Results: Effects of MHA Imports during Sep.1998-Oct.2001

Dependent variable	Price	Price	Demand	Demand
Treated	Group 1	Group 1	Group 1	Group 1
Controls	Group 3&4	Group 2&3&4	Group 3&4	Group 2&3&4
Regression 1				
MHA Nov-Feb	-0.0761**	-0.072**	2.46	2.77
	(0.0291)	(0.0289)	(3.71)	(3.08)
IMPOTH	-0.0135	-0.0145	4.06	3.52
	(0.00958)	(0.00892)	(2.93)	(2.56)
Regression 2				
MHA Nov-Dec	-0.0615	-0.0607	-1.62	-1.06
	(0.0463)	(0.0449)	(3.89)	(3.28)
MHA Jan-Feb	-0.0879***	-0.0835***	5.35	5.34*
	(0.027)	(0.027)	(3.46)	(2.91)
IMPOTH	-0.0136	-0.0146	4.21	3.65
	(0.000962)	(0.0089)	(2.93)	(2.57)
Regression 3				
Right end: 98-01				
MHA	-0.0843**	-0.0793**	1.17	1.83
	(0.0301)	(0.0306)	(2.53)	(2.13)
IMPOTH	0.175***	0.0168***	4.83**	5.36**
	(0.0439)	(0.0421)	(2.15)	(2.35)
Regression 4				
Right end: 98-99				
MHA	-0.139***	-0.0138***	-2.15	-1.19
	(0.031)	(0.0294)	(2.35)	(2.28)
IMPOTH	-0.0306	-0.0282	3.17	2.31
	(0.00199)	(0.018)	(2.22)	(1.77)
Regression 5				
Right end: 01-02				
MHA	-0.0781**	-0.0797**	2.54	2.80
	(0.0332)	(0.0336)	(2.81)	(2.48)
IMPOTH	0.00857	0.00398	-1.48**	-8.09**
	(0.0269)	(0.00253)	(6.18)	(2.43)
Regression 6				
Left end: 98-01				
MHA	-0.0043	-0.00275	4.20	4.15
	(0.0412)	(0.0401)	(3.68)	(2.51)
IMPOTH	-0.0113	-0.0133	4.97***	2.51***
	(0.0072)	(0.041)	(1.63)	(7.06)

Table 5 Estimation Results: Effects of MHA Imports during Sep.2001-Oct.2004

Dependent variable	Price	Price	Price	Demand	Demand	Demand
Treated	Group 1&2	Group 1	Group 2	Group 1&2	Group 1	Group 2
Controls	Group 3&4	Group 3&4	Group 3&4	Group 3&4	Group 3&4	Group 3&4
Regression 1						
MHA Nov-Apr	-0.0212	-0.0226	-0.0162*	0.0085	0.055	0.06
	(0.0127)	(0.0174)	(0.0088)	(0.97)	(1.04)	(0.96)
IMPOTH	-0.0107***	-0.0101***	-0.005**	-0.78**	-0.95**	-0.84*
	(0.0027)	(0.003)	(0.0022)	(0.31)	(0.32)	(0.45)
Regression 2						
MHA Nov-Dec	-0.00131	-0.0165	-0.00483	0.13	0.59	-1.64
	(0.0193)	(0.0233)	(0.0179)	(1.57)	(1.56)	(2.36)
MHA Jan-Feb	-0.0219	-0.0221	-0.0195**	0.29	0.39	-0.29
	(0.0153)	(0.022)	(0.0089)	(1.29)	(1.39)	(1.2)
MHA Mar-Apr	-0.0225	-0.0245	-0.0158	0.47	0.36	0.72
	(0.0133)	(0.0182)	(0.0091)	(0.72)	(0.79)	(0.81)
IMPOTH	-0.0109***	-0.0103***	-0.005**	-0.35	-0.025	0.75
	(0.0027)	(0.0029)	(0.0022)	(0.28)	(0.07)	(0.49)
Regression 3						
Right end: 02-04						
MHA	-0.0131	-0.011	-0.0125	1.68	1.39	2.57*
	(0.0134)	(-.0182)	(-.013)	(1.45)	(1.5)	(1.45)
IMPOTH	-0.013	-0.0168	-0.0165	-2.08	-1.5	-1.74
	(0.0095)	(0.0099)	(0.0291)	(1.68)	(1.89)	(2.89)
Regression 4						
Left end: 02-04						
MHA	-0.0234	-0.0294	-0.0129	0.32	0.9	-1.75
	(0.0218)	(0.0262)	(0.02)	(2.08)	(2.05)	(2.76)
IMPOTH	-0.0011	-0.00195	0.0073**	-2.14***	-2.41***	-2.55**
	(0.0027)	(0.00287)	(0.00345)	(0.73)	(0.79)	(1.06)