EXHIBIT 19

Blumberg No. 5119

Economic Analysis of the Implementation of a Federal Marketing Order for Pecans

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Executive Summary

This study provides an overview of the pecan industry in the US and the potential effects on supply and demand from the proposed Federal Marketing Order (FMO) for pecans. The FMO proposes that an assessment of $0.02-0.03 be charged per pound of improved pecan varieties in shell handled by handlers and $0.01-0.02 for native/seedling varieties. The approach of this study is twofold: first it focuses on the economic framework of the supply and demand for pecans; second, it looks at the costs and benefits of the FMO and other relevant economic considerations. For purposes of this Executive Summary, we have set out below a summary of the cost and benefits of the FMO and the other relevant economic considerations.

A. Generic Promotion Increases Demand and Prices. We have reviewed the literature of a number of agricultural studies to determine the effects of generic promotion campaigns on agricultural product demand and prices. Generic promotion over a wide variety of agricultural products stimulates product demand that translates into higher prices for growers than would have been the case without promotion, as shown in the table from Williams and Welch (2014) in Appendix A.

B. Effectiveness of Tree Nut Promotions; Costs and Benefits to Growers. The estimates of the effectiveness of marketing programs used for this report are based on analysis of post implementation data of marketing orders in tree nuts (almonds and walnuts) and on ex-post implementation data from the Texas pecan promotion program. These studies find that demand for product increases after the establishment of generic promotion programs. The increased demand results in increases in prices that could not be achieved without promotion. Demand increases in those studies have been as high as 6%. Our analysis allows the midpoint of these studies (between 0% and 3% in the tree nut studies) to be the representative scenario and we have used the average of potential demand or approximately 1.5% in our evaluation for benefits of the FMO promotion authority. These marketing programs reviewed are well-established programs, so our report assumes that the proposed FMO for pecans would be less effective at least at first.

Table ES1: Proposed Initial Assessment Range

(Dollars per inshell lb.)

	Low	High	Midpoint
Improved pecans	$0.02	$0.03	**$0.025**
Native/seedling	$0.01	$0.02	**$0.015**

Source: FMO

Table ES2: U.S. Season Average Pecan Grower Price, (dollars per inshell lb.)

	2012	2013	2014
Improved	$1.73	$1.90	$2.12
Native/seedling	$0.88	$0.92	$0.88

Source: NASS/USDA

Table ES3: Assessment as Pct. of U.S. Season Average Pecan Grower Price (midpoint of proposed initial assessment range)

	2012	2013	2014
Improved	1.4%	1.3%	1.2%
Native/seedling	1.7%	1.6%	1.7%

The cost of the assessment as a percentage is calculated by taking the midpoint assessment value for improved and native/seedling varieties and dividing it by the average prices for in shell pound of pecan for each year described in the tables.

Although handlers pay the assessments in federal marketing orders, such as this FMO, for analytical purposes and to take the most conservative case, we are assuming that 100% of the assessments will be reflected in prices paid to growers, i.e. the growers will bear the cost initially. As you note from ES3 above, the assessments/costs are a small percentage of the grower's price even if the grower bears all assessment costs.

Using historical data and information provided by farmers in the different production regions and NASS/USDA, and using price per pound data for 1997 - 2014 a mathematical simulation model was created. We used Monte-Carlo simulation methods for the distributions of key output variables crucial for analyzing feasibility of future business decisions under risk. The simulation model is programmed in SIMETAR©, a simulation and risk analysis software embedded as an add-in in Excel (Richardson, Schumann, and Feldman 2006). The framework of creating a representative farm to analyze risk is widely used in policy analysis, including potential impacts of the Farm Bill (Richardson, Schumann, and Feldman 2006). This avoids using averages, which can be misleading, and instead use data from the entire distribution of historical data. We then apply the 1.5% average generic promotion demand increase to the calculations related to pecans and obtain the following results:

Table ES4: Benefits of Generic Promotion in the Proposed FMO

Benefits per lb. of FMO			
	Low	High	**Average**
Improved pecans	$0.040	$0.096	**$0.063**
Native and seedling	$0.027	$0.042	**$0.036**

The procedure we used involves taking the historical yearly prices from 1997 to 2014, and using the full distribution over those prices to obtain Monte-Carlo simulation for 500 possible prices to obtain the expected average price without the FMO intervention. We then adjusted the historical prices with a demand increase of 1.5% to simulate the possible prices with marketing promotion efforts due to the FMO to get an expected price increase of $0.063 with the FMO for improved pecans as shown in Table ES4. In a similar fashion, for native/seedling the valuation is done using the historical price for a Monte-Carlo simulation before the intervention (without the FMO) and after the marketing program (with FMO). The result is a $0.036 increase in price for native varieties.

The low and high bound were calculated using a simulation with low (0.5%) and high (3.0%) price increase scenarios. The potential benefits due to promotions through the FMO are between 4 and 9.6 cents with an average of 6.3 cents per pound for improved varieties; and between 2.7 to 4.2 with an average of 3.6 cents per pound for native/seedling varieties. Comparing Table ES1 and Table ES3 to Table ES4, it is apparent that the benefits of generic promotion outweigh the costs to growers.

C. Effectiveness on Stimulating Demand Through Increased Quality Standards. One of the authorities of the Council in the FMO (986.69) is the authority to make improvements in product handling. Specifically increasing the quality of pecans (freshness, safety, grade, size, packaging, etc.) delivered into the market can stimulate demand and increase prices. If the Council is able to establish minimum quality standards for handling in the future for pecans, this can lead to a relatively more inelastic demand and more consumer confidence in the product, which will lead to higher prices to growers. The cost of implementing product handling improvements has always been low compared to the benefits to growers. This would be illustrated by the case of pistachios where Alston et al. (2005) show that improving quality assurance in the pistachios resulted in a benefit to cost ratio of at least 5:1.

D. Costs and Benefits Across Various Farm Sizes.

Table ES5: Cost and Benefits by Farm Size of the Proposed FMO From Promotion

	Small	Medium	Large
Production (lbs.)	49,980	291,667	833,333
Production assumes a 78% improved variety and 22% native/seedling split in acreage			
Cost of FMO	$1,140	$6,650	$19,000
*Assessment per pound * pounds produced = cost of FMO*			
Benefits of FMO	$2,853	$16,643	$47,550
*Average price increase per pound * pounds produced = benefits of FMO*			

Shown for 30 acres, 175 acres and 500 acres at 1666.67 lbs. of inshell pecans per acre (average yield per acre over all three regions), as representative for small, medium and large farms in the production area.

With the cost and benefits per pound described in Table ES3 and Table ES4, we have estimated the costs and benefits of the FMO promotion authority by farm size as shown in Table ES5. In all cases the benefits of the FMO outweigh the costs across a range of farm sizes. The cost of FMO is calculated at the average as total pounds times the cost. For example, in the medium farm size of the total 291,667 lbs., 227,500 lbs. are in improved variety (291,667 * 0.78) at an average cost of $0.025 we obtain a cost of $5,688 in improved varieties. The production of native/seedling is 64,167 lbs. (291,667 * 0.22) at an average cost of $0.015 we obtain $963. The total costs then is the sum of the cost for improved varieties of $5,688 and native/seedling of $963 for a total of $6,650. The benefit is calculated using the total number of pounds times the estimated average increase in price. For improved varieties, 227,500 lbs. times the average price increase of $0.063 we obtain $14,333 and for native/seedling we have 64,167 lbs. for benefits of $2,310. Total benefits are the sum of benefits of improved varieties and native/seedling ($14,333 + $2,310) for a total of $16,643. The benefit Cost Ratio (BCR) is simply the additional benefits generated by the program per dollar of cost. Dividing the estimated benefits by the cost we obtain 2.5 which means a $1 cost results in $2.5 dollars of benefits.

The range of benefits for a medium size farms using the low scenario is $10,833 to a high scenario of $24,535. The associated range of the costs for the medium size farm is $5,192 and $8,108 respectively. For a small farm, the costs are in the range of $890 (low scenario) to $1390 (high scenario) with benefits of $1,857 to 4,206 for the low and high scenario respectively. For a large farm, the costs are in the range of $14,833 to $23,167 for the low and high scenario and the benefits of $30,950 to $70,100 for the low and high scenario. In all cases the benefits outweigh the cost. The BCR ranges from 2.08 in the low scenario to 3.02 in the high scenario.

The model for estimating the stochastic prices is more complicated but this is a simple representation of the costs and benefits by farm size.

E. Minimum Size of Farm/Crop for Commercial Growers as used in the FMO. The full input costs for an acre of pecans across the production area requires a certain minimum land size or minimum annual production to be maintained in order for the farm to be economically viable over a period of four years. Failure to have a farm of a certain size or with yields above a certain size would result in either an economically unprofitable farm operation or would require a grower to reduce the necessary inputs on the farm to grow quality pecans over a period of time (reduced watering, moving, spraying, fertilizing, hedging, pruning or other inputs normally required by commercial pecan producers).

We believe, it is highly unlikely, even remote, that a pecan grower can be financially viable over a period of four years (Representative Period, as used in the FMO) if the grower is averaging less than 50,000 lbs. of pecans per year over that period, and is applying all inputs associated with a commercial pecan grower. Said another way, pecan farmers growing less than 50,000 lbs. of pecans on average per year are hobby farmers, experimental farmers, farmers not intending to make a profit or farmers not intending to maintain their farm with the normal inputs of a commercial pecan farmer. We used a yield of 1,666.67 inshell pounds an acre over 30 acres, which is the average yield across the production area calculated by the Proponent Group with input from Dr. Lenny Wells, University of Georgia Pecan Research Scientist.

F. Handler Considerations; Costs and Benefits.

Table ES6: Estimate of Typical Handler Margin

	2012	2013	2014
Improved pecans	$0.575	$0.575	$0.575
Native/seedling	$0.575	$0.575	$0.575

Table ES7: Cost Estimate of Average Handler Price Received

	2012	2013	2014
Improved pecans	$2.31	$2.48	$2.70
Native/seedling	$1.46	$1.50	$1.46

Source: Table ES2 plus Table ES6

Table ES8: Cost as Percentage of U.S. Estimated Pecan Handler Price

	2012	2013	2014
Improved	1.08%	1.01%	0.93%
Native/seedling	1.03%	1.00%	1.03%

Source: Assessment midpoint and estimated the minimum record keeping costs divided by prices shown in Table ES7

The benefits to the handlers outweigh the costs of implementing the FMO. It is evident at the handler level, there is the same magnitude of positive price change as there is with the grower analysis (Table ES4), but a smaller proportion of cost due to the greater prices paid to handlers (Table ES8 as compared to Table ES3).

G. Parity. The anticipated increases in pecan prices from promotion and handling authorities in the FMO should cause pecan prices to move towards parity pricing (as stated by the USDA to be $5.11 per inshell lb. for 2014) but the implemented FMO should not cause pecan prices to be anywhere near equal to or exceeding pecan parity prices.

H. Better Information Will Benefit Growers, Handlers and Consumers. The pecan market today is inefficient, in part because of the lack of reliable, timely data on the domestic pecan crop. Most data on the pecan industry at this time is gathered voluntarily. The FMO proposes handler reports to the Council and requires the Council to make crop reports to the USDA at least yearly. These reports should provide all parties with more reliable product data. Increased confidence in the data on pecans should benefit all participants (growers, handlers and consumers) and lead to more accurate product pricing, and better information regarding product supply and demand.

Economic Analysis on the Proposed Federal Marketing Order for Pecans

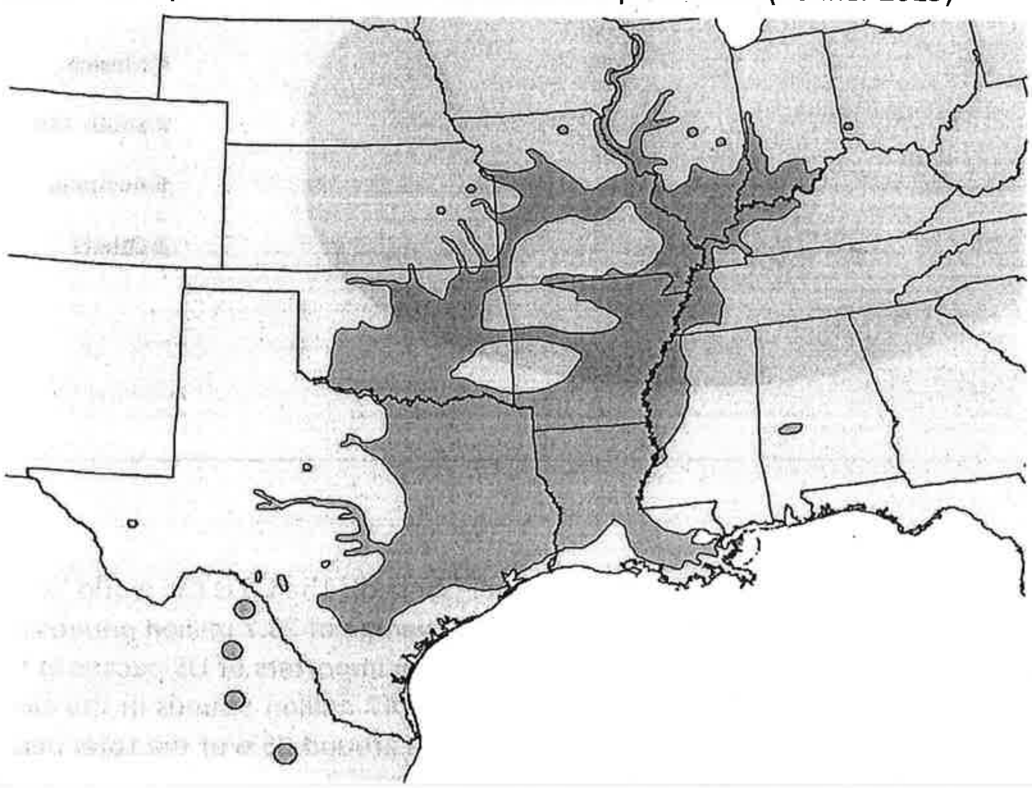
This report has been compiled to provide an economic assessment of the proposed Federal Marketing Order (FMO) for pecans. For clarity purposes the narrative is arranged in two main sections: Section I describes the current economic and marketing state of the pecan industry using available secondary data. Section II describes the costs and benefits of the proposed federal marketing order based on the data presented in Section I and additional input from industry key stakeholders. In this section a risk-based simulation model including several scenarios are described and used to evaluate the effects of the proposed federal marketing order for pecan producers and handlers. The results of such stochastic simulation models are discussed and the mathematical models are presented in an appendix.

Section I: Economic Framework of the Pecan Supply and Demand

A. World Pecan Supply

The pecan (*Carya illinoinensis*) is a perennial tree native to North America and produced extensively throughout the southern region of the USA and the northern portion of Mexico. There are hundreds of pecan varieties around the world which can be classified as *native* or *improved* varieties (Thompson and Young 1985). The majority of the improved varieties have been developed by grafting, with the first grafted trees being sold in the 1880s (Wells and Conner 2007) and a large growth in the commercial planting in the early 1900s.

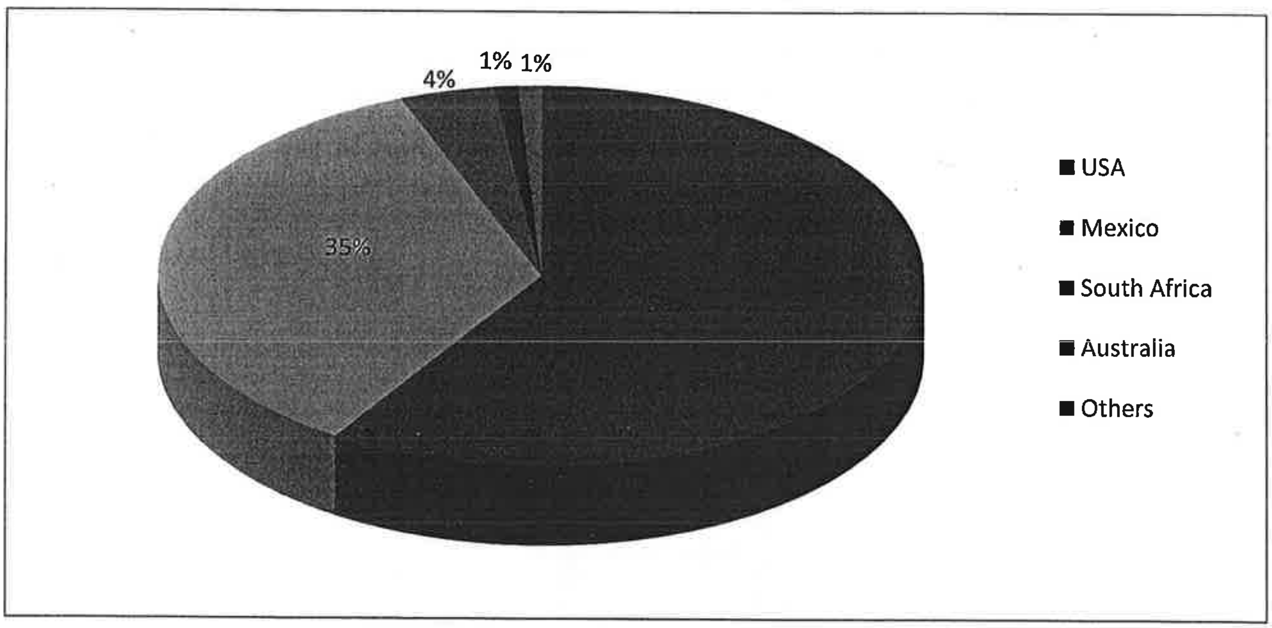
Figure 1: Map of the distribution of the native pecan tree (Conner 2015)



The pecan tree can produce for over 300 years once it passes the first six to seven years to initiate production, in the case of grafted trees or ten to twelve for native ones. Pecan trees exhibit a peculiar production behavior known in horticulture as masting (Chung, Harris, and Storey 1995). This condition entails that the plant will produce a very high yield one year, usually referred to as "on" years, followed by a low yield year, commonly known as "off" year. This alternate bearing nature in pecan production has naturally produced a cyclical behavior as well in the pecan prices, with an inverse relationship: high prices in off years and low prices in on years.

The entire production of pecans in the world is not exactly known. In the past it had been estimated that the US production comprised over 80% of the world's supply (Onunkwo and Epperson 2000). However, based on current trade and consumption of pecans in the world from the International Nut and Dried Fruit Council (2015), the US production is roughly about 59% of the entire world production. The second largest producer of pecans is Mexico with over 35% of the world production. Minor pecan production takes place in Australia, South Africa and South America, including but not limited to Argentina and Peru as shown in Figure 2.

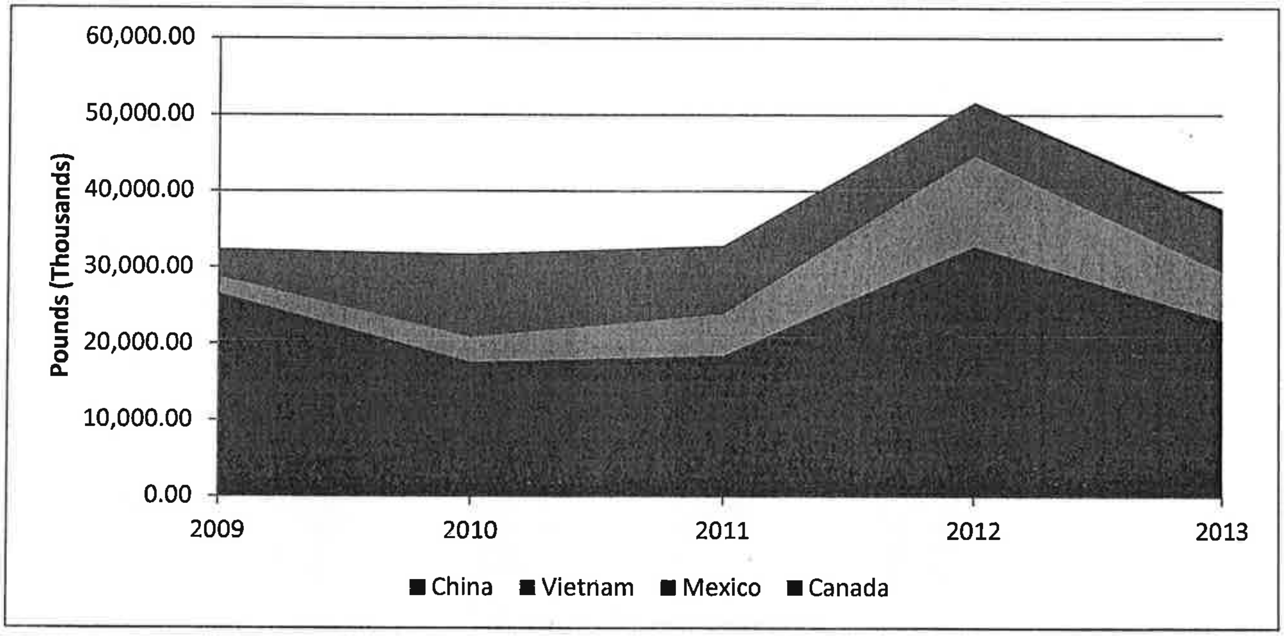
Figure 2: Estimated world production of pecans (INDFC, 2015)



B. U.S. Pecan Trade

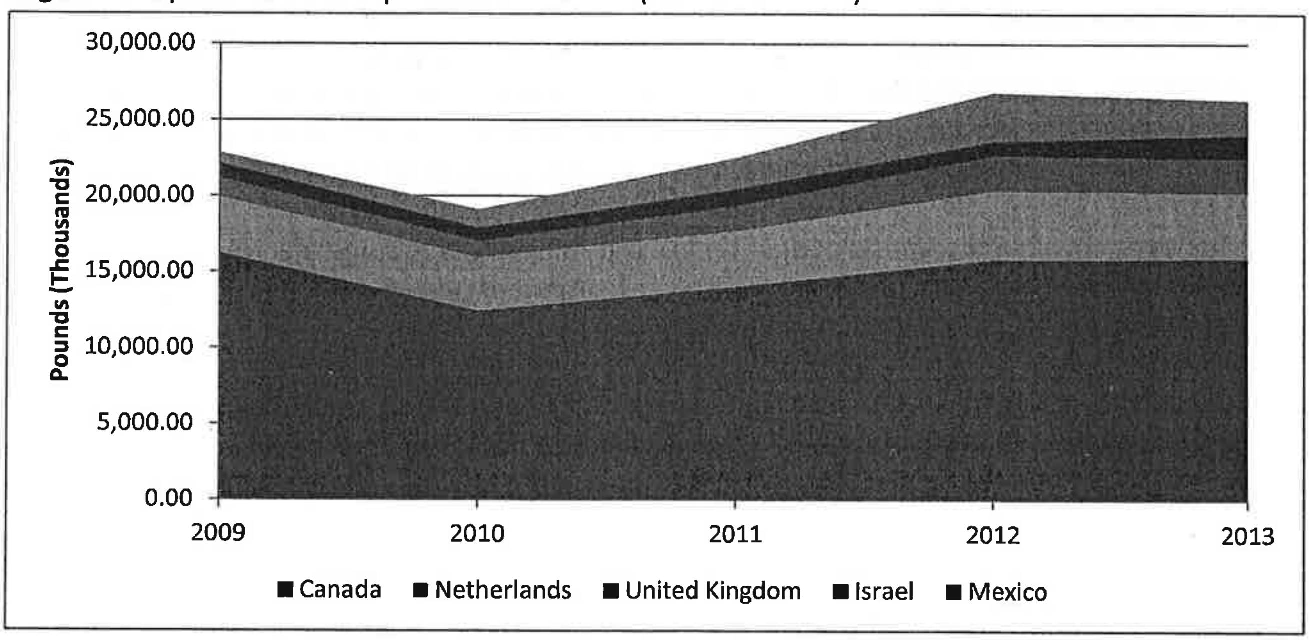
International trade of pecans is done in-shell and in kernel (shelled). The US is the world leader of in-shell pecan exports, exporting mainly to China with an average of 23.7 million pounds per year between 2009 and 2013 (USDA-ERS 2014). The other main importers of US pecans in the shell are Vietnam and Mexico with 5.87 million pounds and 7.47 million pounds in the same period of time. China, Vietnam and Mexico together comprise around 95% of the total pecan exports in shell from the US. Their share can be illustrated by Figure 3.

Figure 3: Main US exports destinations of pecans in the shell (USDA-GATS 2015)



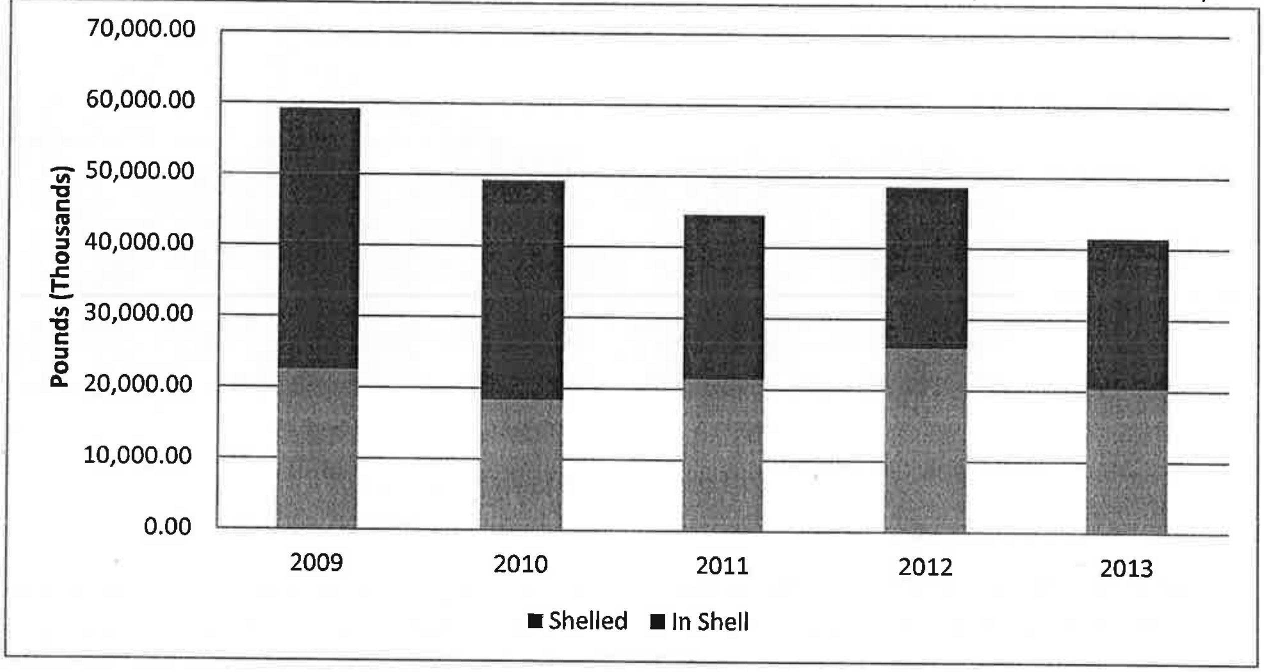
In the shelled pecan segment, the main importers of US pecans are Canada, The Netherlands, the United Kingdom, Israel and Mexico, who have imported on aggregate 57.7 million pounds in average over the same time period (USDA-GATS 2015).

Figure 4: Exports of shelled pecan from the US (USDA-ERS 2014)



The imports for pecans in the US are coming almost exclusively from Mexico (over 99% of the total imports), with an average of 50 million pounds per year in the period between 2010 and 2014. The US remains a net exporter of pecans with the rest of the world, though the trade balance in pecans is negative with Mexico. In Figure 5 a split of the shelled and in-shell imports from Mexico to the US is shown.

Figure 5: Imports of pecans to the US from Mexico in the shell and shelled (USDA-GATS 2015)



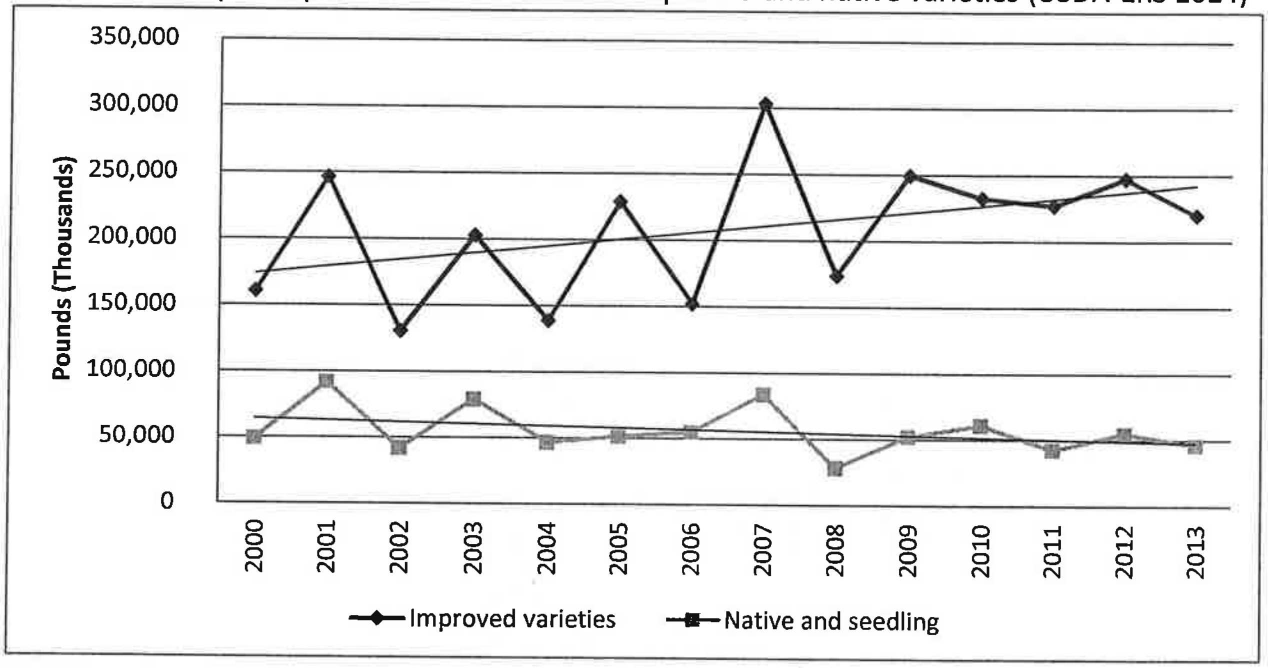
C. Current U.S. Supply of Pecans

The production of pecans in the US can be evaluated separately for *native varieties* or *seedlings* and *improved varieties*. Over the past 10 years, there has been a trend to increase the production from improved varieties, as shown by the trendline in Figure 6., while the production from the native varieties has remained stagnant (USDA-ERS 2014).

Production from improved varieties is on average 235 million pounds per year in 2009-2013. The native/seedling production of pecans in the same period was 51.5 million pounds, which represents less than 20% of the total production.

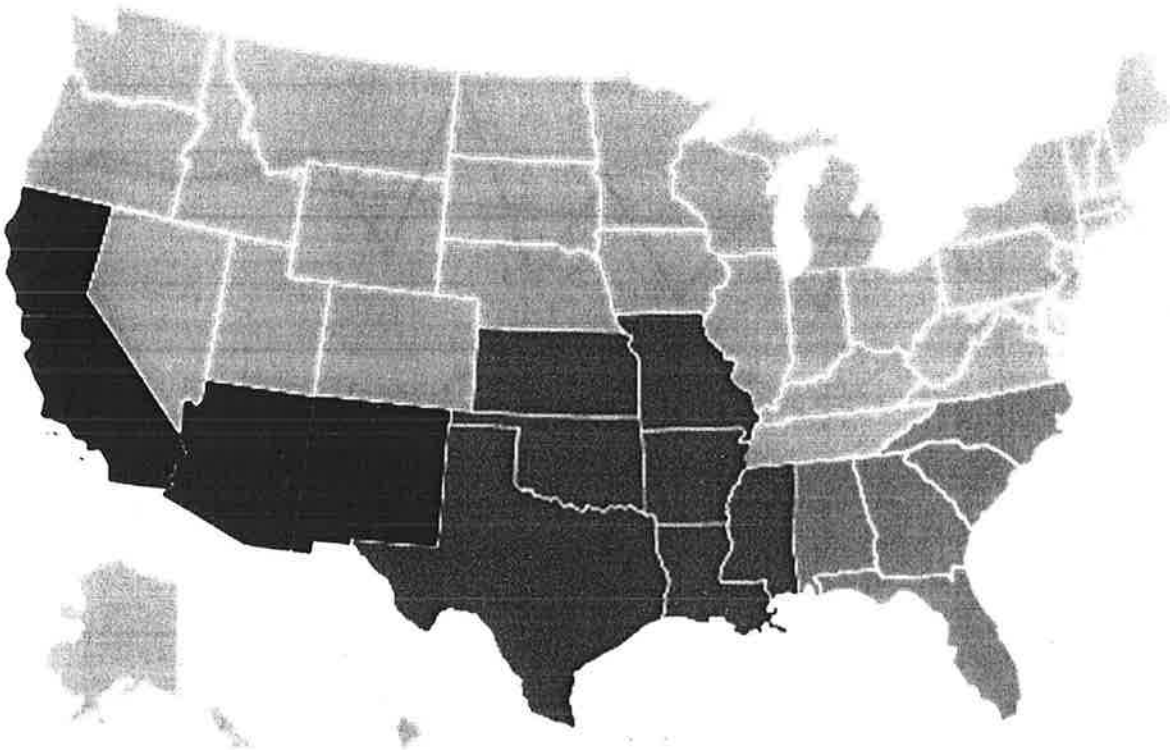
The cyclical pattern and the trends in the pecan production are shown in Figure 6. Agricultural practices have been implemented in recent years by some growers to reduce the variation in yields, which has attenuated the effect of "on" and "off" years in the production.

Figure 6: Total pecan production in the US for improved and native varieties (USDA-ERS 2014)



The commercial pecan production in the US takes place in 15 states, which can be grouped in three regions, described in Figure 7. These three regions are: **Western Region**, consisting of: New Mexico, Arizona, California; **Central Region**, consisting of: Texas, Oklahoma, Louisiana, Mississippi, Arkansas, Missouri, Kansas; and **Eastern Region**, consisting of: Georgia, Florida, Alabama, North Carolina and South Carolina.

Figure 7: Pecan production regions: Black=Western; Dark gray=Central; Medium gray=Eastern



The production of pecan is distributed across all three regions, with most of the harvest in the period between 2002 and 2014 coming from three states, one in each region: Georgia, New Mexico and Texas, with 32%, 22% and 18% of the total production of pecans respectively. All three regions have production of improved varieties. The native production however, is heavily concentrated in the region of origin of the pecan tree: the Central Region. In native/seedling production, Oklahoma, Texas and Louisiana have the lead with 70% of the entire country's seedling production. In terms of number of acres in production, around 40% of the total acreage of pecans are native varieties (USDA-NASS 2015) in the country, but this varies by region of production. According to the 2012 Agricultural Census data (USDA-NASS 2015) in the Central region, acreage for native varieties is 60% of the total acres under production; in the East only 16% is seedlings and almost no native acreage exists in the West.

The variety being grown is highly relevant to any analysis, since production practices, farm sizes, costs and prices are very different for improved and native varieties. Most of the horticulture advances have taken place in commercial orchards producing mostly improved varieties. According to the American Pecan Board (2015), commercial farms in production using improved varieties range between 20-50 trees per acre. The native production on the other hand may have as little as only one tree per acre in some cases.

Farm sizes also differ by region. Across all regions more than 70% of the reported farms have 50 or more acres under production. In the Central and West regions, almost half of the farms have between 50 and 499 acres under production, but less than 30% of the farms are this size in the East. The very large farms of 500 acres or more represent 23%, 28% and 44% of the acreage in the Central, Western and Eastern regions respectively, showing a higher concentration in large producers in the Eastern region.

Table 1: Production, prices per pound and crop value of improved varieties of pecan by state

	Production			Price per pound			Crop Value		
State	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**
	(1,000 pounds)	(1,000 pounds)	(1,000 pounds)	(dollars)	(dollars)	(dollars)	(1,000 dollars)	(1,000 dollars)	(1,000 dollars)
Alabama	3,400	2,500	1,600	1.40	1.94	2.19	4,760	4,850	3,504
Arizona	20,000	22,500	21,000	1.60	1.90	2.10	32,000	42,750	44,100
Arkansas	1,600	2,000	2,200	1.54	1.60	1.60	2,464	3,200	3,520
California	4,300	5,000	5,000	1.58	2.06	2.30	6,794	10,300	11,500
Florida	1,100	700	150	1.10	1.72	1.74	1,210	1,204	261
Georgia	96,000	83,000	71,000	1.94	1.96	2.30	186,240	162,680	163,300
Louisiana	5,000	1,500	2,500	1.30	1.40	1.62	6,500	2,100	4,050
Mississippi	2,000	3,800	700	1.25	1.23	1.64	2,500	4,674	1,148
Missouri	200	500	170	1.45	1.34	1.85	290	670	315
New Mexico	65,000	72,000	65,000	1.70	1.90	2.00	110,500	136,800	130,000
Oklahoma	5,000	3,000	4,000	1.55	2.05	1.80	7,750	6,150	7,200
South Carolina	1,500	1,500	200	1.75	2.00	2.36	2,625	3,000	472
Texas	42,000	22,000	48,000	1.52	1.79	2.08	63,840	39,380	99,840
United States	**247,100**	**220,000**	**221,520**	**1.73**	**1.90**	**2.12**	**427,473**	**417,758**	**469,210**

Table 2: Production, prices per pound and crop value of native varieties of pecan by state

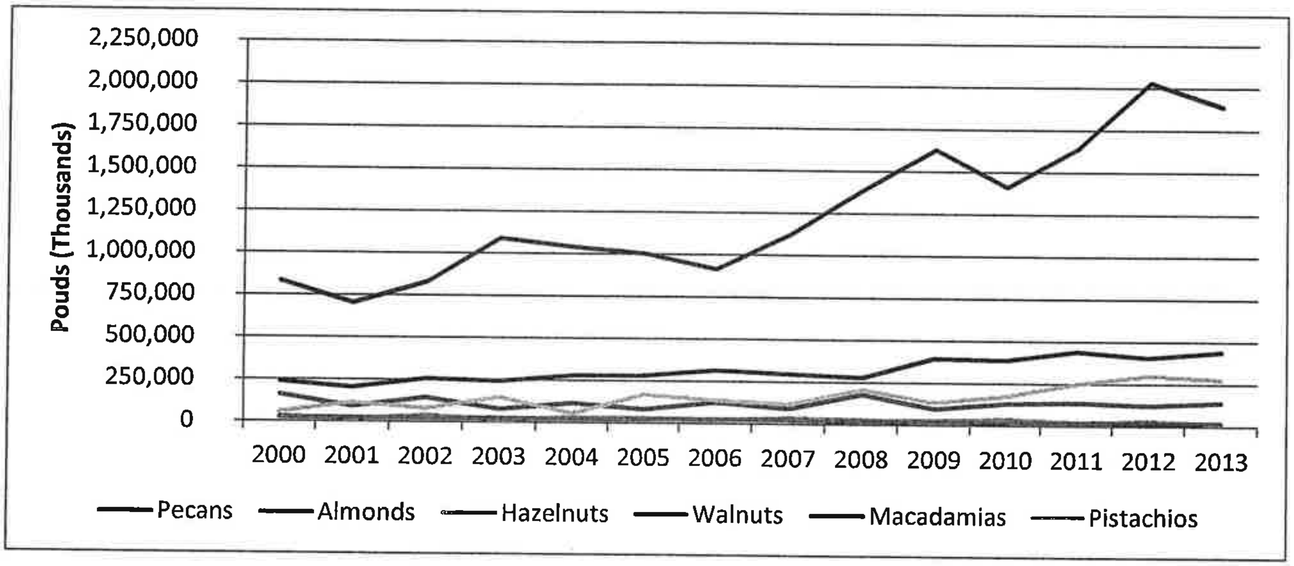
	Production			Price per pound			Crop Value		
State	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**
	(1,000 pounds)	(1,000 pounds)	(1,000 pounds)	(dollars)	(dollars)	(dollars)	(1,000 dollars)	(1,000 dollars)	(1,000 dollars)
Alabama	600	770	300	0.83	1.02	1.10	498	785	330
Arkansas	600	700	1,300	0.85	0.83	0.84	510	581	1,092
Florida	900	(D)	50	0.75	(D)	1.16	675	(D)	58
Georgia	4,000	6,000	2,000	1.22	1.24	1.43	4,880	7,440	2,860
Kansas	3,000	(D)	880	1.35	(D)	1.30	4,050	(D)	1,144
Louisiana	10,000	9,500	11,500	0.70	0.86	0.76	7,000	8,170	8,740
Mississippi	500	1,700	300	0.85	0.95	0.91	425	1,615	273
Missouri	2,300	2,240	470	0.95	1.01	1.08	2,185	2,262	508
Oklahoma	20,000	17,000	15,000	0.85	0.80	0.90	17,000	13,617	13,500
South Carolina	300	60	50	1.25	1.50	1.50	375	90	75
Texas	13,000	6,000	12,000	0.84	0.90	0.85	10,920	5,400	10,200
United States	**55,200**	**46,330**	**43,850**	**0.88**	**0.92**	**0.88**	**48,518**	**42,632**	**38,780**

*(D) represents data not reported by NASS.

D. Growth in U.S. Supply of Pecans

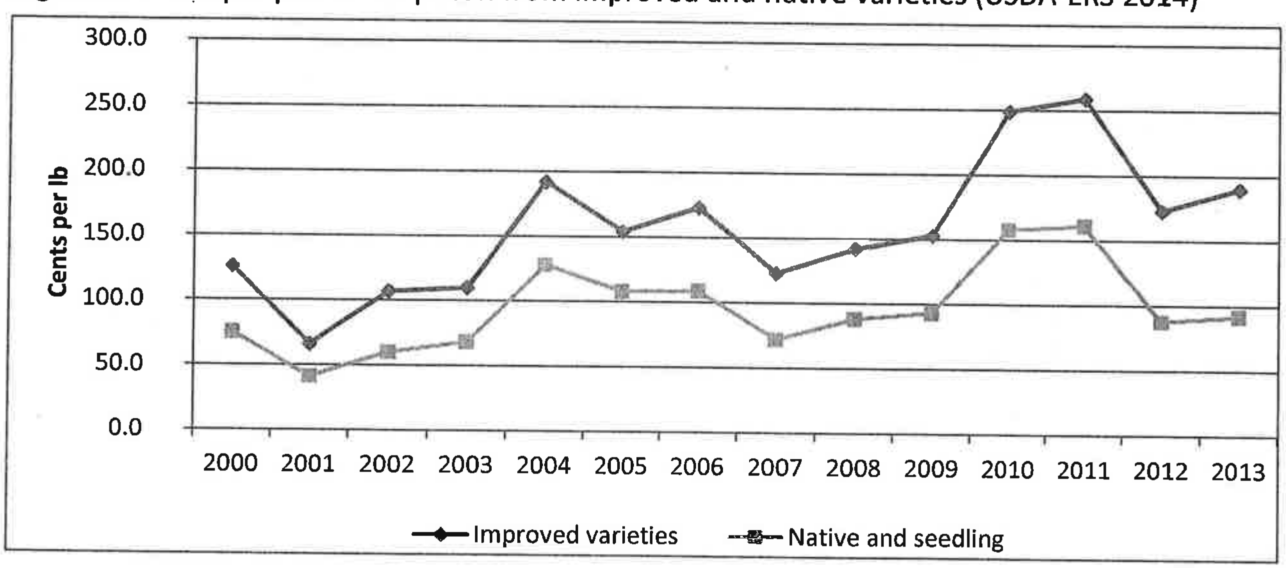
As was previously mentioned and described in Figure 6, there has been a positive trend in pecan production in the past decade. However, the production of pecans is still only 1-2% of the total tree-nut production in the US, while other nuts have had a stronger growth (USDA-ERS 2014) as seen in Figure 8. Wood, Payne, and Grauke (1994) pointed out that the lack of appropriate marketing in pecans may be one of the reasons for the industry not to continue the development rate it had in the 20th century.

Figure 8: Tree nut production in the US (USDA-ERS 2014)



The new plantings are almost entirely improved varieties. The cyclical nature of production and prices has generated a response in supply, especially in high price years (*off* years). Changing land use in pecan farms under production to a different use is highly impractical, thus exit from the market is not very common. On the other hand a particular reaction that can have consequences is the planting in low yield / high price years ("off" years).

Figure 9: Prices per pound for pecan from improved and native varieties (USDA-ERS 2014)

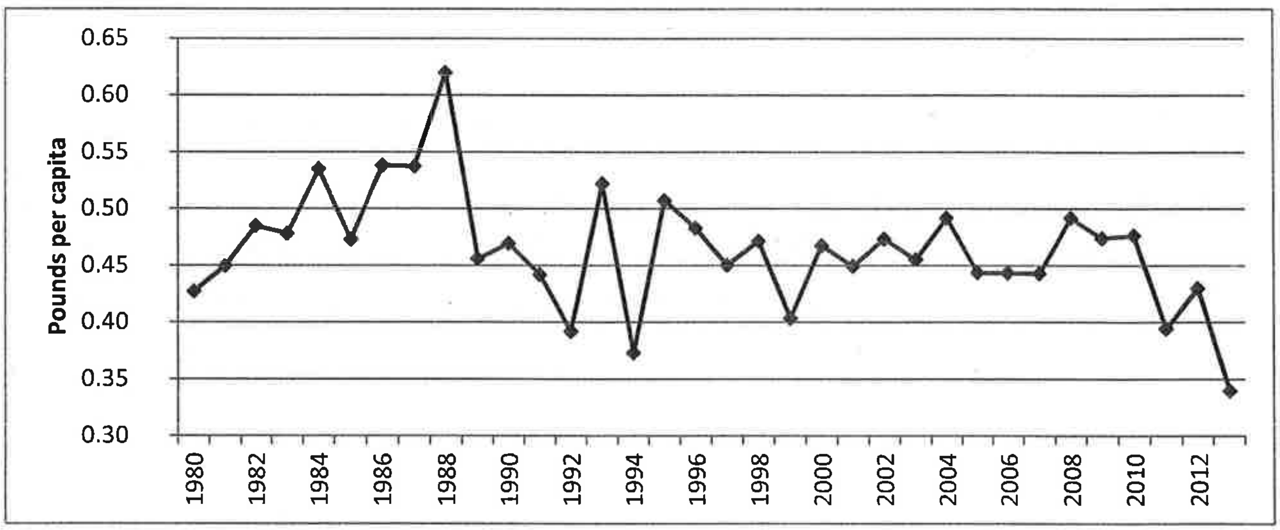


Improved variety trees planted begin production 6-7 years later. As a reaction to the prices for pecans behaving like shown in Figure 9, considerable planting activity took place in 2010 and 2011 (American Pecan Board 2015) which will come into production in 2016-2018. This added production could put some pressure in price and be a challenge for the pecan industry in the coming years if no marketing development and promotion takes place.

E. Current U.S. Demand for Pecans

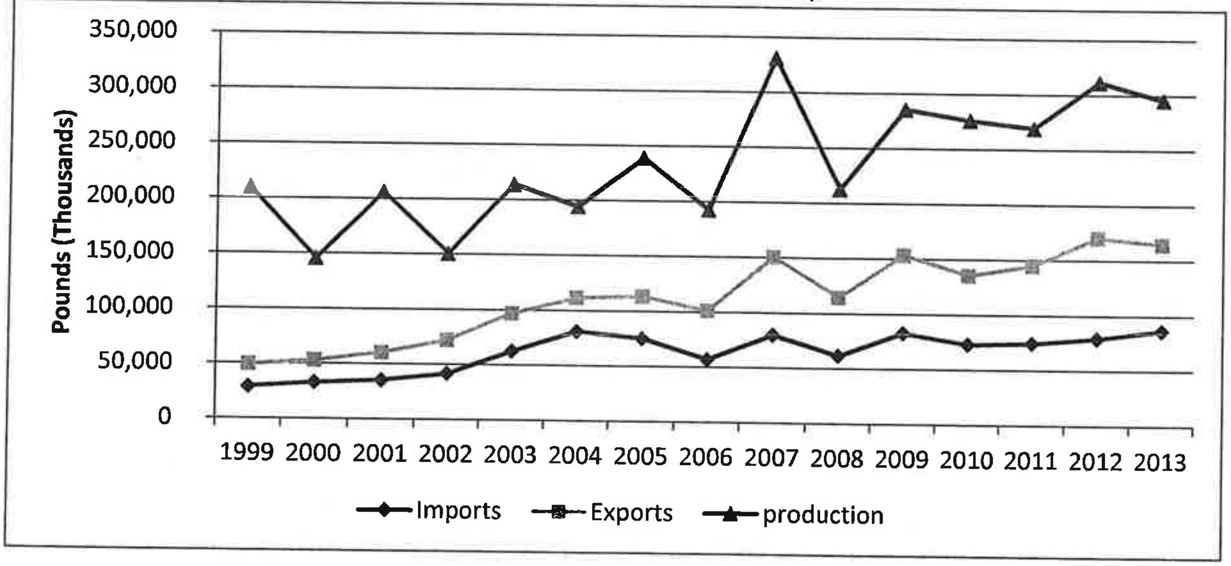
The US also leads the world consumption with an average of 288.5 million pounds per year in the period between 2008 and 2012, yielding the highest per capita consumption with 0.45 pounds per individual per year on average (USDA-ERS 2014). As shown in Figure 10, the consumption has remained relatively stable throughout the years until recently, when it has a decreasing trend.

Figure 10: Per capita consumption of pecan in the US (USDA-ERS 2014)



This decrease in domestic consumption does not match the increase in production described in Figure 6. The increased production has been fueling on the export market that has been growing at a faster rate than the domestic intake as shown in Figure 11.

Figure 11: Utilization of pecan production (USDA-NASS 2015)



Another component of the explanation of the gap between production and utilization figures is the held stocks by the handlers. Given the cyclical nature of the pecan tree production handlers of pecan, which include buyers and shellers, hold on to stocks of production in some years, a process usually referred to as accumulation. Figures 12 and 13 describe the behavior of beginning and ending stocks and their interaction with the domestic use and international trade. Figure 12 shows the total supply, which is composed of beginning stocks + production of that year + imports.

Figure 12: Utilized production and supply of pecan in the US (USDA-NASS 2015)

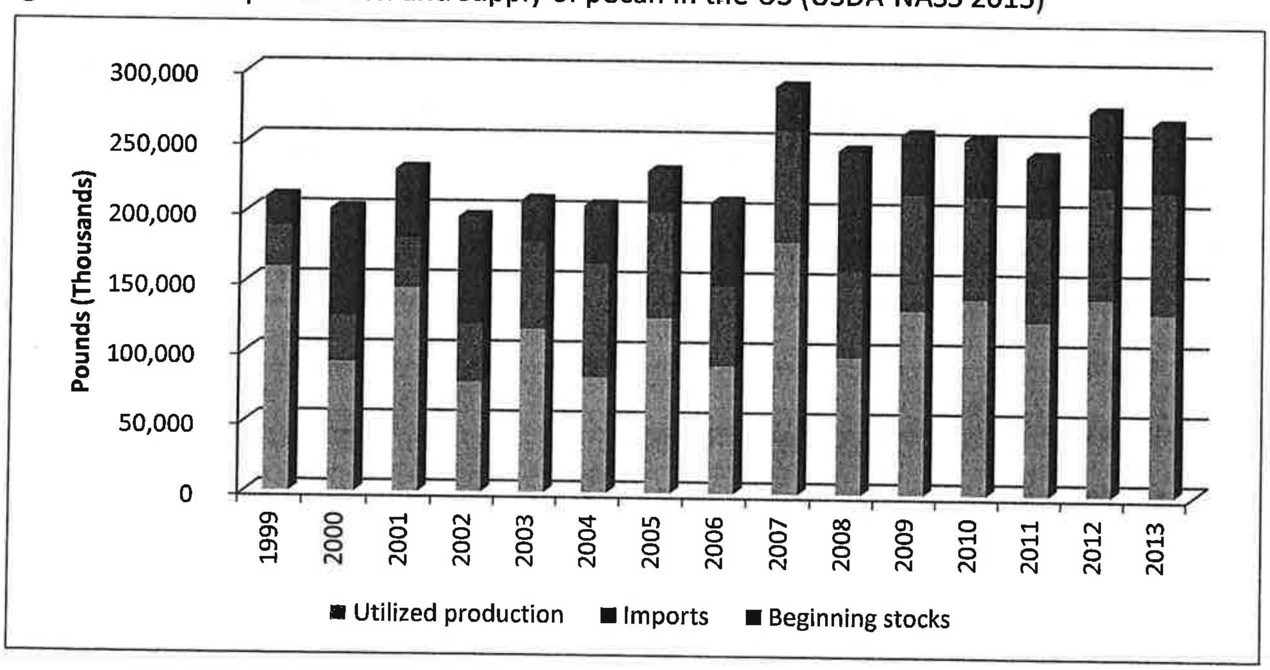
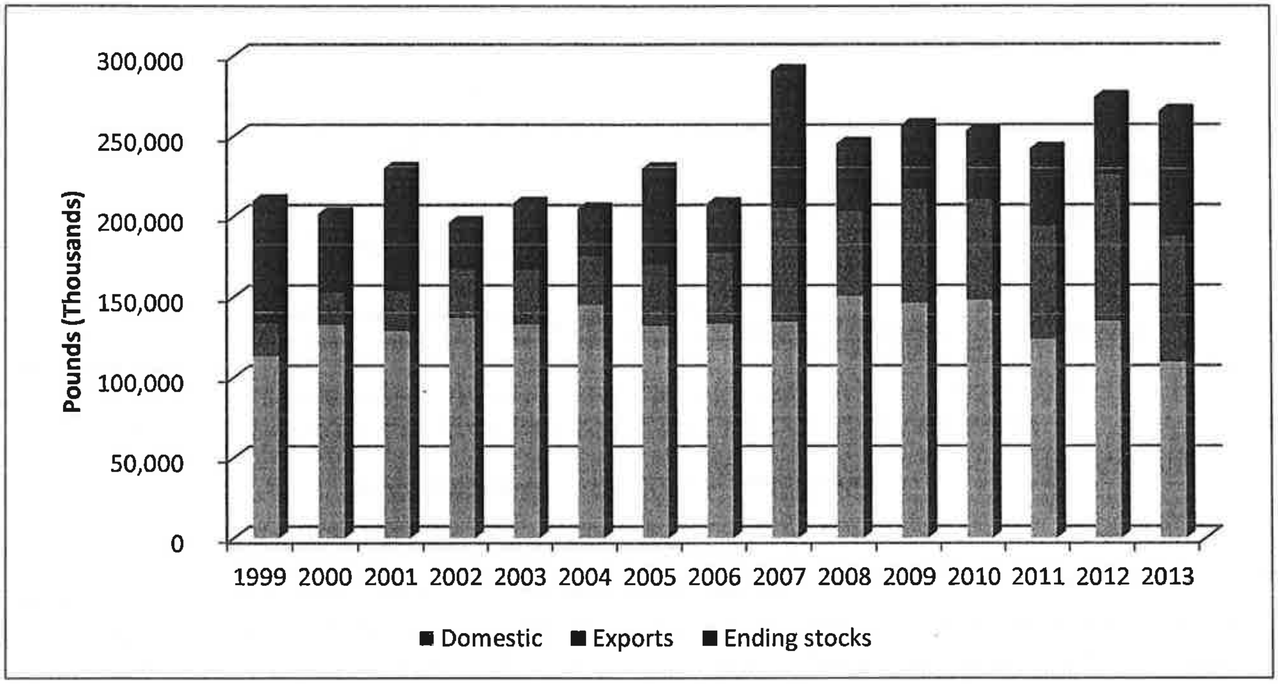


Figure 13: Ending stocks and utilization of pecans (USDA-NASS 2015)

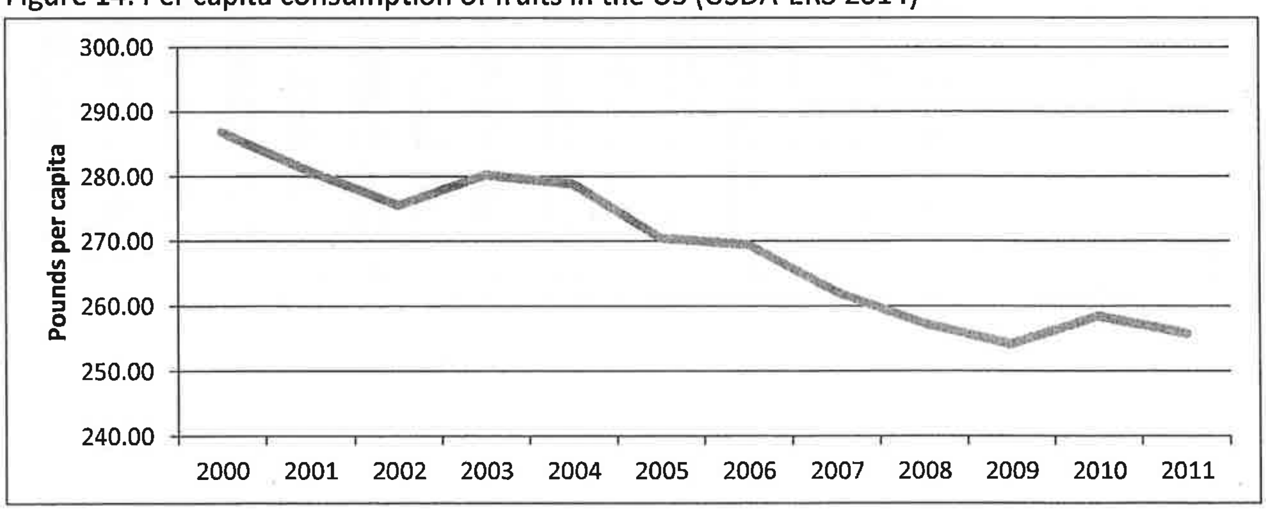


In Figure 13 what can be seen is the total utilization of pecans. This is broken down by domestic utilization + exports + ending stocks. It can be seen that the share of exports has been growing, as well as the accumulation.

F. Trends in U.S. Demand for Pecans versus other tree nuts

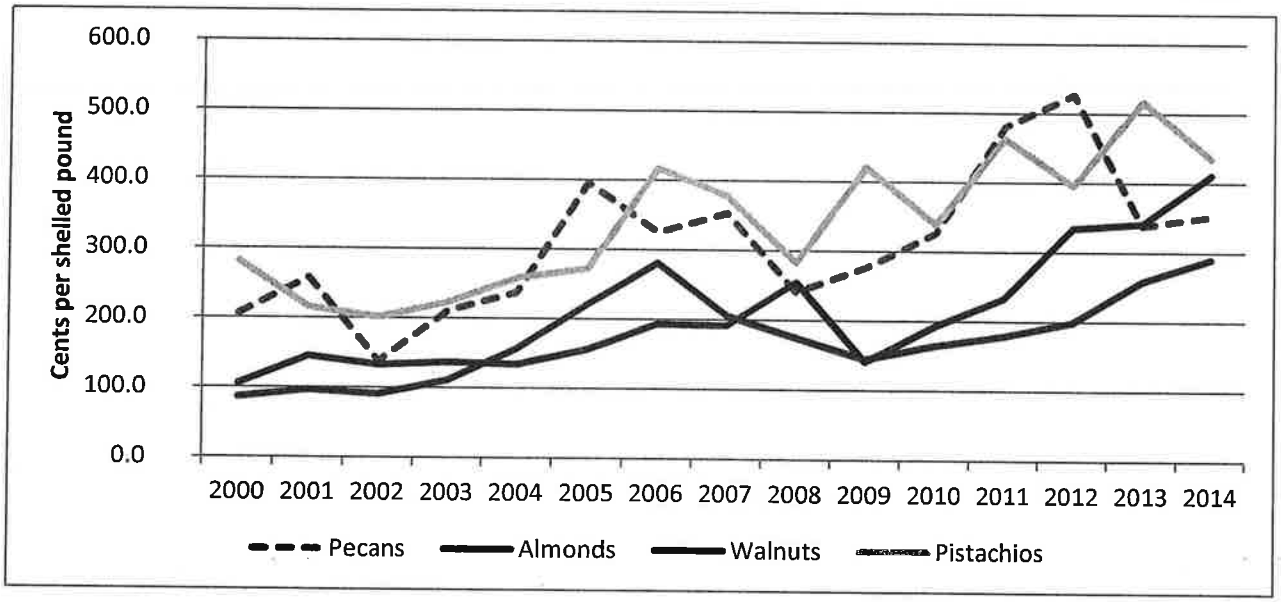
Pecans, like any other fruit and vegetable in the US are not exempt from the trends amongst US consumers. The most pertinent of these trends is the decline in consumption of fruits and vegetables in the diet, in spite of the revisions to the US dietary guidelines (Palma and Knutson 2012). A clear illustration is given by Figure 14 that describes the per capita consumption of fruits and tree nuts in the US.

Figure 14: Per capita consumption of fruits in the US (USDA-ERS 2014)



Another challenge is the competition of pecans in the fruit sector with less expensive imports (Palma, Ribera, and Bessler 2013). Furthermore, the biggest challenge in this regard is the contest with the other nuts, where some of these industries have invested more in marketing efforts than the pecan sector for stimulating the demand.

Figure 15: Season average grower prices in cents per pound of shelled nut (USDA-NASS 2015)



As seen in Figure 15, tree nuts prices have an increasing trend. A simple time series regression analysis of prices reveals that the slopes of the price regressions for each nut, which indicate the speed at which the prices are increasing, is higher for all the nuts depicted in the graph compared to pecans. When reducing the span in years of the regression analysis to more recent years, the differences in the rate of increase of the prices are stronger in the last five years from 2009 to 2014.

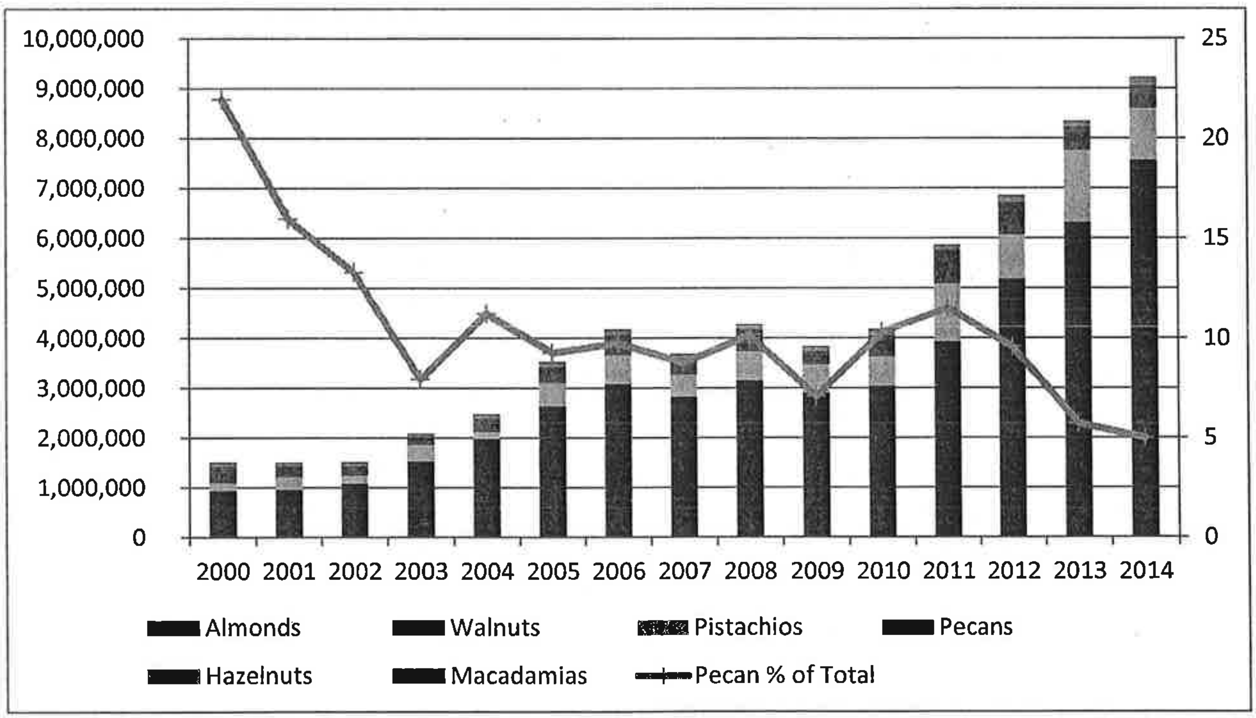
Not all is gloom and doom in the pecan market trends. Palma, Ribera, and Bessler (2013) show that as income level increases so does the consumption of fruits and vegetables, including nuts. This information can be used to target market segments that would react to promotion activities. Onozaka and Mcfadden (2011) show that production claims, e.g. fair trade, local, organic, etc., have an effect in the price consumers are willing to pay for fruits and vegetables. Furthermore, Palma, Ness, and Anderson (2015) suggest that some consumers react to key attributes of food products that provide them status. These consumers have a tendency to pay higher prices for food with attributes they find satisfying a need for status, e.g. local, organic or healthy.

For pecans in particular, Palma, Collart, and Chammoun (2014) found in a discrete choice experiment that If no additional information than variety is provided about the products, individuals were willing to pay a premium of $0.13 on average at the retail level for the native varieties of pecans compared to a baseline of no information. This is in spite of native/seedling pecans having more pieces than improved varieties. The price premium can be linked to the connection of the "native" attribute with the perception of natives being a "natural" product. This could be used to plan targeted marketing strategies in native/seedling pecans increasing the potential benefits of the FMO. However, it is not considered in the price differentials shown later in the report as this is a route the proponent group may or may not take.

G. U.S. Tree nuts Crop Value

The increasing trends in the production of tree nuts and in the prices, especially in almonds, have increased the value of the tree nut production in the US. Figure 16 shows how the nut production value has increased since 2000. In this figure it can also be seen that the growth in crop value in nuts has come mostly from almonds, pistachios and walnuts. In the graph a line showing the share of pecans in the value of nut production is plotted on the right axis. It is clear to see that in this period the market share of the pecan sector to the nut industry has experienced a precipitous decline, from over 20% of the total nut market in the year 2000 to around 5% of the entire crop value of tree nuts in 2014. If anything at all, this relationship shift can serve as an illustration of how other tree nut crops have exploited its growth potential and the pecan industry has lagged behind other nuts.

Figure 16: Nut market value with share of pecans in the right axis (USDA-NASS 2015)

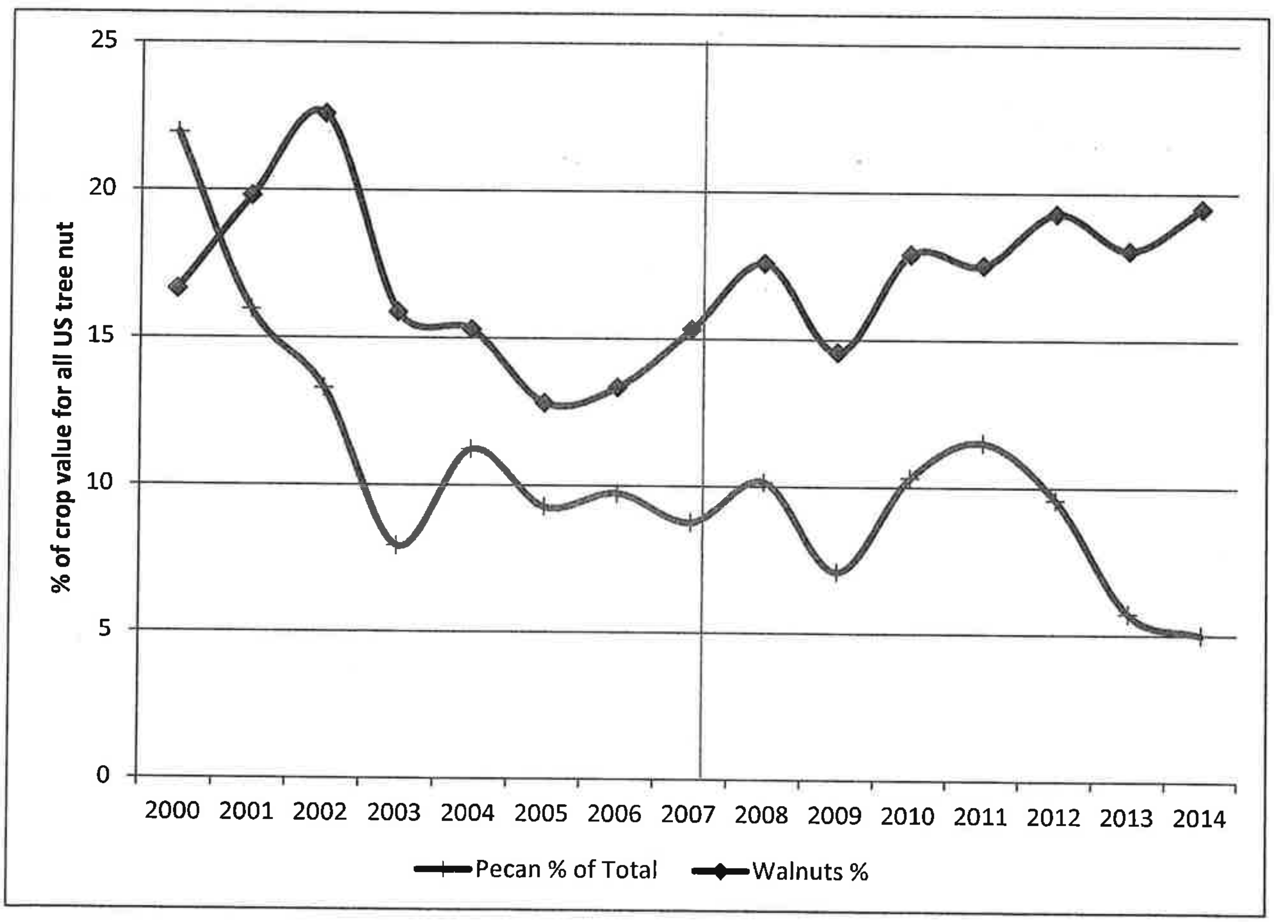


Interestingly, the three nuts driving the increase in crop value are almonds, walnuts and pistachios, which have federal regulated marketing orders in place. The first two have marketing programs in as part of their federal marketing orders, and the latter has benefited from increased quality standards. Both of these aspects are properties of the proposed FMO for pecans. Of course, this correlation structure does not imply causation: two events being related, does not mean that one causes the other. However, the data seems to point out in that direction, but it should be recognized that there are other factors at play in the market.

Nevertheless, several studies have shown there is a positive effect of promotion on their demand of agricultural products in general (Williams, Capps, and Palma 2008, Lee et al. 1996, Neff and Plato 1995, French and Nuckton 1991) and specifically in tree nuts (Moore et al. 2009, Crespi and Sexton 2001, Florkowski and Park 2001). The methods across the studies in the literature differ, but the unequivocal effect has been that having a marketing program (funded by a Federal Marketing Order in the case of the literature cited above) increases demand for the products. A list of these studies can be found in Appendix A of this report.

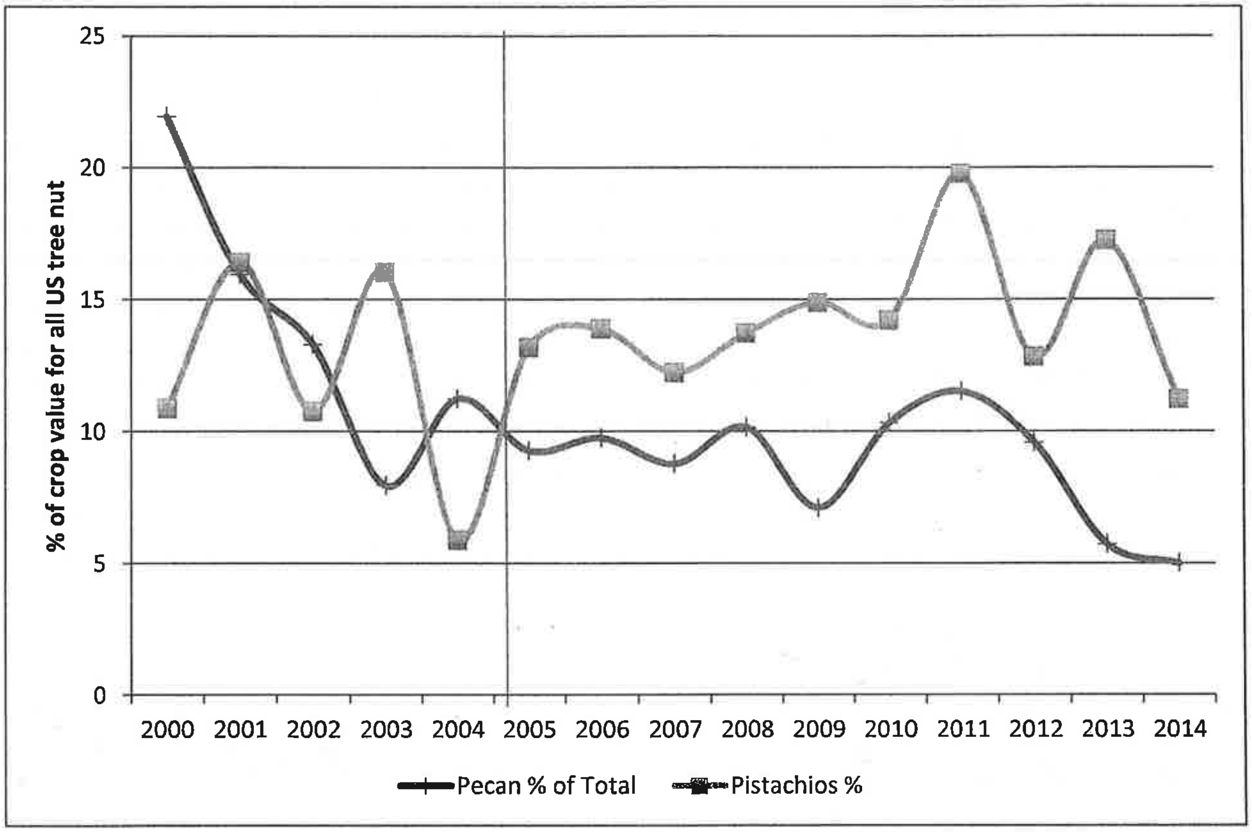
With that in mind and for more than illustrative purposes the plots in Figure 17 draw attention. In the graph one of the series drawn is the share of the total crop value of tree nuts in the US for **pecans.** The other series in Figure 17 is the share of that same total for **walnut** production. A vertical line indicates the year when the marketing program for Walnuts under the Marketing Order that regulates walnuts grown in California was implemented. It can be seen that though the walnuts value share from all tree nut market was coming from a decreasing trend, the positive momentum is enhanced by the implementation of the marketing program.

Figure 17: Percent market share of pecans and walnuts (USDA-NASS 2015)



The story in Figure 18 is quite similar. Again, one of the plotted series is the **pecan** share of the total value of tree nuts and the other one is the market value share of **pistachios**. A federal marketing order for pistachios was implemented in 2005 which called for quality assurance and testing. The trend in the share of the value is positive from that point onward.

Figure 18: Percent market share of pecans and pistachios (USDA-NASS 2015)



Section II: Costs and Benefits of the Proposed Federal Marketing Order

A. Background

As discussed in the framework for the federal marketing order, pecan production fluctuates in production, size, costs and prices. Given the fragmented nature of the industry, it has proven in the past to be a difficult task to device policies that work in the entire industry's best interest; even more so, to ensure that the stakeholders in such plans are confident and engaged, avoiding a free-rider situation (Adams 2007).

This phenomenon is not uncommon in the economics field and has been researched extensively, especially in the context of public goods provision. Goods considered public goods are those that provide benefits for an entire group of individuals, but some may derive more benefit from the existence of the good than others (Ledyard 1997). Public goods also carry the peculiarity of having both a public value for the whole group and a private value for each individual contributing to the provision and using the good.

Facilitation of public goods has been an interesting topic for economists amongst other things because of the need for these goods in the markets and the difficulty in the markets themselves to secure them unequivocally every time they are needed (Kagel and Roth 1995). Most of the literature and the practical experiences in this regard though, point in the direction that a group of individuals or firms will contribute to the public good if they all have stronger incentives to do so than they would have to *defect* and not collaborate to a common goal.

In the particular case of the pecan industry, a marketing effort for the entire industry would benefit the entire industry (Florkowski and Park 2001, Moore et al. 2009). However, it is not unreasonable to believe that some of the growers and handlers in the pecan sector might find such a program more valuable than others.

This report is an attempt to provide the private value that a grower would be able to achieve by the implementation of the proposed marketing order. The calculations show that in all cases the benefits from such a program outweigh the cost to growers and handlers; hence the industry would be better off with the program than without it. The study should also point out that the assessments would be paid by the handler.

B. Theoretical Framework

The mathematician John Nash (1951) described that best outcome in a decision making framework will be that one where the individuals seek the most beneficial result for themselves and the group as a whole. With this in mind, we have developed a model of costs and demand that would be impacted by the specifications of the proposed FMO.

The study begins by evaluating the impact in the cost for the pecan grower. To produce a cost and income statement of the "model farm" the study uses the historical data on prices, production (USDA-ERS 2014) and acreage (USDA-NASS 2015) that has been presented in the previous section to devise valid scenarios for the upcoming years after the implementation of the proposed FMO. Yields are calculated from the production and acreage data. Actual production costs from the members of the American Pecan Board are also used to calibrate the model. Additionally, publicly available data regarding consumer prices in the agricultural sector and interest rates was also used to ensure external validity of the model.

The production farm can vary in size. In order to evaluate the impact of the program across all sizes and mixes of varieties the National Agricultural Statistics Service 2012 census data (USDA-NASS 2015) is used to calculate the national and regional averages in size and mixtures. The mixture of native and improve varieties under production in a farm can also vary from zero native production to a 50/50 split or more.

Table 3: Proportions of native and improved variety acreage per production region

Region	Improved Acres	% of Total	Native Acres	% of Total	Total Acres
CENTRAL	113,099	41%	164,680	59%	277,779
EAST	115,599	84%	22,540	16%	138,139
WEST	52,732	>99%	187	<1%	52,919
TOTAL	281,430	60%	187,407	40%	468,837

Table 4: Pecan farm sizes per production region

	Acreage										
Region	0.1 TO 0.9	1.0 TO 4.9	5.0 TO 14.9	15.0 TO 24.9	25.0 TO 49.9	50.0 TO 99.9	100 TO 249	250 TO 499	500 TO 749	750 TO 999	1,000 OR MORE
CENTRAL	0%	2%	7%	7%	13%	17%	19%	14%	5%	5%	11%
EAST	0%	3%	11%	7%	7%	10%	8%	10%	5%	7%	32%
WEST	1%	7%	8%	4%	8%	8%	16%	20%	0%	0%	29%
TOTAL	0%	2%	8%	7%	10%	14%	15%	13%	5%	5%	19%

The evaluation of the program will be done with mathematical simulations of the size of the assessments, production per year, prices in the market for native and improved varieties and variable costs of production. This way we can introduce "**stochastic processes**" into the evaluation. That is we assume that variables are risky and do not do the calculations with just the averages, but a distribution of possible values for the key variables.

By using stochastic inputs for the model, we are trying to account for the uncertainty and variability that can take place in the prices and other variables and the unexpected effects from other sources of uncertainty. A stochastic variable is one that has a random behavior. The random distribution around a variable can be estimated. These random variable distributions are used to have certain level of confidence around the values produced through simulation, which is the approach of this study. When using these random behaviors of the variables the analysis can single out the effect of the proposed Federal Marketing Order, as the other variables have the same behavior with or without the results of the Federal Marketing Order.

The next stage is simulating in the model an effect of the FMO in the demand similar to the one reported in the literature for other similar marketing programs for fruits and vegetables, and tree nuts in particular. We used Monte-Carlo simulation methods for the distributions of key output variables crucial for analyzing feasibility of future business decisions under risk. The simulation model is programmed in SIMETAR©, a simulation and risk analysis software embedded as an add-in in Excel (Richardson, Schumann, and Feldman 2006). The framework of creating a representative farm to analyze risk is widely used in policy analysis, including potential impacts of the Farm Bill (Richardson, Schumann, and Feldman 2006). This avoids using averages, which can be misleading, and instead use data from the entire distribution of historical data.

The results of these increases in prices due to generic promotion for the model farm are then compared with the case with no promotion program. Next, the performance of the model farm without the costs associated with the proposed FMO is compared with the farm with the cost stipulations of the FMO assuming no intervention in demand, i.e. no increase in prices. Finally, the analysis includes an evaluation of a hypothetical insurance purchase that could guarantee the price differentials and yields the prices a risk neutral pecan stakeholder would be willing to pay for such. The complete model and simulation are shown as appendixes.

C. Specifications of the Proposed Federal Marketing Order

The proposed Federal Marketing Order has a main intent to fund advertising and promotion to increase demand for the pecan industry using the funds collected through assessments. The proposed federal marketing order would have upon implementation an initial assessment rate of $0.01-0.02 dollars per pound for *native and seedling pecans* and $0.02-0.03 per pound for *improved varieties pecan* and $0.01-0.02 per pound on *substandard class pecans* in the initial four years of implementation. In subsequent years, the assessment would not exceed 2% of the aggregate of all prices in each classification based on the Council data or the average of the USDA average price. These ranges are described in Table 5.

Table 5: Ranges of the proposed Federal Marketing Order Assessments

	Assessment per lb.		
	Low	High	**Midpoint**
Improved pecans	$0.02	$0.03	**$0.025**
Native/seedling	$0.01	$0.02	**$0.015**

Table 6: U.S. Season average price to grower and cost of the assessment as % of average price

	Price ($ per in-shell lb.)			Midpoint assessment as %		
	2012	**2013**	**2014**	**2012**	**2013**	**2014**
Improved pecans	$1.73	$1.90	$2.12	1.4%	1.3%	1.2%
Native/ seedling	$0.88	$0.92	$0.88	1.7%	1.6%	1.7%

The cost of the assessment as a percentage in Table 6 is calculated by taking the midpoint assessment value for improved and native/seedling varieties and dividing it by the average prices for in shell pound of pecan for each year described in the table.

Each handler that first manages the pecans in shell will pay the assessments. They will be collected on the ratio of the in-shell pecans managed by the handler and the in-shell pecans managed by all regulated handlers in the area. If the handler does not pay the assessments within the time prescribed, the assessment may be increased by a late payment charge and/or an interest rate charge at amount prescribed.

On August 31st each year the handler warehousing in shell pecans will be identified as the first handler and be required to pay the assessed rate on the pecans for each category in their possession at that date. On those same dates the inventories from the current fiscal year will also require the first handled to pay the assessment and are no longer eligible to inter-handler transfer.

D. Effect of the Proposed Marketing Order Provisions on Demand

The objective for this segment is to show what would happen if the assessments were invested similarly to other programs that are already in place in the fruit and vegetable industry. The literature review described in page 23 is used as a reference for the effect on demand that the proposed FMO would have: especially generic promotion programs that are already in place in other tree nuts. These studies find that demand for product increases after the establishment of generic promotion programs. The increased demand results in increases in prices that could not be achieved without promotion. Demand increases in those studies have been as high as 6%. Our analysis allows the midpoint of these studies (between 0% and 3% in the tree nut studies) to be the representative scenario and we have used the average of potential demand or approximately 1.5% in our evaluation for benefits of the FMO promotion authority. With these numbers as reference, the approach to the effects in demand of the proposed Federal Marketing Order in the model is rather conservative. This is due to the fact that other tree nuts have very well established programs and it may take some time to compete in the market to regain some of the market share.

The method of evaluation is taking the historical yearly prices from 1997 to 2014, and using the full distribution over those prices to obtain Monte-Carlo simulation for 500 possible prices to obtain the expected average price without the FMO intervention. We then adjusted the historical prices with a demand increase of 1.5% to simulate the possible prices with marketing promotion efforts due to the FMO to get an expected price increase of $0.063 with the FMO for improved pecans as shown in Table 6. In a similar fashion, for native/seedling the valuation is done using the historical price for a Monte-Carlo simulation before the intervention (without the FMO) and after the marketing program (with FMO). The result is a $0.036 increase in price for native varieties.

Table 7: Benefits of generic promotion in the proposed FMO

	Benefits per lb. of FMO		
	Low	High	**Average**
Improved pecans	$0.040	$0.096	**$0.063**
Native and seedling	$0.027	$0.042	**$0.036**

The low and high bound were calculated using a simulation with low (0.5%) and high (3.0%) price increase scenarios. The potential benefits due to promotions through the FMO are between 4 and 9.6 cents with an average of 6.3 cents per pound for improved varieties; and between 2.7 to 4.2 with an average of 3.6 cents per pound for native/seedling varieties. Comparing Table 5 and Table 6 to Table 7, it is apparent that the benefits of generic promotion outweigh the costs to growers. To put this in context, with respect to the average prices shown in Table 6, the 6.3 cents increase in price at the midpoint effect of generic promotion for improved varieties represent a 2.8% raise[1].

The model evaluates the effect of this price premium on the profitability of a model farm in Figure 19.

Figure 19: Evaluation of different promotion effectiveness levels on (NPV) of a model farm

Prob(Unfavorable)	27.0%	26.6%	26.0%	25.0%	24.0%	22.6%	22.2%
Prob(Cautionary)	51.2%	51.2%	51.6%	52.0%	52.0%	52.4%	52.4%
Prob(Favorable)	21.8%	22.2%	22.4%	23.0%	24.0%	25.0%	25.4%

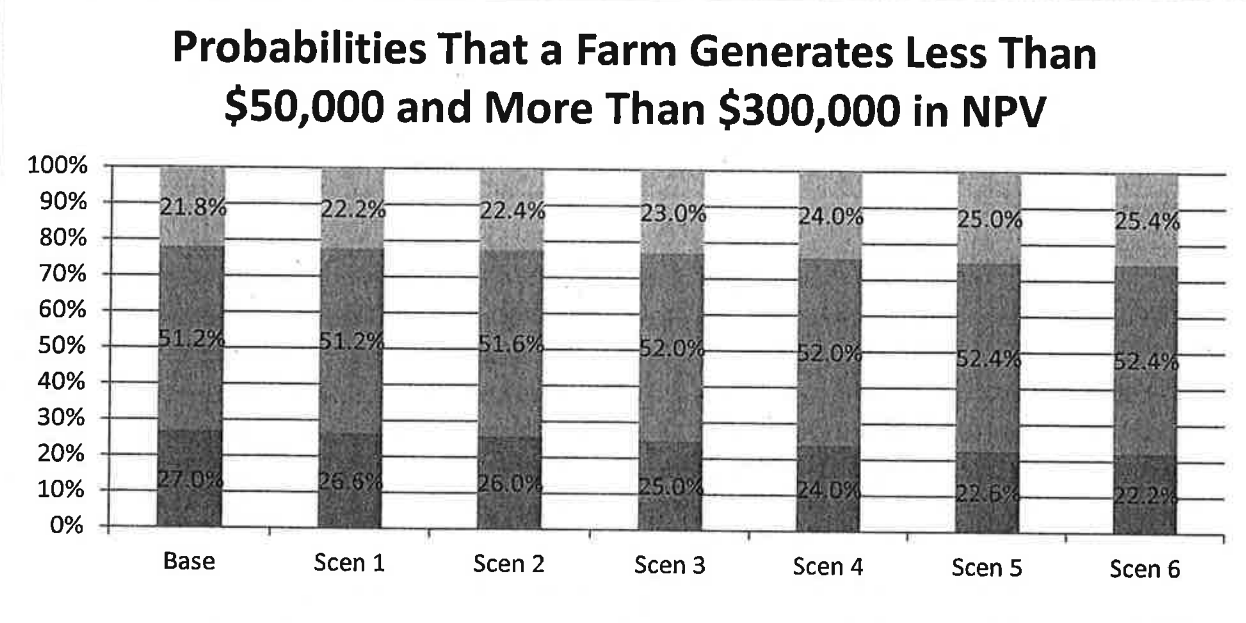


Table 8: Different scenarios for promotion effectiveness

Variety	Base	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Improved	0.00%	0.50%	1.00%	1.50%	2.00%	2.50%	3.00%
Native	0.00%	0.25%	0.50%	0.75%	1.00%	1.25%	1.50%

The different scenarios for evaluation in this case are then the price effects because of generic marketing for pecans that could come from the assessments collected through the proposed Federal Marketing Order described in Table 8. The effects considered are rather conservative in light of the results the current marketing programs in tree nuts are having in

[1] The effect of 1.5% in the simulation of prices result in a higher increase in the actual price due to the distribution used for the simulation. This was an empirical distribution. These have a higher weight on the tails, which means that the probabilities of events on the extremes are higher than, for example a normal distribution.

their respective crops. Also worth noting is that native varieties of pecans and these are the last to leave the inventories (American Pecan Board 2015), the weight of marketing on native variety prices has been attenuated to half of the improved varieties potential impact.

As seen in Figure 19, scenario 6, which has the most optimistic expectation from improves the profitability of the model farm by almost 5%, compared to the base scenario in Figure 19. This is reflected in the reduction in the unfavorable probability from 27.0% to 22.2%. It must be noted again that the most hopeful situation evaluated with the model is equivalent to the average result of marketing efforts reported for tree nuts (Crespi and Chacón-Cascante 2004, Kaiser 2002).

A logical question under these scenarios would be that with the higher prices paid to growers the handlers will purchase more expensive pecans across the board due to the assessments and the increase in prices following the marketing efforts. Though this is accurate, the price increments considered for the farm model reflect an increase in the demand of pecan, cascading to the grower with a margin of 30-40% to the handlers.

E. Effect of the Proposed Marketing Order Provisions on Cost

a. Production

The full input costs for an acre of pecans across the production area requires a certain minimum land size or minimum annual production to be maintained in order for the farm to be economically viable over a period of four years. Failure to have a farm of a certain size or with yields above a certain size would result in either an economically unprofitable farm operation or would require a grower to reduce the necessary inputs on the farm to grow quality pecans over a period of time (reduced watering, moving, spraying, fertilizing, hedging, pruning or other inputs normally required by commercial pecan producers).

We believe it is highly unlikely, even remote, that a pecan grower can be financially viable over a period of four years (Representative Period, as used in the FMO) if the grower is averaging less than 50,000 lbs. of pecans per year over that period, and is applying all inputs associated with a commercial pecan grower. Said another way, pecan farmers growing less than 50,000 lbs. of pecans on average per year are hobby farmers, experimental farmers, farmers not intending to make a profit or farmers not intending to maintain their farm with the normal inputs of a commercial pecan farmer. We used a yield of 1,666.67 inshell pounds an acre over 30 acres, which is the average yield across the production area calculated by the Proponent Group with input from Dr. Lenny Wells, University of Georgia Pecan Research Scientist.

The proposed Federal Marketing Order would require the collection of an assessment described in section II.C. The results of the analysis described in the theoretical framework are shown in Figure 20. These results show that merely collecting the assessments, with no marketing action taken, has very little influence in the bottom line ability of the farm to make profits. The graph shows in dark grey the probability that a pecan firm would not make enough (in net present value terms) to cover the opportunity costs of investing in something else ($50,000); in light gray, the probability of making between $50,000 and $300,000 which measures a healthy return on the total assets owned by the company; and in lighter gray, the probability of making more than $300,000. As shown the probabilities are virtually the same regardless of the assessment rate. This is an indication that the assessment would have very little impact in the cost structure of the firms.

Figure 20: Effect of different assessment levels on net present value (NPV) of a model farm

Prob(Unfavorable)	30.6%	31.0%	31.0%	31.0%	31.0%	31.0%	31.0%
Prob(Cautionary)	48.8%	48.6%	48.6%	48.6%	48.6%	48.6%	48.6%
Prob(Favorable)	20.6%	20.4%	20.4%	20.4%	20.4%	20.4%	20.4%

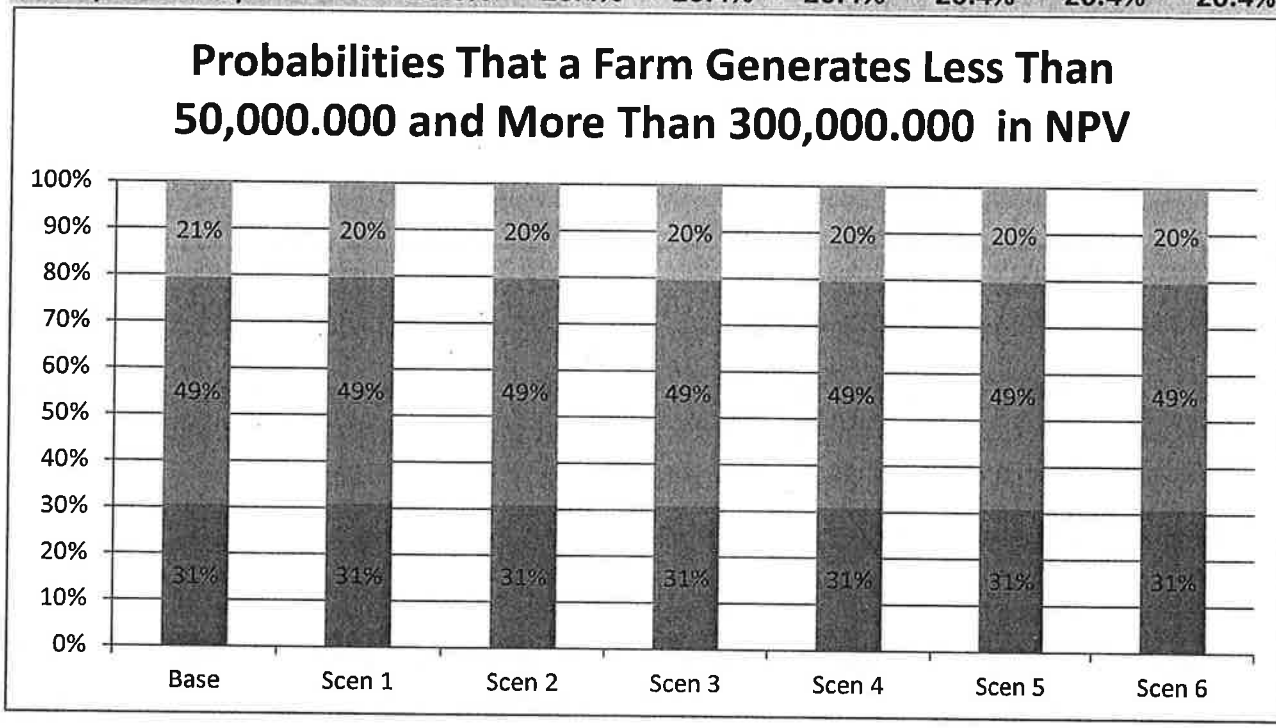


Table 9: Different scenarios for assessment levels for their effect in farm costs

Variety	Base	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Improved	**$ 0.000**	$0.020	$0.022	$0.024	$0.026	$0.028	$0.030
Native	**$ 0.000**	$0.010	$0.012	$0.014	$0.016	$0.018	$0.020

In horizontal axis of the graph in Figure 20 we have the different scenarios for assessment levels. The different assessment levels for each scenario are defined in Table 9: they are the minimum to the maximum level at 2 tenths of one cent increments. The results of simulating the net present value of the model farm with different assessment sizes manifested as a reduction in the actual prices paid to growers show that there is no significant effect on the profitability of the farm. The probabilities of a farm succeeding with the current conditions and with the assessments proposed by the Federal Marketing Order are not different.

b. Handling

From a handlers perspective the cost of the federal marketing order will be twofold: collection and accounting. The collection stage is process from every grower that the first handler purchases pecans from. The accounting refers to the book keeping of the pecan assessments that have been collected and paid. Since the accounting of payments to growers for the in-shell pecans is already part of the process for handlers, the reporting of the assessments collected would be the only additional tasks to be performed as a result of the implementation of the proposed Federal Marketing Order.

The handler margins range from 30-60% of the price. With the historic prices from 1997-2014 this would result in an expected margin of $0.58 per pound of in-shell pecan. Using the prices for growers described in Table 6 the handler prices are estimated and shown in Table 10. The table also shows the midpoint of the assessment as a percentage of the prices paid by the handlers.

Table 10: U.S. Season average price to handler and cost of the assessment as % of average price

	Price ($ per in-shell lb.)			Midpoint assessment as %		
	2012	**2013**	**2014**	**2012**	**2013**	**2014**
Improved pecans	$2.31	$2.48	$2.70	1.08%	1.01%	0.93%
Native/ seedling	$1.46	$1.50	$1.46	1.03%	1.00%	1.03%

The benefits to the handlers outweigh the costs of implementing the FMO. It is evident in Table 10 that at the handler level there is a positive price change as there is with the grower, but a smaller proportion of cost due to the greater prices paid to handlers

F. Reaction to Market Price

Table 11: Cost and benefits by farm size of the proposed FMO

	Small	Medium	Large
Production (lbs.)	49,980	291,667	833,333
Production assumes a 78% improved variety and 22% native/seedling split in acreage			
Cost of FMO	$1,140	$6,650	$19,000
*Assessment per pound * pounds produced = cost of FMO*			
Benefits of FMO	$2,853	$16,643	$47,550
*Average price increase per pound * pounds produced = benefits of FMO*			

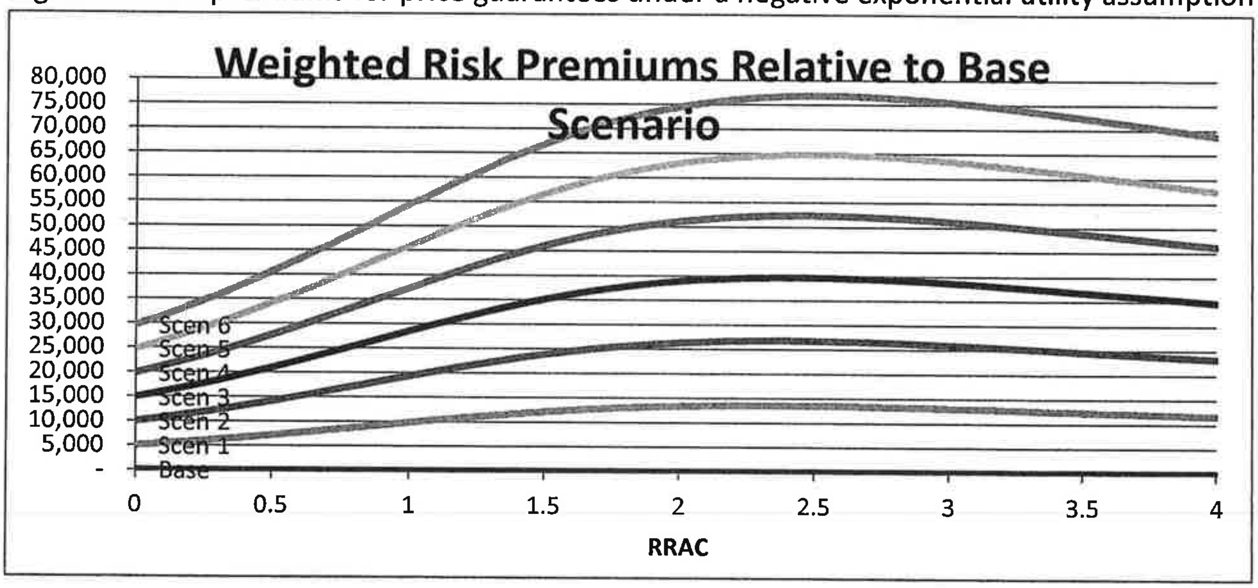
Shown for 30 acres, 175 acres and 500 acres at 1666.67 lbs. of inshell pecans per acre (average yield per acre over all three regions), as representative for small, medium and large farms in the production area.

With the cost and benefits per pound described in Table 5 and Table 6, we have estimated the costs and benefits of the FMO promotion authority by farm size as shown in Table 11. In all cases the benefits of the FMO outweigh the costs across a range of farm sizes. The cost of FMO is calculated at the average as total pounds times the cost. For example, in the medium farm size of the total 291,667 lbs., 227,500 lbs. are in improved variety (291,667 * 0.78) at an average cost of $0.025 we obtain a cost of $5,688 in improved varieties. The production of native/seedling is 64,167 lbs. (291,667 * 0.22) at an average cost of $0.015 we obtain $963. The total costs then is the sum of the cost for improved varieties of $5,688 and native/seedling of $963 for a total of $6,650. The benefit is calculated using the total number of pounds times the estimated average increase in price. For improved varieties, 227,500 lbs. times the average price increase of $0.063 we obtain $14,333 and for native/seedling we have 64,167 lbs. for benefits of $2,310. Total benefits are the sum of benefits of improved varieties and native/seedling ($14,333 + $2,310) for a total of $16,643. The benefit Cost Ratio (BCR) is simply the additional benefits generated by the program per dollar of cost. Dividing the estimated benefits by the cost we obtain 2.5 which reflect a $1 cost results in $2.5 dollars of benefits.

The range of benefits for a medium size farms using the low scenario is $10,833 to a high scenario of $24,535. The associated range of the costs for the medium size farm is $5,192 and $8,108 respectively. For a small farm, the costs are in the range of $890 (low scenario) to $1390 (high scenario) with benefits of $1,857 to 4,206 for the low and high scenario respectively. For a large farm, the costs are in the range of $14,833 to $23,167 for the low and high scenario and the benefits of $30,950 to $70,100 for the low and high scenario. In all cases the benefits outweigh the cost. The BCR ranges from 2.08 in the low scenario to 3.02 in the high scenario.

The evaluations described above have been made with the assumption that the volatility in prices, yields and costs will remain. It is a safe assumption. What would also make a safe supposition is to believe that pecan farmers across the country would like to minimize risk. If they could minimize risk, while still achieving profitability, they would be willing to pay for it, just like grain farmers buy price insurance.

Figure 21: Risk premiums for price guarantees under a negative exponential utility assumption



What is described in Figure 21 is just that. If farmers in the pecan business are moderately risk averse or risk neutral and they have a decreasing marginal utility for money, then they would be willing to pay to avoid the price volatility and be able to ensure a price premium. The cost of the assessment in a model farm used for the evaluation is **$6,650** at the average assessment level. This means that the improvement on price for pecan farmers due to the potential effects of the proposed Federal Marketing Order at the lowest level exceeds the cost of the assessment at its highest level.

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Appendix A

The Impact of Promotion on Demand (Williams and Welch, 2014)

COMMODITY	STUDY	BENEFIT-COST RATIO		PROMOTION LASTICITY*	
		average $ earned per $ spent on promotion		% demand change from a 1% expend. change	
ALMONDS	Crespi and Sexton (2005)		6.2b		0.13
COTTON	Williams et al. (2011)	Producer	5.7	Retail	0.05
		Importer	14.4	Mill	0.03
DAIRY	USDA (2012)	All Dairy	3.05		0.078
		Fluid milk	2.14		0.071
		Cheese	4.26		0.033
		Butter	9.63		0.042
		Exports	5.12		0.066
DRIED PLUMS	Alston et al. (1998)		2.7b		0.05
EGGS	Schmit and Kaiser (1998)		0.54-6.33a		0.006
HASS AVOCADOS	Carman, Li, and Sexton (2009)		2.5-4.0a		0.148-0.372a
HIGHBUSH BLUEBERRIES	Kaiser (2010)		9.12		0.109
HONEY	Ward (2008)		6.02-7.91a		0.082
MEAT:					
BEEF	Kaiser (2014)		11.2		17.4
PORK	Kaiser (2012)		14.44		0.018
LAMB	Ghosh and Williams (2014)		0.006-0.046d		0.037
MUSHROOMS	Richards (2011)	Retail	9.4-18.3e		0.008-0.089e
		Food Ser.	1.41-5.35e		0.039-0.058e
ORANGE JUICE	Williams et al. (2004)		2.9-7.0a		0.127-0.428a
POTATOES	Richards and Kaiser (2012)		5.17		0.32-0.116e
RAISINS	Kaiser, Liu, and Consignado (2003)		5.1-15.3a		0.029-0.133a
RICE	Rusmevichientong Kaiser (2009)		6.21-14.48a		0.21
SORGHUM	Capps, Williams, Málaga (2013)	Food/ind.	8.48		0.046-0.048a
		Exports	-0.144c		-0.33-0.066c, e
SOYBEANS	Williams, Capps, and Lee (2014)		6.5		0.023-0.047e
STRAWBERRIES	Carter et al. (2005)		44.0b		0.16
TABLE GRAPES	Alston et al. (1998)		44.9		0.16
WALNUTS	Kaiser (2005)		1.65-9.72a		0.005
WATERMELON	Kaiser (2012)		27.73		0.098h
WHEAT	Kaiser (2010)	Exports	9.51-20.00a		0.295-0.412a
MEDIAN			6.5		0.049
MEAN			9.8		0.093

* INCLUDES BOTH DOMESTIC AND EXPORT DEMAND PROMOTION ELASTICITIES.

A DEPENDING ON THE MODEL USED OR ELASTICITIES ASSUMED. B MARGINAL BCR. C NOT STATISTICALLY DIFFERENT FROM ZERO.

D LONG-RUN AND DEPENDING ON THE MARKET SEGMENT E. DEPENDING ON MARKET SEGMENT AND/OR PROGRAM TYPE

Measuring the effects of promotion on the demand for a commodity like wheat is simple in concept. Promotion is intended to increase the demand for the commodity as illustrated in Figure 27. If successful, the consequence is a shift in the demand for the commodity to the right. All that the analyst needs to do, then, is measure the extent of the demand shift. However, actually measuring the magnitude of any shift in commodity demand that can reliably be attributed specifically to the promotional efforts of the related checkoff program is a good deal more complicated. Early efforts to measure the demand effects of promotion programs relied largely on anecdotal evidence and simple comparisons of gross investments in promotion and gross changes in sales. During periods of rapidly expanding markets, rising prices, and growing checkoff investments, this approach tended to yield some persuasive stories and even more impressive upward-sloping graphical relationships between promotion expenditures and sales. The problem with this approach, however, is that various factors other than promotion programs affect the volume and value of commodity sales, such as relative price changes, agricultural policies, changes in incomes, population growth, competition from other products, and consumer health concerns and demographics, just to name a few. The problem becomes all too apparent in years when markets turn down and prices drop. Program managers find that taking credit for rising demand and prices in good years forces them to take the blame for declining demand and prices in bad years.

Over the years, increasingly sophisticated statistical methods have been developed to isolate and measure the unique contribution of promotion programs to the performance of the sales of the commodity being promoted. Most common has been the use of econometric regression techniques and models to statistically disentangle the effects of promotion program activities on commodity sales and demand from those of other market forces. The process usually requires a large amount of not only historical data on the sales of the product and advertising expenditures over time but also data related to the many other relevant market forces that might have affected sales over the same period. The application of the statistical technique to the data allows for the measurement of the unique contribution of each market force considered, including promotion, to the change in sales observed over the years.

Even if the statistical analysis indicates that a promotion program has had a positive and statistically significant effect on market sales, however, the question remains as to whether the increase has been large enough to cover the cost of the program. For that reason, the next step in the measurement process is to use the statistical results to calculate some aggregate measure of the effectiveness of the promotion expenditures. A standard method of determining if checkoff promotion pays has been to calculate the average return per dollar spent on advertising and promotion, i.e., a benefit-cost ratio (BCR), as the increase in market sales revenue or cash receipts (net of promotion costs) per checkoff dollar spent on promotion activities. An estimated BCR of greater than 1 is taken as an indication that the program is beneficial because net revenues (or profits) have increased by more than one dollar for every dollar spent on promotion. On the other hand, a BCR of less than 1 is taken to mean that the promotion program has been an unprofitable investment for stakeholders since each dollar spent generates less than a dollar in additional net revenue.

A large and growing number of studies have analyzed the effectiveness of checkoff programs. Most those studies have found that checkoff promotion programs increase producer net revenues by more than the cost of the promotion programs that generated those revenues. The consensus apparent across a wide range of studies by many researchers covering a large number of checkoff commodities is that the return to stakeholders from advertising and promotion by commodity checkoff organizations is positive and robust. In general, commodity checkoff program advertising and promotion have been found not only to be effective in increasing sales but also to have increased sales by more than enough to cover the costs of the advertising and promotion activities. Although varying widely across commodities and time periods, the BCRs calculated by most checkoff studies of the effectiveness of domestic advertising and promotion programs generally fall in the range of about $2 to $10 (Table 2). The BCRs for soybeans and grain sorghum, the only two grains with a national checkoff program, are reported to be $6.5 and $8.5, respectively4, meaning that their respective checkoff programs return $6.5 and $8.5 to producers for every checkoff dollar spent on promotion and advertising (Williams, Capps, and Lee, 2014 and Capps, Williams, and Málaga, 2013, respectively). Other studies of the returns to a diverse group of checkoff commodities report BCRs in the range of $0.54 to $44.9 from their respective promotion programs with a median of $6.5. Importantly, note that the BCR for any commodity checkoff program is not indicative of the amount of the additional net revenues (profit) the program generates for producers or the magnitude of the impact of the program on market demand or price. Despite the reasonably high BCRs calculated for most checkoff programs, the total amount of checkoff funds by those programs spent is actually quite small relative to the value of production of the checkoff commodity (cash receipts). Soybean producers, for example, have spent over a billion dollars on checkoff programs since the 1970s. Nevertheless, those expenditures actually have been quite meager when compared to the value of annual soybean sales (cash receipts) over the same period. Between 1970/71 and 2012/13, total soybean checkoff investments have amounted to only between 0.03% and 0.44% of total soybean farm cash receipts each year. The same is the case for other commodity checkoff programs regardless of the size of their program. Lamb producers spend only about $1.5 million a year on lamb promotion through their checkoff program which amounts to only about 0.1% of the value of lamb sales. With such low advertising-to-sales ratios (often referred to as the checkoff investment intensity), the overall impact of commodity checkoff programs could hardly be expected to be highly significant in a practical sense in its effects on U.S. production, prices, revenues, exports, and world market shares even if the impact could be said to be statistically significant.

The low checkoff investment intensities across commodities is one reason for the wide variation in the reported BCRs across checkoff programs (see Table 2). Benefit-cost ratios are calculated as the ratio between the additional industry net revenues (profits) generated by checkoff programs and the cost of the advertising and promotion required to generate that additional revenue (i.e., checkoff expenditures). Because small increases in industry net revenues are generated by checkoff programs with even smaller expenditures of checkoff dollars, small changes in the revenues generated (the BCR numerator) or in checkoff expenditures (the BCR denominator) can result in large changes in the calculated benefit-cost ratio.

Checkoff groups sometimes interpret estimated BCRs much in excess of 1:1 to imply large absolute impacts of their program on the market. Nothing could be further from the truth. A BCR of 5:1, for example, results by dividing a $5 billion industry profit benefit by a $1 billion checkoff investment or by dividing a $5 benefit by a $1 investment. Both investments yield a 5-to-1 return. Thus, the level of the BCR is actually independent of the level of the revenues earned and checkoff dollars spent. That is, there is no unique BCR associated with a given level of expenditures or revenues. Small checkoff programs with low levels of checkoff expenditures and producer revenues generated can have higher BCRs than large checkoff programs with high levels of checkoff expenditures and producer revenues generated. For example, the $14.44 BCR of the lamb checkoff program with annual checkoff expenditures of about $1.5 million is much higher than the $6.5 BCR of the soybean checkoff program which spends over $120 million annually.

Also, checkoff groups often erroneously assume that high BCRs are the objective of their programs. In fact, the objective is to generate additional sales that add to producers' profits. They also erroneously tend to assume that checkoff programs with the highest BCRs are the most effective checkoff programs. In fact, however, a high BCR actually implies that producers are underinvesting in their checkoff program which imposes an opportunity cost on the industry. That is, a high estimated BCR tells producers how much additional revenue they could earn for each additional dollar of increased assessment and expenditures given how the checkoff funds are being spent by their checkoff organization. So the high BCR to the lamb checkoff program of $14.44 means that by not increasing the level of the lamb checkoff assessment and, therefore, investments in lamb promotion, lamb producers fail to earn the additional $14.44 that is available to them for every additional dollar they might choose to invest. As the level of expenditures increase, of course, the BCR would be expected to drop to some extent because the increase in revenue generated would be less than the increase in expenditures. That is, the increase in revenue generated for every additional dollar declines as expenditures increase. That is known as the law of diminishing returns. So, in fact, given an effective, efficient, and growing checkoff program, the optimal BCR is equal to one because checkoff expenditures will have increased to the point where any additional expenditures will return less to producers than the additional investment.

Of course, a low BCR can also result from an inefficient, ineffective checkoff program that has little impact on market sales or sales. For that reason, in addition to the BCR, an important measure for checkoff programs is the checkoff promotion elasticity, that is, the percentage change in demand generated from a 1% change in checkoff expenditures. A checkoff promotion elasticity close to zero would, of course, mean that the promotion program operated by the checkoff organization with the funds contributed by producers is totally ineffective in moving demand. That is, there is no "bang" for the "bucks" invested by producers. In this case, the estimated BCR would be zero. The higher the checkoff promotion elasticity, the higher the "bang" for the "bucks" invested by producers. But what is a reasonable level for a promotion elasticity? Across the numerous studies of commodity checkoff programs, the estimated domestic and export demand promotion elasticities vary between 0.005 to 0.428 and -0.3 to 0.98. The median domestic and export promotion elasticities of 0.049 and 0.051 imply that the few highly positive reported domestic and export promotion elasticities skew their means (0.076 and 0.122, respectively) upward substantially. Given these reported checkoff promotion elasticities, a reasonable expected promotion elasticity is around 0.05 meaning that a 10% increase in checkoff promotion expenditures tends to increase commodity demand by 0.5% and a doubling of expenditures would be expected to generate about a 5% increase in demand.