An economic analysis of the desirability of another tree nut marketing order: Pecans

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AN ECONOMIC ANALYSIS OF THE DESIRABILITY OF ANOTHER TREE NUT MARKETING ORDER: PECANS

by

Clement Gem Argwings - Kodhek

A Thesis Submitted to the Faculty of the

DEPARTMENT OF AGRICULTURAL ECONOMICS

In Partial fulfillment of the Requirements
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THE UNIVERSITY OF ARIZONA

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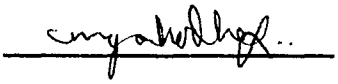
SIGNED: 

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

Eric A Monke 21 July 1988

Eric A. Monke Date

Professor of Agricultural Economics

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A number of people both inside and outside of the Agricultural Economics department deserve mention here. Eric Monke for intellectual stimulation, guidance, and encouragement ever since my sophomore year; Annie for helping turn computers from an annoying chore to a helpful tool, and Naniki and my friends for making the past year better than it would otherwise have been.

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ABSTRACT

The Agricultural Marketing Agreements Act of 1937 allows groups of specialty crop producers to form marketing orders to affect various aspects of the market in which they sell. Two of the three major tree nuts - almonds and walnuts - operate under marketing orders. This study examined the question of whether or not the third major tree nut industry - pecans - should follow suit.

An econometric model of the demand side of the tree nut industries was developed and used in simulations to see how prices and total revenues in the pecan industry would change under different assumptions as to the existence, or form, of a marketing order. The results showed that over the simulation period - 1988 to 1992 - the industry would benefit from the formation of a marketing order that limited quantities reaching the primary market, and used the surplus for developing new markets.

CHAPTER 1

INTRODUCTION

Stress in the agricultural sector in the United States has led to increasing interest in alternatives to traditional crops. International factors such as a strong dollar and policies of export promotion, self sufficiency and protectionism by foreign governments have reduced foreign market demands for traditional crops -- wheat, corn, soybeans and cotton -- from their record levels of the 1970's. Stagnant or declining demand for traditional crops has been a characteristic of the domestic market as well. The search for alternatives has led many farmers to consider specialty crops, whose markets - both domestic and foreign - are growing.

Specialty crops are no guaranteed panacea for those who may turn to them. Specialty crops are subject to great price variability - particularly the highly perishable ones. Tree nuts too are subject to price variability, partly because of natural cycles in tree productivity. Also, while demand is growing, price elasticities of demand are by no means infinite, and as more and more resources are devoted to specialty crop production excess supply may become a problem. With tree nuts, excess supply problems may become chronic as output adjustments for perennial crops are slow. The long period between planting and first harvest and the prominence of initial investment costs in total production costs are a large part of the reason for this.

Some growers have used marketing orders and agreements to address problems relating to the marketing of specialty crops, particularly output and price variability. At present almonds and walnuts are under a marketing order. Some members of the pecan industry are considering this possibility. However, just how successful or useful marketing orders are or have been is not clear. There has been relatively little academic research on marketing orders and evidence about their efficacy is mixed. Even less is known about how orders impact on each other in the competition for space in the consumers finite budget and stomach. This thesis will examine marketing orders for tree nuts - specifically almonds, walnuts and pecans - in an effort to add to the knowledge about the desirability, feasibility and operation of marketing orders.

A review of the literature is presented in Chapter 2. The almond, pecan and walnut industries will be the subject of Chapter 3. These chapters will provide real world information that gives a background to the empirical and analytical work that follows. In Chapter 4 a model of the demand for nuts will be developed and estimated. Simulations based on the model will be run and used to reach further conclusions about the competitive environment in the industry. Particular attention will be given to questions of how substitution in consumption among tree nuts may affect marketing order performance. The descriptive, quantitative and analytical information gained from those three chapters will be used to reach empirical and analytical conclusions about marketing orders for tree nuts that will be discussed in Chapter 5, the conclusion. This chapter will emphasise the question

of whether or not, or how, pecan farmers should go about forming a marketing order or some other alternative.

Some interesting work has been done on the effects of marketing orders on the welfare of society as a whole. However, since the ultimate aim of this thesis is to answer the question of whether or not a specific group of growers should form a marketing order, the emphasis of the thesis, as with marketing order legislation, is producer welfare.

CHAPTER 2

MARKETING ORDERS

This chapter considers the role of marketing orders in U.S. agriculture. The chapter begins with an examination of the historical origins of marketing orders. The following section discusses specific provisions of marketing orders and analyzes how they work. The chapter also considers some of the economic problems created by marketing orders and discusses the results of previous research into these problems.

Historical Background

Marketing orders currently cover 33 crops - over half of the tree fruits and 15% of the vegetables produced in the United States - worth $5.6 billion in 1984. There are about 90 federal and state marketing order programs (47 federal, 33 California and 15 by other states). In California over 70% of fruits and vegetables are covered by marketing orders (French, 1987).

The need for some form of help for the producers of fruits and vegetables has long been justified in terms of the special problems associated with their production and marketing. The perishability of the products, the seasonal production and the sometimes dramatic variations in yield from year to year (especially with tree crops), all lead to dramatic variations in prices over time both within and between seasons. Perennial crops were slow to respond to changes in economic incentives because of the substantial time lag between planting and first harvest;

in the basic crop industries production decisions are made from year to year. The market power of the few produce buyers relative to the many sellers was seen as exploitative, as buyers could play grower against grower to the buyers advantage. Variations in quantity supplied, sizes and maturity made it difficult for consumers to know exactly what they were buying.

To solve problems associated with disorderly marketing and market power, growers first tried forming cooperatives. Over 700 of these were formed between 1890 and 1920. Although a few from that period survive to this day -- including the California Almond Growers Exchange, Diamond Walnut and Sunkist -- most failed. A key factor was the voluntary nature of membership and consequent free rider problems. Initial legislative efforts -- marketing agreements-- suffered the same problems. Marketing agreements were allowed by congress in 1933 in response to the large harvests and low prices that resulted from the increases in production caused by good prices just before and during WW I.

Producers who did not join the voluntary marketing agreements or cooperatives reaped extra benefits from the activities of these organisations without paying any part of the costs. When co-op members held back their some of their crop from market, free riders were able to sell a larger proportion of their production. The California Fruit Growers Exchange, now Sunkist, provides an example of this behavior. Until 1941, the cooperative operated its own weekly shipment proration program. Weekly sales levels were set to ensure prices that would leave

the grower some profit. This quantity was shared out among the cooperating packing houses. Excess output, which averaged 20 % of the cooperatives production, was diverted to low value uses. But this pattern of behavior created opportunities for non members, who shipped all of their output to the higher priced fresh market. As a result non members were better off than members.

The Agricultural Marketing Agreements Act (AMAA) of 1937 was introduced to remedy the free rider shortcoming of the voluntary programs. Marketing order legislation exempts groups of producers from anti - trust regulations, and was first enacted in the 1930's. Federal legislation in the Agricultural Marketing Agreements Act (AMAA) of 1937 set the attainment of parity prices as the goal of marketing orders. However the California Marketing Act of the same year however, provides a clearer view of the stimulus behind the 1937 bills. It says in part,

> the marketings of commodities in excess of reasonable and normal market demands, disorderly marketing of such commodities; improper preparation for market and lack of uniform grading and classification of commodities; unfair methods of competition in the marketing of commodities and the inability of individual producers to maintain present markets or to develop new or larger markets for California grown commodities, results in an unreasonable and unneccessary economic waste of the agricultural wealth of this state.

They also mention that these conditions would jeopardize the long run supply of food and fibre.

The AMAA remains the principal marketing order legislation. Its key provision is that a marketing order, once approved, is binding on all producers. To form a marketing order requires a public hearing,

where arguments for and against the order can be made. The proposed order and these arguements are then reviewed by the Secretary of Agriculture (or State Director of Agriculture for a state order). If convinced that the proposed order will achieve the goals of the AMAA (or corresponding state act) -- parity prices and or orderly marketing -- then adoption is recommended. Further objections may be filed following this preliminary decision. Once this critique and review process is completed, the Secretary submits a final version of the order to be voted on by the affected industry. For federal orders, two-thirds of voting producers, who must represent at least two-thirds of the production volume, must agree to the order before it becomes effective. The order is then binding on all producers and handlers until such time as the Secretary suspends or terminates it. This can happen if the majority of producers vote for termination of the order or if the Secretary feels the order is not fulfilling the intent of the act.

Groups of producers often have a choice between forming a state or federal marketing order. Some industries have both. Although there may be some overlap between the two, there are several differences between the two programs. Historically, the major difference was that state orders allowed for generic advertising and promotion. In 1962 the cherry order became the first federal order with this provision. In addition, some states allowed marketing quotas for commodities long before federal law did. For example, even now, most fruits and vegetables destined for freezing or canning are ineligible for a federal order. Some states, most notably California, allow such orders. Another important distinction is that state orders can be used to regulate the

intrastate movement of a commodity. Federal laws only cover interstate movement.

Volume Control and Market Allocation Provisions

The farm production sector is made up of many small price taking producers. Marketing orders allow producers to centralize some of their marketing decisions, in order to gain some degree of market power. To increase income, they can set price, sales and, in some cases production. With a marketing order, incomes are increased in a way that could not occur if each single producer, who sells all his output without consideration of market price effects, made separate marketing decisions. Marketing orders also allow producers to alter other aspects of the market. Table 2.1 shows what provisions -- Quantity Control, or Production and Marketing Support (including quality control) -- are authorized by the federal marketing orders as of January 1985. Not all authorized provisions are necessarily used in any given year.

Under the hypothetical conditions of perfect competition, an equilibrium is reached when the price of output is high enough to cover average total costs of production, including a 'normal' profit. Under these conditions, there is no incentive to enter or exit the industry. But if production takes place in an environment of imperfect knowledge, and uncertainty from variation in yields, demand, and costs of production, equilibrium can be attained only accidentally and sustained only briefly. If prices move around a long run equilibrium in a random fashion, then in some periods, prices may not cover total costs of

TABLE 2.1 PROVISIONS OF FEDERAL MARKETING ORDERS, 1985.

AREA AND COMMODITY	VOL. MANAGEMENT IR	VOL. MANAGEMENT SR	QUALITY CONTROL	MARKET SUPPORT
Florida Citrus	SH		GMS	
Texas Oranges and Grapefriut			GMS	PC/RD/A
California - Arizona Navel Oranges	HP		S	RD
California - Arizona Valencia Oranges	HP		S	RD
California - Arizona Lemons	HP		S	RD
Florida Limes	HP/SH		GMS	PC/RD/A
Indian River Grapefruit	HP			
Florida Interior Grapefruit	HP			
Florida Avocados	SH		GMS	PC/RD/A
California Nectarines			GMS	PC/RD/A
California Pears, Plums and Peaches			GMS	PC/RD/A
Georgia Peaches			GMS	
Colorado Peaches			GMS	RD
California Kiwifruit			GMS	PC
Washington Peaches			GMS	PC/RD
Washington Apricots			GMS	PC/RD
Washington Cherries (sweet)			GMS	PC/RD
Washington - Oregon Fresh Prunes			GMS	PC/RD
California Desert Grapes	SH		GMS	PC/RD
California Tokay Grapes	HP/SH		GMS	PC/RD/A
Oreg.-Wash.-Calif. Winter Pears			GMS	RD/A
Hawaii Papayas			GMS	PC/RD/A
10 States Cranberries		RP/PA	GMS	RD
8 States Cherries (tart)		RP	GMS	
Washington-Oregon Bartlett Pears			GMS	PC/RD
California Olives			GMS	RD/A
Idaho - E. Oregon potatoes			GMS	PC
Washington Potatoes			GMS	P
Oregon-California Potatoes			GMS	P/RD
Colorado Potatoes			GMS	PC/RD
Maine Potatoes			GMS	PC
Virginia-North Carolina Potatoes			GMS	
Idaho - Oregon Onions	SH		GMS	PC/RD/A
S. Texas Onions	SH		GMS	PC/RD
Texas Valley Tomatoes			GMS	PC/RD/A

TABLE 2.1 Contd.

AREA AND COMMODITY	VOL. MANAGEMENT IR	VOL. MANAGEMENT SR	QUALITY CONTROL	MARKET SUPPORT
S. Texas Lettuce	HP/SH		GMS	PC/RD
S. Texas Melons	SH		GMS	PC/RD
California Almonds		RP/MA	GM	RD/A
Oregon-Washington Filberts		MA	GMS	P
California Walnuts		RP/MA	GMS	P/RD/A*
Far West Spearmint Oil		RP/MA		RD
California Dates		MA	GMS	C/RD/A
California Raisins		RP/MA	GMS	RD/A
Wash.-Idaho-Oregon-Calif. Hops		RP	GMS	P/RD
California Prunes		RP	GMS	P/RD

Volume management. IR - intraseasonal regulation, SR - Seasonal Regulation, HP - handler prorate, SH - shipping holiday, RP - resesve pool, MA - market allocation, PA - Producer Allotment.

Quality control. GM - grade and/or maturity standards, S - size regulations, GMS - grade, maturity and size

Market support. PC - pack and container regulation, P - pack only, C - container only, RD - research and development, A - Advertising and promotion.
* A since 1987

Adapted from French (1987), and U.S. Controller General,1985.

even the most efficient producers.

Marketing orders offer producers several management strategies to avoid these periods of losses. These provisions limit short run supply to an amount that raises prices to adequate levels, allocate supply to different markets, or distribute sales across time periods so that grower income is increased relative to unregulated marketing.

Rate Of Flow Provisions

Handler prorates limit the amount of product a handler can handle during any given period and thus control the volume of fresh products available in markets in a given time period. Shipping holidays are used to reduce supplies in markets during periods of reduced trade activity such as holidays. This may reduce spoilage and handler losses. Prorates are used most in the citrus and onion orders, as both products store well unharvested. Currently one third of the federal orders employ these rate of flow provisions.

Just as income from a given crop can be increased if it is allocated to different markets (see below), income can be increased by reallocation of the product over time. If all the supply, particularly of a perishable product, arrived in a given market at the same time just after harvest, prices would fall dramatically. By lengthening the period the product is on the market, and preventing the product from reaching the market at the same time as substitutes, these policies sustain higher prices over a longer time period.

Advances in communication and storage technology have probably made these marketing order provisions less important than in the past.

In the past, markets were less sophisticated and subject to gluts and volatile prices. But today, food is rarely found rotting in terminal markets. A $ 1 telephone call yields market conditions in any part of the country, and advances in storage technology is continually increasing the shelf life of perishable food products.

The potential for rate of flow regulations to stabilize prices is uncertain. Farell (1966, p.311) discusses how the interaction of rate of flow regulations, intermediate handlers their response to expected prices can increase price instability. Intermediate buyers intend to resell in the future and therefore are more interested in expected than current prices. This gives speculative behavior the potential to increase price instability. Announcement of a price decrease by a dominant cooperative, for example, could lead to a drop in current period sales if middlemen anticipate further price decreases in the future. When a price hike is announced, the opposite may happen if they anticipate further price hikes in the future. A 1987 report of the Almond Board of California (ABC 1987) claimed speculation was having just such instability effects on the almond market in the United Kingdom. The speculation in this case was related to expected harvests rather than expected rates of flow.

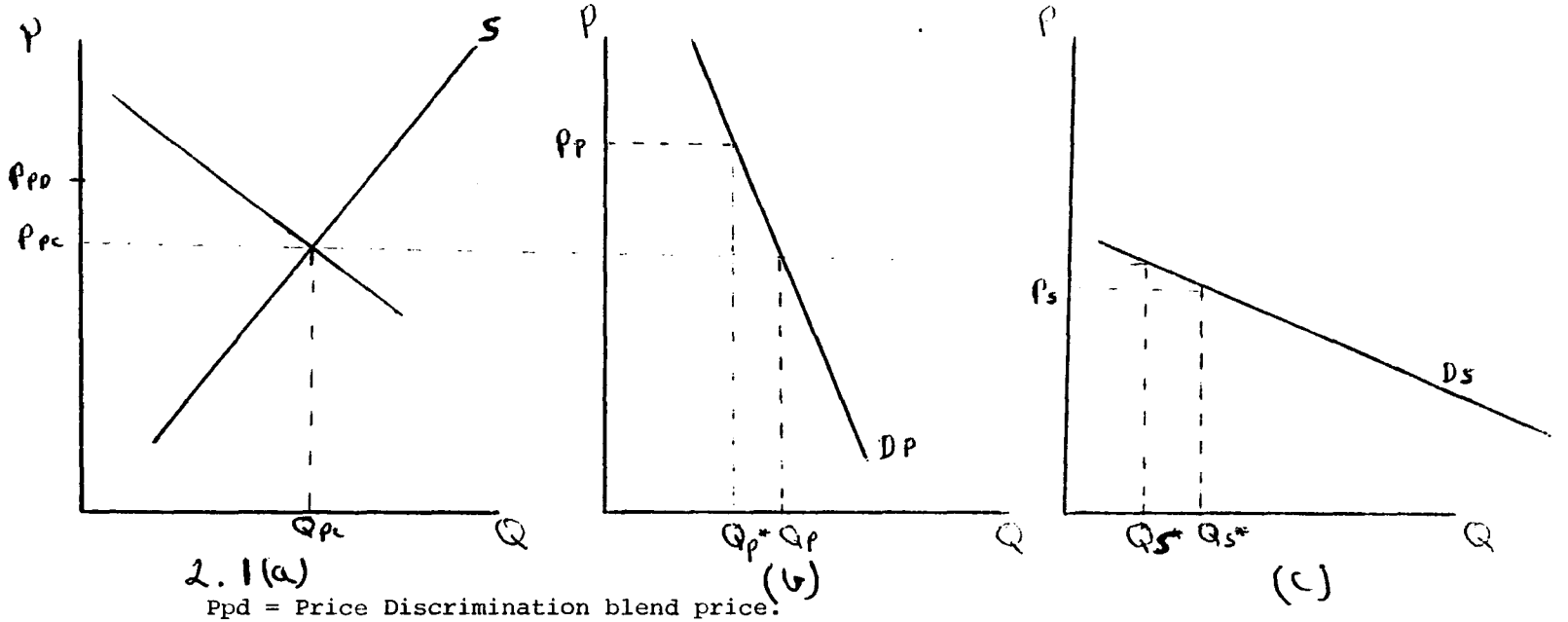
Empirical evidence is mixed on the effect of rate of flow regulations on prices. Power, Zepp and Hoff (1986) examined the California - Arizona navel orange prorate but found only minor differences in the stability of shipments and prices in a year when the prorate was suspended compared to similar years when the prorate had been in effect. Carman and Pick (1987), while admitting that 1986 was an

unusual year in the lemon industry " conclude that there is substantial evidence that both sales and prices were more stable during years when the prorate was used than during the 1986 crop year when prorate was not used." These two examples from fairly similar industries show how difficult it is to make general conclusions about the impact of marketing orders.

Market Allocation

Another way that marketing orders attempt to increase total revenue to growers is through the manipulation of the quantity of output that is sold in different market outlets. If elasticities of demand in two or more distinct markets are different, then price discrimination may increase total revenue. Revenue is maximized when marginal revenue in each market is equal. If conditions were otherwise, revenue could be increased by transferring product from the market with lower marginal revenue to the one with higher marginal revenue. If elasticities of demand differ, this equality corresponds to different prices in the different markets.

Figure 2.1a shows supply in a hypothetical market. The quantity Q_{PC} and price P_{PC} are those that would prevail in a perfectly competitive equilibrium. If demand in the primary market (2.1b) is inelastic, total revenue and price may be raised above perfectly competitive levels by restricting sales. If demand in the secondary market is elastic (2.1c) a larger portion of total supply is sold there. Total revenue and sales are higher at Q_{S*} than at Q_S , even though price is lower. As a result average prices received by growers are



Ppd = Price Discrimination blend price.
Ppc = Perfect competition price.

Pp = Price in Primary Market
Ps = Price in secondary market

FIGURE 2.1. Price Enhancement Through Market Allocation.

increased above P_{PC} (to P_{PD}).

In the specialty crop industries, the fresh and domestic markets usually represent the primary market, and processed and export markets comprise the secondary markets. Most orders have focussed on restricting primary market supplies, even at the expense of negative returns in the secondary market. These provisions have been particularly important in industries where the product is not highly perishable. All of the federal nut orders have this provision, as do the federal date and raisin orders. In the citrus industry, orders that regulate the rate of flow of the product to the fresh market in effect make processing a residual secondary market.

In recent years this provision has been less used , in spite of recent record crops. Decreased emphasis on market allocation has resulted from public outcry over the destruction of edible food that occurred in the 1970's, strong export markets that have offered prices as good as or better than domestic prices, and the decreased popularity of supply control relative to market promotion as a means of improving grower prices.

Reserve Pool

Market allocation is often undertaken in conjunction with reserve pools, where the product may be held until it is decided to dispose of it in a secondary market or to destroy it. Four of the six federal orders that have market allocation provisions also have the reserve pool provision. A reserve pool is declared when the marketing order administrative committee, with the approval of the Secretary (or

State Director) of Agriculture, declares a specified percentage of handler throughput to be unavailable for sale. The pool will is held by the handler, usually at the expense of the order administrative committee, until demand conditions improve. The pool can be diverted to secondary markets or destroyed if the committee decides that the reserve cannot be released to the primary market without too detrimental an effect on prices. In such a case, the reserve pool works as a market allocation device.

A reserve pool can also be held over to the next marketing season. In this case, the reserve can be used to stabilize prices over time. If the subsequent crop is small and prices are high, all or part of the pool may be sold. In years of large crops, a reserve helps keep prices from falling. Growers may realize income gains from inter year management of stocks. Polopolous et. al. (USDA 1985) suggest that interseasonal storage may be done more efficently by an order than by private traders. They argue that part of the risk associated with speculative interseasonal stockholding is the lack of knowledge about the storage inventories and storage release plans of other traders. If an order controls all the stocks in storage then it has all the relevant information and can make storage decisions that are less hampered uncertainty.

Order administrative committees have not generally used reserve pools as stabilizing devices. Farell(1966 p.309) suggests that the pools are used to raise the troughs in prices, but stocks are only rarely released in times of short crops when they would lower the peaks. Instead, stocks are eventually disposed of in an improved secondary

market, or destroyed. Such a policy improves returns relative to a pure stabilization policy.

Reserves have also been used to substitute for future production. In the mid 1960's, for example, raisin growers were given the option of not producing, and instead taking title to some of the stock in a reserve pool. This saved both variable costs and the opportunity costs of the fixed factors as well as avoiding further additions to stocks. Growers took holidays or grew something else.

Reserve pools are limited to industries where the product is not highly perishable or expensive to store. The federal orders for almonds, walnuts, spearmint oil, raisins, hops and prunes have this provision. Of these, only the walnut and spearmint oil orders have had serious problems with large stocks. In the walnut industry, stocks grew large partly as a result of temporary problems in the export market. The existence of a strong secondary market seems to be an important factor in limiting the growth of stocks.

The almond order, due to the influence of the dominant cooperative, strives not to hold stocks over till the next marketing year. Disposing of all the crop in the year it is harvested and mandating a portion of the reserve to new product and market development has been credited with the successful development of new markets. Sales from the reserve pool at low prices in export markets helped develop the market that now takes over half of California's almonds.

Producer Allotments

If a product can only be grown in a specific area, producer allotments can be a powerful tool to limit supply. Thus the gains from the formation of an order are not dissipated by production increases. The supply limiting effects of producer allotments have the same results as those seen in a primary market under market allocation. The restricted quantity is sold at a higher price that results in higher total revenue if the industry is operating on an inelastic portion of the market demand curve.

Growers with producer allotments are allowed to market, in the current period, a specified percentage of their sales in an historical base period. This provision provides a benefit over and above enhanced prices to those who are in the industry when the allotments are handed out. Those producers recieve quota rents -- the discounted present value of future profits -- as a result of the marketing order. New growers can only get into the industry by buying an existing allotment from an existing producer. The same applies to producers wishing to expand. If the rate of return in the industry increases over time, as it probably will due to the artificial restriction on supply and normal increases in demand resulting from income and population growth, then so does the value of the quota rent. The extra profits that the allotment holder would have earned if he had stayed in the industry are amortized into the price of the allotment. Thus a new entrant recieves no enhancement of his rate of return above what it would have been without the order. Quota rents of this type are direct transfers from new

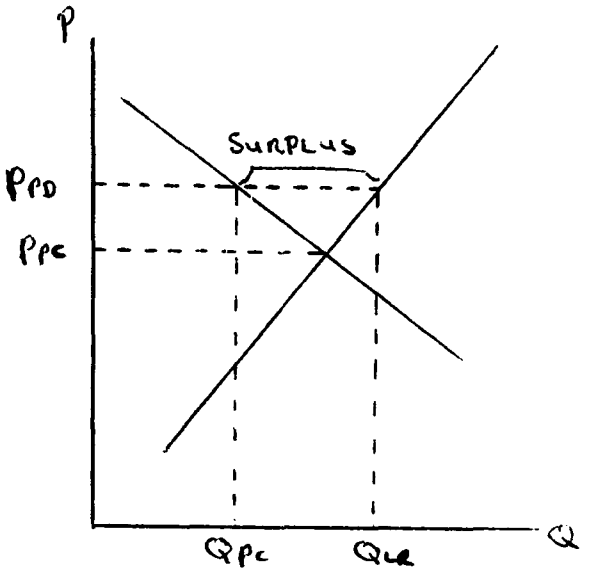
producers as well as from consumers to existing producers who hold the allotments.

Problems With Volume Control And Market Allocation Provisions

The impact of volume management on increased production has proven the achilles heel of marketing orders emphasising these provisions. Any enhancement of prices tends to encourage increased production within the area under the order as well as in other regions both domestic and foreign. Producer allotments can only remove the problem of increased production within the area under the order. Price enhancement also encourages the production and consumption of substitutes.

Long term problems of resource misallocation have been associated with the volume control and market allocation provisions of marketing orders. The California state order for cling peaches provides one of the more dramatic examples of the resource misallocation that can occur. Various orders in the industry have had provisions for the destruction of immature peaches on the tree (known as 'green drop'), actual uprooting of trees in return for credit against future unsaleable reserves, and the diversion of peaches from the cannery to be destroyed. In 1970 - 71, for example, almost 21,000 acres of trees were uprooted and 200,000 tons of peaches were diverted at the cannery. From societies point of view these represent lost rescources and caused much public outcry against marketing orders in the early 1970's, and has resulted in a decreased tendency to use destruction provisions.

Figure 2.2 illustrates the general problem associated with



Ppd = Enhanced blend price from market allocation.
Qpc = Quantity demanded at Ppd.
Ppc = Price under perfect competition.
Qlr = Quantity supplied at Ppd.

FIGURE 2.2. Long Run Problems From Market Allocation

volume control. Following successful market allocation,producers receive a blend price P_{PD} (see also Figure 2.1) which is higher than the price they were receiving under perfect competition. This higher price leads (at a rate depending on the biological characteristics of the commodity), to an increase in output towards Q_{LR}, the quantity at which the blend price received under price discrimination meets the long run supply curve.

Faced with this situation the order committee has several options. The committee could declare a reserve equal to the difference between Q_{LR} and Q_{PC} and warehouse it. In the next period, if $Q_{LR} - Q_{PC}$ continues to be held off the market, growers still see price P_{PD} and again produce Q_{LR}. Unless bad weather or unforseen shortfalls occur, this scenario leads to ever increasing stocks that are held at ever increasing cost. These costs are ultimately recouped from growers, reducing income. The stocks could be destroyed, but growers would still lose the money used to grow, harvest, haul and store what was destroyed.

Alternatively, the extra output could be allocated between the primary and secondary markets. The recipient market (or markets) shows a fall in price that, ceteris paribus, will be reflected in a lower blend price to growers. In the citrus industry, for example, high prices in the fresh market have been maintained by allocating an ever increasing proportion of the lemon and orange crops to the frozen concentrated juice market.

In industries such as onions, potatoes, and tomatoes, where the period from planting to harvest is short and capital costs relatively low, adjustment to over-production problems is quick and relatively low

cost. With perennial tree crops, however, response to changing economic conditions is slow. It takes an average of 5 years for a newly planted tree to bear fruit (and even longer for recovery of the investment costs). In such industries chronic surpluses can develop. Supply becomes so large in relation to effective demand that market price is less than minimum long - run average total costs of even the most efficient producers. This does not result in immediate massive exit from the industry due to the large investment costs already incurred. With fixed costs accounting for a large share of total costs, growers try and wait out bad years, continuing production so long as revenues exceed short - run variable costs.

Chronic surplus is necessarily a short run phenomenon since total costs are not being covered and the grower is losing equity. However, the short run in perennial crop industries may be of several years duration. Readjustment may be a long and economically painful process. The problem is one of excess resources in the industry - a problem marketing orders have been accused of creating or aggravating by retarding resource adjustments. In the cling peach industry, for example, as trees were being uprooted, other growers, particularly the large and efficient ones, were planting new trees.

The inability of marketing orders to maintain incomes above their competitive equilibrium in the long run is widely accepted, but they still seem popular with growers. Berck and Perloff (1985) suggest that the literature on welfare losses and gains from marketing orders underestimate the benefits available to producers from forming a

marketing order. Researchers, they say, failed to take account of the dynamic adjustment path profits will follow in moving from the static equilibrium under perfect competition to the long run, zero profit equilibrium. Profits are raised when a marketing order goes into effect, eventually returning to zero. But the present discounted value of profits that growers see when they are deciding to vote for an order is strictly positive. The problem with such reasoning is the implicit assumption that there will be no negative profits during the transition period. However, the point that growers will enjoy at least several years of good returns before new production cuts into profits, appears valid. In the almond, walnut and pecan industries this period would last at least 4, 6 - 9 and 8 years respectively.

Production and Marketing Support Provisions

Under the production and marketing support provisions of marketing orders, additional programs are aimed at maintaining and improving the quality of industry products, reducing industry costs in production and marketing, reducing unfair trade practices and increasing the demand for industry products. Quality control has always been an important part of marketing orders, but advertising and promotion provisions were not introduced into federal orders until the 1960's. As Table 2.1 shows these latter provisions are today, the most common of all provisions.

Quality Controls

When fresh fruits and vegetables are sold, consumers often have no way of knowing the quality of the product. Growers fear that the poor products of others -- bad, unripe or worm infested products -- will discourage consumption or repeat purchases of that product. Commercial buyers are also at risk in buying fresh products. Most trade in fresh produce is done without the buyer actually seeing the commodity.

Brands are not yet important enough in the fresh fruit and vegetable industries to minimize such externalities. Marketing order maturity standards, the setting of grades and minimum grades for selling, size regulations, and inspection provisions allow an industry to enforce quality control. Grade and quality standards, along with impartial inspection, help reduce the risk of losses from goods spoiled in transit or from misrepresentation of the product as higher quality. These controls also reduce marketing costs, as buying over the telephone is cheaper than physical examination of every lot.

Maturity standards keep unripe products from being sold to consumers. This is especially important when maturity cannot be easily ascertained by the consumer. They also counter the tendency to market produce prematurely to capture premium prices afforded to early harvests.

Minimum grades and grading provide traders a scale of reference by which to judge and compare different lots of an unseen product. Grades refer to characteristics such as color, size, shape, and amount of scarring, blemishes, insect damage, rot and foreign material, depending on the particular product. Minimum grades ensure that fruits

and vegetables not meeting a certain standard will not be sold to consumers. They also keep low quality imports out of domestic markets and thus act as a tool to restrict market supply.

At times, marketing orders invoke size regulations. This can keep unripe products off the market if size and maturity are related. However, if size is an attribute unrelated to the quality of the product, this provision may also be used as a way of limiting quantities getting to market. For example, marketing order regulations include a provision that imported product must meet the same standards as domestic production covered by the order. Thus regulations becomea type of non tariff barrier if imported fruits and vegetables have different characteristics from the domestic product.

Quality, grade and size regulations have not evoked much controversy or discussion in the literature on marketing orders, despite their presence in almost all federal orders. One issue that has come up involves the disposal of product that does not meet minimum standards and is whether consumers would be willing to buy lower quality at lower prices and whether these prices would allow positive net returns to growers, handlers and retailers. If a low quality product could not cover the cost of marketing it, then it would not get to market even in the absence of an order. The marketing order provision becomes redundant. The USDA report by Polopolous et. al. (USDA 1985) recommends mandatory grade labelling at retail rather than minimum quality standards so that consumers can make their own choices.

From time to time these provisions have stirred controversy

within an order. This happens when grade standards impact different groups of growers in different ways. In the Florida citrus industry for example, Indian River District growers demand, and usually receive, size standards for grapefruit that are smaller than those for the interior districts. Problems have also arisen between growers of ripe red and vine ripe green tomatoes. In the walnut industry, some industrial users complain that nuts with only 1% oil content are best for their needs. Most domestic nuts are over 2% oil and most imported nuts do not meet this standard. Section 8 e of the AMAA requires that imports meet the same standards as domestic products and thus such walnuts cannot be imported. In this case, product not meeting the standards are superior for some purposes.

Inspection by impartial third parties -- usually federal or state government employees-- is one of the protections from packers and middlemen that growers have sought through marketing orders. At times, inspection is done at the expense of the order committee representing the producers and handlers. Given the externalities related to a few growers poor quality, and the beneficial effect inspection can have on a market, producers would be expected to provide at least some of the cost of inspection. When the federal or state taxpayer incurs the full cost, then producer and handler profits are increased.

Research

Marketing orders can collect assessments from producers to fund research. Research is aimed at improving yields and production and harvesting practices, developing new varieties, and controlling pests.

Research related to marketing covers such diverse activities as new product development, advancing processing technology, developing better containers and packaging, and improving storage techniques. Marketing orders also fund data collection, economic research and market surveys. Much of this data is necessary for the crop size estimates that must be reported before the Secretary of Agriculture will declare a reserve. This information also helps the industry with pricing, marketing and production planning.

Pack and Container

Regulations dictating the size and type of containers that may be used and how the product may be packed are aimed at reducing trading costs through standardization. This could hinder innovations in packaging, but exceptions are liberally granted. At times the order committee actually funds a users conversion to, or experimentation with, new packaging.

Unfair Trade Practices

This provision is aimed tries to ensure that handlers cannot discriminate among producers in some arbitrary manner. Sampling procedures are laid down and prices must be posted so that growers can be sure that they are receiving the same prices for the same grade.

Advertising and Promotion

The advertising and promotion provisions of marketing orders allow assesments for activities aimed at maintaining, enlarging or modifying demand. In recent times these have become increasingly

important provisions of marketing orders. They have been further encouraged in recent years, as the federal government now allows assesments for these activities to be levied across state lines. In Washington and Oregon, commodity commissions undertake advertising, promotion and research but are not permitted to practice volume management or quality control. The newest marketing order, between California vineyards and vintners, provides only for promotion.

Advertising is directed at both final consumers and intermediate buyers. Promotion, using means other than paid public announcements, is more important for reaching intermediate buyers. Promotion, as part of systematic development of the domestic, but particularly the export market, has been an important factor in some industries. Almonds are perhaps the most successful example. Today over 60% of U.S. almonds are sold overseas, largely because of industry wide cooperation to cover the expenses involved in new market development.

Industry promotion also covers such public relations activities as funding political campaigns for key senators and congressmen, as well as articulating industry viewpoints to public and private groups. Order industry groups claimed some credit for the passage of the 1985 Targeted Export Administration Act that provides matching funds to agricultural groups working to build foreign markets.

It is difficult to assess the effectiveness of these efforts. Whether advertising reduces the elasticity of demand for the product, or shifts the demand curve out so that more will be purchased at any given price, are empirical questions. Even then it is difficult to separate changes in demand that had nothing to do with the advertising and

promotion, from those attributable to higher consumer income, changes in tastes, changes in markets for competing products, relative price changes and any one of a host of other external factors. All economic theory can say is that if the cost of promotion is less than the resulting increase in total revenue then it is worthwhile. As Sidney Hoos (1957 p. 31) put it, " To answer the simple question often asked by industries such as 'should we advertise' or 'how much should we spend on advertising' requires the audacity, boldness, confidence and daring of an advertising account executive."

One recent phenomenon of interest is nationwide advertising by industries not under orders. This begs the question as to whether orders are necessary to undertake the promotion function. The federal government now allows nationwide assessment collection for advertising by agricultural groups as has been done by the beef, dairy, pork and potato industries. Another effect of the proliferation of advertising campaigns is that industries may be compelled to spend resources on advertising just to maintain markets. At some point, advertising and promotion may merely cancel the efforts of other industries yet no industry would dare to be the first to get off the advertising treadmill for fear of losing markets.

SUMMARY

Marketing order enabling legislation provides growers a wide range of options as to what form of a marketing order they may form. As shown in Table 2.1, the most commonly adopted provisions are those

related to quality control and market support, particularly as regards packaging and containers, and informational advertising on the nutritional content of products. The popularity of these provisions arises from their positive contribution to efficiency in the marketing of specialty products. Drawbacks that may be associated with these provisions are relatively innocuous.

It is the volume management provisions which have evoked most controversy and discussion. It is now generally accepted that price enhancement through the volume management provisions is unlikely to last. Without control over entry into the industry, an order cannot indefinitely maintain abnormal profits to growers. Even producer allotments do not solve this problem.

The 50 year experience with marketing orders suggests that ultimately a free market in a dynamic economy is more powerful than institutions built to counterract market forces. Marketing orders have led to some lasting beneficial results in some industries but these have tended to be in areas where orders have tried to make markets more efficient. Where they have tried to foster inefficiencies, their positive effects on producer welfare have been, at best, transitory.

CHAPTER THREE

THE TREE NUT INDUSTRIES

With the wide array of choices as to what form of marketing order a group of growers may form, it is difficult to make meaningful generalizations about the effect of marketing orders without referring to the circumstances in particular industries. This chapter will focus on the history and current conditions in the almond, walnut and pecan industries as well as evaluating the performance of, or potential for, marketing orders in those industries.

The California Almond Industry

Almonds were first grown in California in the late 1800's. As early as 1900 several groups of growers formed pools for the sale of their combined crops. Speculative buyers who had previously played grower against grower now used their bargaining power to play one pool off against another pool. In an attempt to further strengthen producer bargaining power, nine small grower pools with a total of 230 members met in Sacramento in 1910 to form what is now The California Almond Growers Exchange (CAGE) (Jewett and Voorhies, 1959).

The principal aim of the Exchange was to shrink the difference between grower and final consumer prices for almonds. Between 1910 and 1918 returns to growers rose 50 % while consumer prices stayed almost constant. Over that period production nearly doubled to 4000 tons. Since that early success, the Exchange has remained a major part of the

almond industry. In many ways, the history of the industry is the history of the Exchange. In only 3 years since 1910 has the exchange marketed less than half of the crop.

High prices before and during World War I led to increased plantings and production, and the industry aimed for a larger share of the U.S. market for shelled almonds that was, until then, dominated by imports. As a result of industry efforts, in 1922 congress passed a law levying a 10 cents a pound tariff on imported almonds. The justification was higher labor costs for shelling California almonds. The mid 20's and 30's were dominated by problems at the exchange related to its inability to finance growers, overpayments in one season that led to compensating charges in subsequent seasons, independent packers encouraging hostility towards the exchange among growers, and efforts by the exchange to standardize varieties and quality, for the good of the exchange as a whole, that alienated some groups of growers.

After World War II excess production, a fall off in domestic demand (particularly for the chocolate-almond candy bars that were a part of the GI ration), and a flood of subsidized low price imports from Spain and Italy put many growers on the verge of going out of business. On August 4, 1950, a marketing order, to be administered by a ten member Almond Control Board, was formed. The official objectives of the order were diversion of surplus almonds into non competitive outlets, and the maintainance of domestic prices above world prices by providing protection from imports. Jamison (1973) suggests that CAGE also supported the order in order to spread the costs of holding some

proportion of the almond crop in oversupply years over all handlers.

Loyns (1968) analysed the effects of the surplus disposal program over the 1950 - 1966 period and found that it decreased farmer revenue in 7 of those years and increased it in only 4 years compared to the situation that would have prevailed without the order. This result was caused by reserve percentages that were not consistent with revenue maximization, and low volumes of sales of almonds from the reserve.

Subsequently, the order expanded its functions into production research, grading and packaging, and demand promotion. A particularly important policy change occurred when the Control Board began to allow handlers to freely dispose of the surplus almonds. This led to the opening of export markets which at first returned 80% or better of the domestic prices. By the 1960's, as Europe became more prosperous, demand there grew to a point where there was no difference between European and domestic prices for almonds. In fact the second dollar devaluation in 1972 and the subsequent growth in foreign demand began to force domestic prices to higher levels. Since 1972, more almonds have been exported than consumed domestically. Today, up to 65% of all California almonds go to export markets -- primarily West Germany, Northern and Western Europe, Japan, Canada and, recently, the Soviet Union.

The reserve provisions have been successfully used to develop new markets particularly after handlers were given control over disposal of their reserve holdings. Since 1982 a 2 to 10 percent market development reserve has been declared. The nuts in that reserve can only be used in new almond uses and for new product development.

Almond Acreage, Supply and Disposition

California almond production increased from 2000 tons in 1910 to 300,000 tons in 1987. While the trend in yields per bearing acre is impressive and certainly responsible, for part of this growth (see Figure 3.1), the increase in acreage is primarily responsible as can be seen in Figure 3.2. The increasing importance of the San Joaquin Valley is also evident in the figure, and can be attributed, in part, to deliveries of subsidised irrigation water from the California State Water Project since the 1960's.

Another important factor in increasing almond acreage has been tax law. Before the 1969 tax reform, almond orchards were popular tax shelters with non-farm investors. Orchard development costs could be deducted from current tax liabilities. For estate taxes, assets were valued at less than full value and payment of those taxes could be postponed at rates of interest below market rates. Fig 3.1 shows the effect of these provisions. After 1969 all development costs had to be capitalised before the close of the fourth taxable year. The dip in non bearing acreage after 1975 reflects the drop off in plantings four to six years earlier.

Bushnell and King (1986) suggest that another significant factor in increased almond production was mechanization and the simultaneous reduction in the agricultural labor force. Farmers who had difficulty in obtaining and scheduling labor at peak times turned to crops that need very little labor. Almonds are one of these crops. Harvesting is done by machines which first shake the nuts off the tree and then vacuum them off the ground. Most other operations are fully

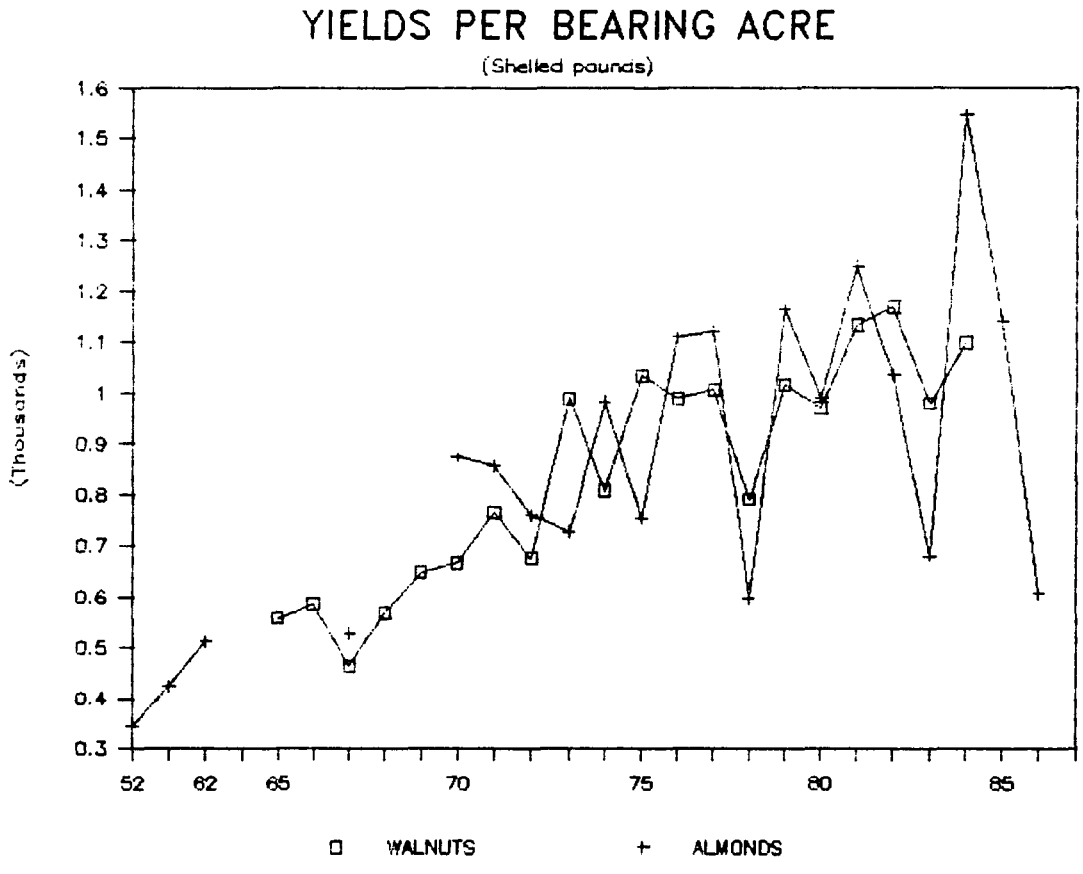


FIGURE 3.1. Yields Per Bearing Acre

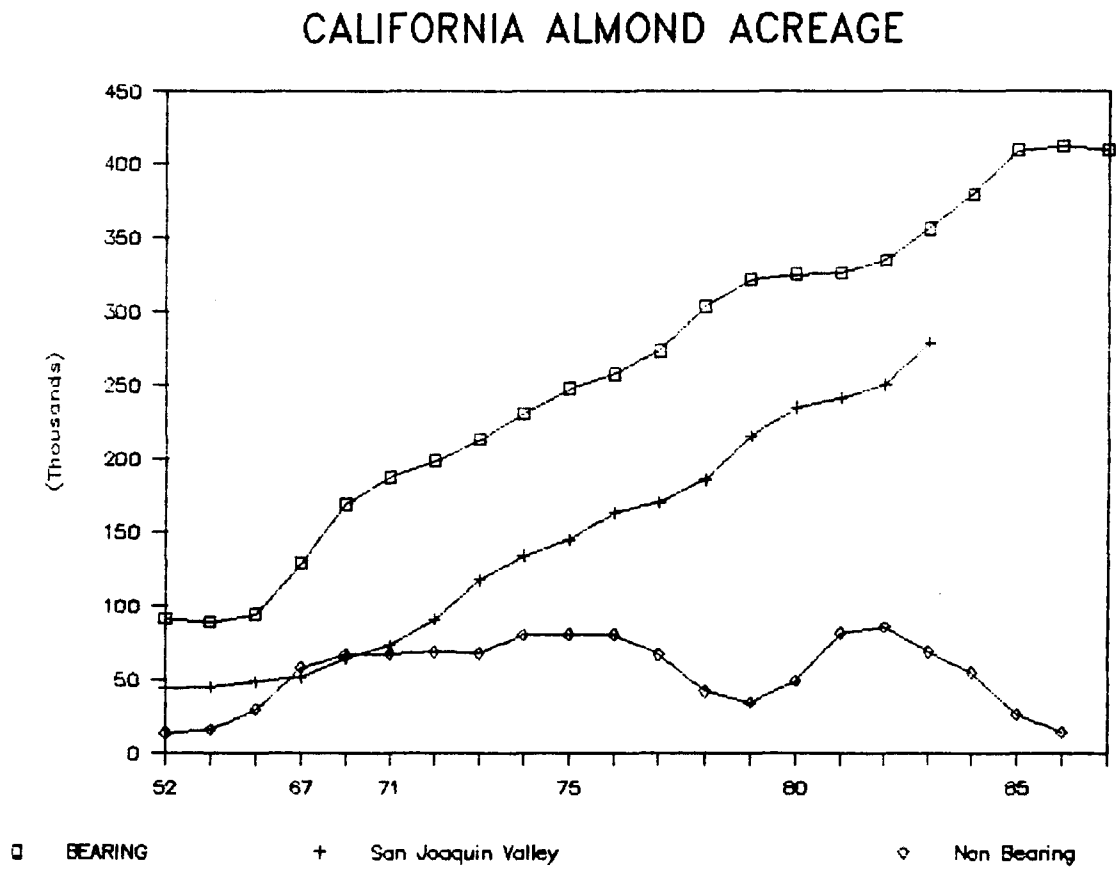


FIGURE 3.2. California Almond Acreage

mechanized as well.

Since 1981, non bearing acreage has fallen dramatically, causing bearing acreage to become constant in the last three years. The growth in pistachio acreage is partly responsible for this change. Following the trade embargo on Iran, pistachio acreage increased from 838 acres in 1976 to 31,900 acres in 1984 (Huang, 1985). Pistachios recieved tax preferences for part of this period, but abuses led to their termination. However, 300 and 400 percent tariffs on raw and roasted pistachios from Iran are still in force.

The recent record production levels and the strong dollar have had effects on prices and grower incomes and, undoubtedly, on plantings. From 1985 to 1987 the number of independant grower - handlers doubled from fifty to one hundred, all trying to market their own crop and improve returns above what the big handlers were generating for them. For the 1987-88 season the Almond Growers Exchange lost majority membership, and control, of the Almond Control Board, because, for only the third time since the board's inception in 1950, CAGE handled less than 50% of the crop.

Figure 3.3 shows how production and supply followed an upward trend despite wide swings in some years due to yield variations. Figure 3.4 shows how important the export market has been as a market for the increased production. The Exchange, which today has 5,300 members, claims and deserves much of the credit for opening up export markets in over ninety countries.

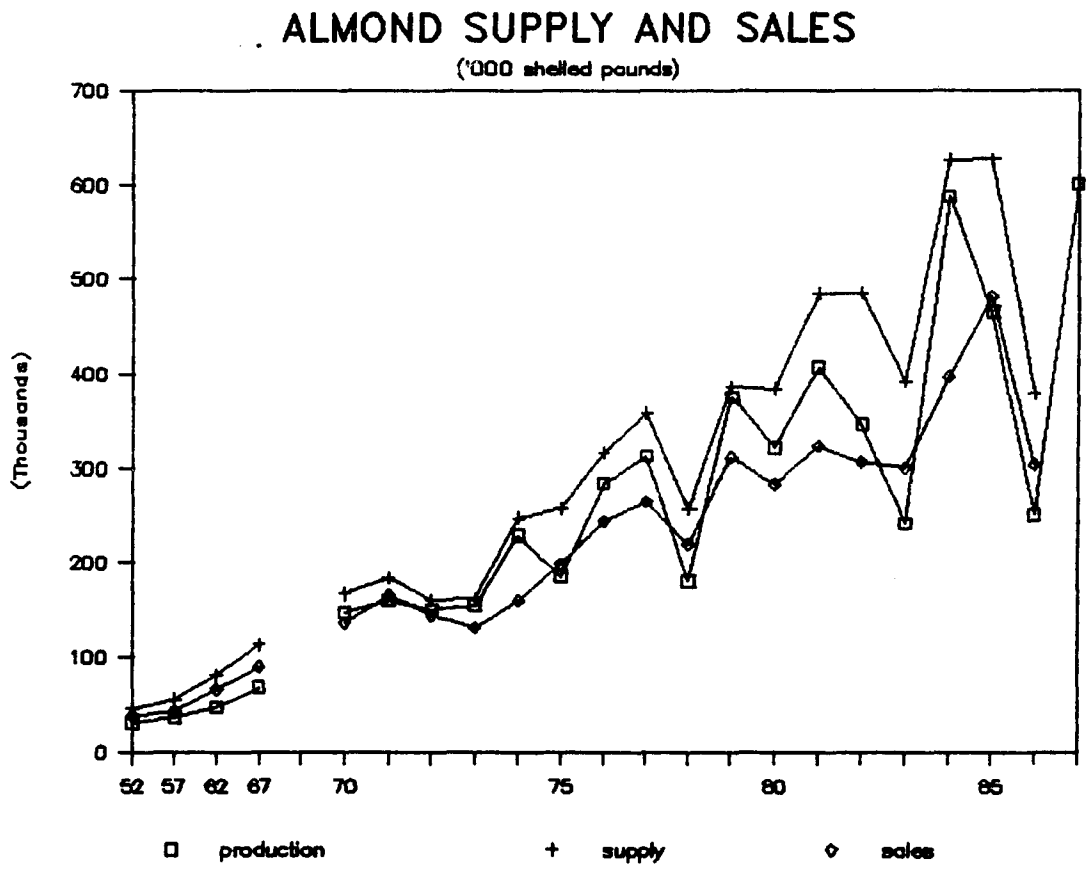


FIGURE 3.3. Almond Supply And Sales

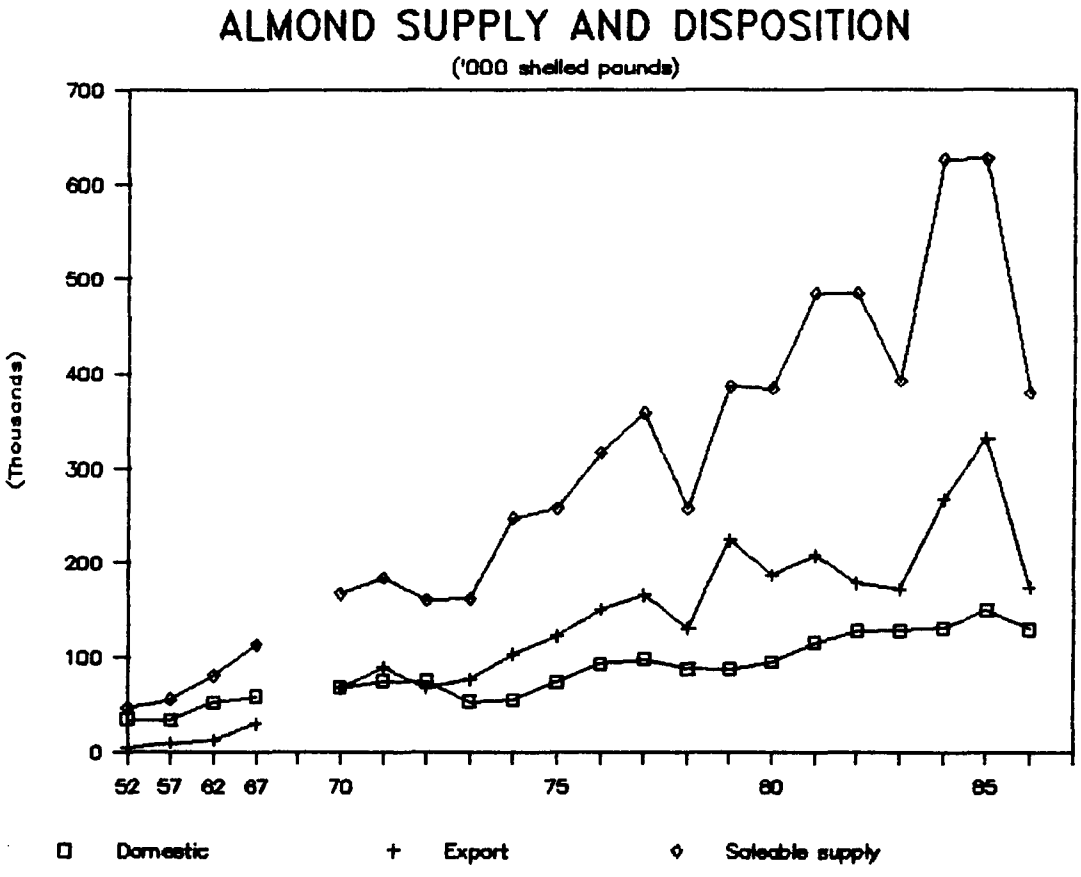


FIGURE 3.4. Almond Supply And Disposition

CAGE has also played an important part in industry efforts to increase consumption in the United States. Per capita domestic consumption of almonds has come from behind walnuts and pecans to being about 100% more than both of them. From the 1965-1967 period to the 1984-86 period total per capita nut consumption rose by 25%. Over the same period almond consumption grew by more than 120%, accounting for most of the net growth in per capita nut consumption. Walnuts just kept pace with the growth in all nuts (once almonds are removed from the totals) and pecan consumption fell.

Research in product development and promotion , sponsored particularly by CAGE and ACB has led to 2000 new product lines incorporating almonds since 1950. Distribution channels for almonds have changed. Today more almonds are sold as snacks (by retailers and rack jobbers) than in the past. Confectioners still remain the primary channel in the distribution of almonds, and have become even more important in the 1980's. Today almost 30 % of almonds consumed domestically reach the final consumer in this form. It is the other processed forms that have become relatively less important. However, given the increasing absolute amount of almonds marketed, a fall in the percentage distributed through any channel probably does not indicate a reduction in the absolute volume of almonds going through that channel.

Impact of The Order

The almond order succeeded in its aims of keeping growers in business and allowing the industry to grow (ACB 1981). An objective indicator of the size of an industry is the real value of its output. In real terms the industry has grown 300% since 1965-67. Whether this has left the individual grower better off, is unclear. Figure 3.4 shows that while the value of production follows an upward trend, real prices have trended downwards. If it were not for the dramatic export marketing success of the almond order, almonds may have followed the typical path of volume controlling marketing orders.

The 1979-80 period when the industries' real output was highest and per acre gross income (1967 $) at $586 - $744 compared to $300 - 400 for the rest of the 1965- 1985 period was a period following a short year, 1978, but probably more importantly - years when most of todays foreign markets had been opened and the dollar was weak. With a normally sloped supply curve and a fallen dollar, exporters were able to sell more almonds at somewhat higher dollar prices. The dependance of grower income on export markets suggests how the almond order has been able to reduce the impact increased production could have had on prices. Although the domestic market for almonds has grown since the mid 1960's, it has not grown nearly as fast as production. Aggressive export market development, made possible by all growers and handlers sharing in the costs of breaking into markets abroad, has been the principle benefit the almond industry has gained from having an order. The judicious use of marketing order legislation, such as the declaration of reserve percentages when the crop is large or markets sluggish, promotion, and

research towards the development of new markets and products, has made this a much admired industry.

The Almond Control Board does not try to hold stocks from year to year unless, by May of the following year, it is clear that the next crop will be small. This is one way in which this order has avoided some of the problems associated with marketing orders. According to the CAGE president (Baccigaluppi, 1985) the reserve is used to provide time for the development of new outlets. In 1981 for example, a 25% unallocated reserve (unavailable for sale) was declared; by April, 1982, the reserve was all released, and by May, it was all sold. Due to this kind of marketing success, and in spite of repeated record crops, the almond industry has not reached a situation of chronic surplus.

In 1987, 2.5 cents a kernel pound was collected for advertising and only .3 cents for all other order expenses - administration, generic public relations and research. This rate structure shows the importance the order membership attaches to the advertising and promotion function. The order also encourages handlers to develop their own marketing programs through a provision that allows brand advertising to be credited against the industry wide advertising assessment.

The California almond industry has seen yield per acre increases of 40% over the 1966-68 to 1984-86 period. How much of this is attributable to research funded by the order is difficult to know. However the $250,000 or so spent in each of the last few years on research on yield improvement, developing new varieties with characteristics customers and growers want, fighting the navel

orangeworm and other pests, could not have been collected without the order. The same applies for the $500,000 - $700,000 used for the administration of the order. This funds the Almond Board of California which, apart from administering the order, serves as a clearing house for information and as an institutional framework for industry activities. These functions alone may justify its existence.

Pacific Coast Walnuts

The West Coast walnut industry began in 1868 when Joseph Sexton, a Santa Barbara nurseryman, planted 1000 English walnut seedlings. The industry had an early start with grower organisations. By 1892 the Los Nietos and Rancito Walnut Growers cooperative marketed 40% of the crop. In 1896 a central association of local cooperatives - Walnut Growers of Southern California - was formed. It was disbanded in 1911. In March 1912, 14 local associations rejoined to form The California Walnut Growers Association, that was to set grade and quality standards as well as sell walnuts. That organisation is now Diamond Walnut, a part of Sun Diamond Growers of California.

Walnuts imported from France dominated the American market until a trade embargo by the French and the First World War allowed prices and demand for California walnuts to rise. The quality of the product also improved in this period. By the end of the war, California had 50% of the US market. Brand advertising under the Diamond label also helped the market for the California product to grow. By 1930 there were over 100,000 acres of walnuts and the California Walnut Growers Association marketed 85% of the California crop.

In spite of the coming recession, prices were stable and sales were good. This led to increased plantings, especially in the north. In 1931 a very large and poor quality crop of 31,000 tons put the industry in serious trouble. The Agricultural Adjustment Act appeared to provide a solution; in 1933, the association, independent packers and Oregon growers formed a marketing order. One of the first acts of the newly formed Walnut Control Board was to declare a 30% reserve on the record 51,000 ton crop. That, along with low interest government loans, allowed the industry to survive.

In 1934 the growers association marketed 91% of the crop and had 8000 grower members. In that year, an export marketing manager was appointed. Also of interest in the history of the industry was the war - time decline of the European markets that led to a purchase of 1.5 million pounds of walnuts for G.I. rations as part of the federal governments Lend Lease program and, in response to labor shortages during the war years, the an agreement with Mexico allowing for the importation of 50,000 workers.

In the 1950's, the cooperative moved north from Los Angeles to Stockton to be nearer to the northern growers. It also began a premium payment system to encourage improved quality. In the 1960's, an industrial sales department was formed. By the mid sixties only 9000 of the 164,000 acres of walnuts in the state were in Southern California. In the 1970's, exports began to increase rapidly while adverse weather led to the abandonment of most commercial growing in Oregon. Also in the 1970's the cooperative, now known as Blue Diamond, joined with Sunsweet Growers to form the giant Diamond Sunsweet Inc., a federation of six

west coast fruit and nut cooperatives.

In the early 1980's the industry suffered due to above average harvests and a strong dollar. Matters were made worse by the so called 'Pasta War' when the European Economic Community placed a 30% tariff on California walnuts in retaliation for a 40% tariff the U.S. had put on Italian pasta. The industry, rather than risking loss of long standing customers in Europe, absorbed short term losses and honored commitments on delivery and price. The industry paid over $2 million in tariffs and estimates it lost over $10 million in revenue during the 'war'.

By 1986 conditions had improved. The Pasta war ended, the dollar had dropped 30% from its 1985 peak and the crop was the smallest in years. In the summer of 1987, a Walnut Commission was established to collect assessments for advertising and publicity. $1.75 million in assesments yielded $7 million of federal matching funds from the Targeted Export Administration The industry reports that in - shell exports to countries targeted for TEA activities for walnuts rose by 45% in 1987, while exports to countries not targeted fell by 10%. Sales of shelled nuts rose 40% in targeted countries and only 6% in non targeted countries. With further drops in the dollar, recent permission to sell in Japan, and a renewed interest in promotion, the California walnut industry appears to be on a strong footing.

Walnut Acreage, Supply and Disposition

In sharp contrast to the increases in almond acreage, walnut acreage has gone up only 70% since 1930, and 35% since the 1965-1967 period. Average yields per acre have doubled over the period however,

causing the average crop to go up by almost 130 % . Walnuts, unlike almonds, need deep, high quality soils and therefore have had more competition for land from other crops, particularly grapes, kiwifruit and, pistachios. In Figure 3.5 the fall off in non bearing acreage after the mid 70's is evident. Sharp variations in yield per acre have been experienced in this industry, but these year to year swings in production are relatively small compared to almonds and pecans.

Both supplies and stocks have been increasing steadily (Figure 3.6), and Figure 3.7 shows that sales in both domestic and export markets have risen over the past 15 years. Still, total disposition has lagged below production, allowing stocks to build up. Since the mid 80's, industry supply has remained at around 90,000 tons of production, 60,000 tons of domestic sales, and 20,000 tons of exports. Growth in exports holds out hope for a reduction in the levels of stocks which were as high as 40% of production in 1983.

The increased importance of shelled relative to in-shell walnuts has been a clear trend in the industry. Today over 65% of walnuts are sold in shelled form. Export, bakers, other food manufacturers, confectioners and rack jobbers are increasingly important channels in the distribution of walnuts. Industrial outlets in particular buy shelled nuts. Retailers and grocery wholesalers (including rack jobbers) are important outlets as those are the distribution channels for home uses.

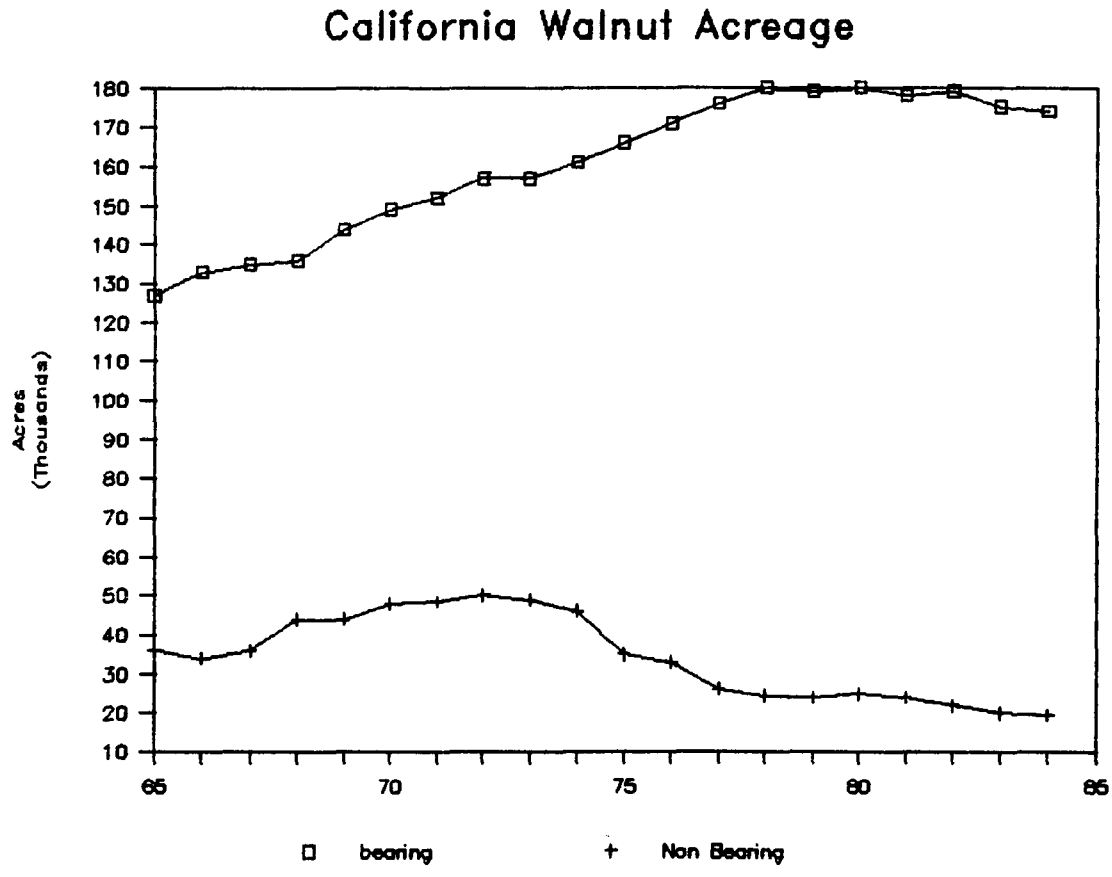


FIGURE 3.5. California Walnut Acreage

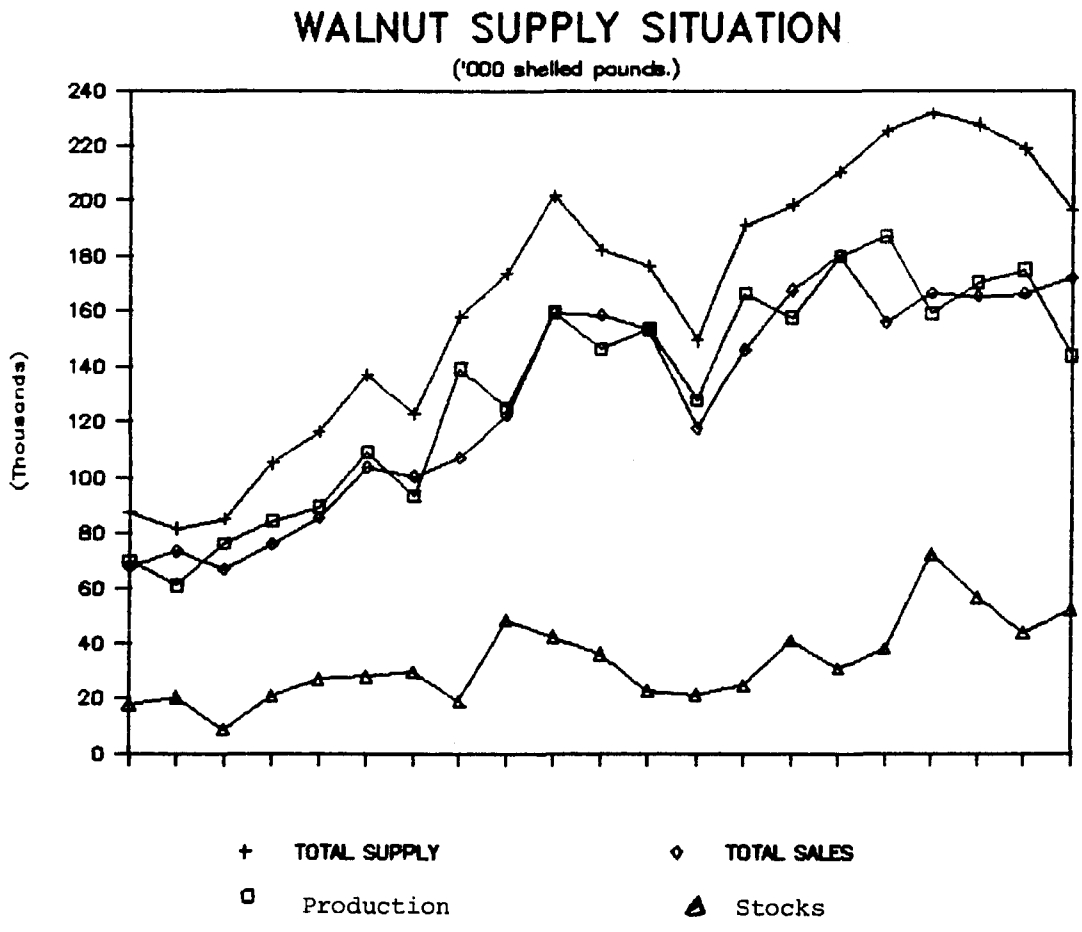


FIGURE 3.6. Walnut Supply Situation

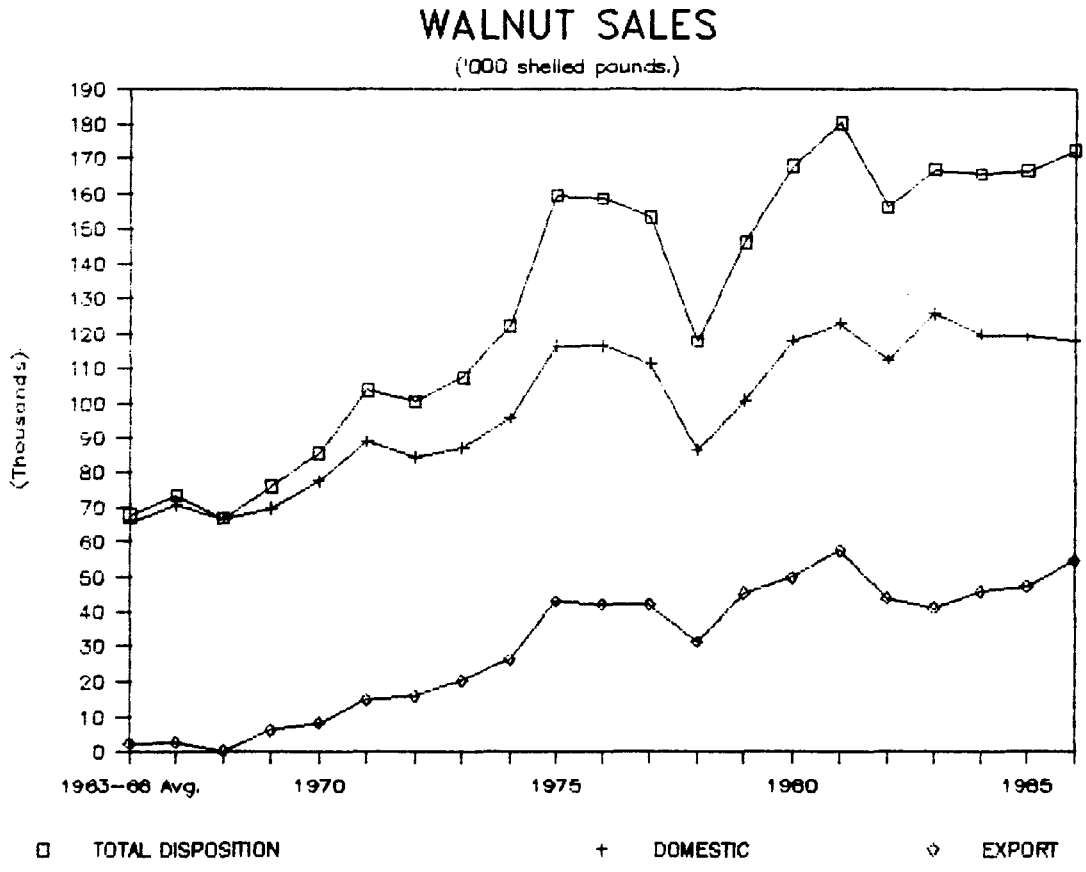


FIGURE 3.7. Walnut Sales

Impact of The Order

The walnut industry has not enjoyed the success and glamour that is associated with the almond industry. Stronger competition in export markets from Chinese, Indian and European walnuts as well as Turkish hazelnuts is part of the reason for this. Almonds face less competition from competing production areas abroad. Almonds also face less competition from the supply side due to their ability to survive on lower quality land. These factors are probably responsible for part of the difference in growth rates experienced by the two industries.

In the mid 1980's real walnut prices were around 60% of their levels in the mid 1960's. Real farm value has shown no marked upward trend since 1965, only wide swings up and down. A smaller and relatively recent committment to promotion is blamed by some for allowing US. per capita consumption of walnuts to lag behind almonds (though consumption has bypassed pecans). The dominant Diamond Walnut cooperative does some product development work, but not on the scale seen in the almond industry. The development of walnut oil that is produced by crushing shells is its proudest achievement in this area and allows the cooperative to provide members a better return on their walnuts than independent handlers.

The walnut order provides for quantity control in the form of free, reserve and export percentages. Quality control is undertaken for the Walnut Marketing Board by the California Department of Food and Agriculture at taxpayer expense. Although quality problems due to growing conditions such as rain, blight or codling moth problems are unavoidable, the board makes quality control a major part of its export

marketing efforts. For example, the Walnut Marketing Board (1987) emphasizes that California walnuts do not suffer from the rancidity problems found in walnuts from other countries.

Production research has taken about $250,000 of the boards budget in each of the last few years and is the second largest item in the boards' $1.1 million budget. Research on storage facilities and fumigation techniques help to maintain walnut quality and also helped the industry to recently gain permission to export to Japan. Research is undertaken on a wide range of subjects, which this year included fertilizer utilization, genetic engineering of walnuts, the effects of high density plantings, plant-water relations and disease control. Without the order much of this work would not be done.

Walnut Board activity levels, as shown by its budgets for administration, research and generic public relations, is not much different from those of the Almond Board. However the $14 million the almond board spends on advertising dwarfs the rest of its activities and makes the almond order so different from the walnut order. Market research and development for the domestic market is the largest item on the Walnut Boards budget but is only around $500,000. This difference could be the source of the greater export and domestic marketing success of the almond industry since it is the only obvious difference between the two orders. With the recent approval of the walnut commission, whose funds will be turned over to the Walnut Board to use for advertising, the walnut industry is trying to eliminate this difference. Initial results of Targeted Export Administration activities suggest that the

recent upward trend in exports can be continued. Even if TEA funds are cut -- $7 million of taxpayer money in 1987 -- it is likely that the industry will continue to collect funds for advertising and export promotion.

Increasing exports may return the value of output to the levels of the 1977-82 period when real (1967 = 100) returns ranged between $450 and $555 per acre, compared to about $310 for the rest of the 1965-85 period. An increased emphasis on export promotion by the industry, and a widening of the role of the order to include funding for these efforts, both suggest that the walnut order is about to become an important factor in fostering the growth of the industry. The earlier emphasis on supply control and stock holding did not allow this to happen.

The Pecan Industry

Pecans are native to Texas and other Southeastern states. Today, as well as being grown in a few foreign countries, pecans are grown in a large number of southern tier states. The leading producing states are Georgia, Texas and New Mexico which together produce over 75% of the crop. Georgia alone, with a harvest of 100,000 to 150,000 tons each year, accounts for almost 50% of the crop each year. About ten other states produce from 1 to 5% of the crop each.

Production over such a wide area has made it difficult to form producer organizations on a national level. Statewide organisations are predominant, with the 67 year old Texas Pecan Growers Association the best known. There are also associations for Louisiana-Mississippi,

Oklahoma, the Southeast and Western Irrigated growers. In California a nut shellers association has been formed. These associations concern themselves mainly with sharing information gained from research at state universities and by extension agents. To improve marketing and the demand for pecans, the industry recently formed a National Pecan Marketing Council.

Pecan Supply And Disposition

No data is collected annually on nationwide pecan acreage. The Census of Agriculture (every four years) provides data on pecan production and acreage in states where there is significant production. Given the nature of the native groves, and tree spacing ranging from a crowded 30 by 30 foot spacing to a more spacious 40 by 40 spacing for improved and seedling pecan groves, numbers of trees is a better measure of production than acreage. From 1964 to 1978 numbers of bearing trees stayed steady between 5 million and 5.5 million trees.

In 1978 there were 5.3 million bearing trees. There were also over 2.5 million non bearing trees, 75% of which were in the western irrigated zones in Texas, New Mexico, Arizona, and California. The rest were in Georgia, where in the last ten years there has been an increase in plantings. The state had 371,000 non bearing trees in 1978, and 80,000 more four years later. Aggregate production has been trending upwards due to growth in these five states. Reduced acreage in almost all the other producing states, and the lasting impact of alternating freezes, hurricanes and drought in the Southeast, has made pecan production in the 1984-86 period only 15% larger than that of the 1965-

67 period.

Figure 3.8 shows pecan production over that period. The graph also shows the dramatic effect of alternate bearing on aggregate production. Since 1980, production has trended upward and the swings in production have become less pronounced; in the increasingly important irrigated western groves, alternate bearing is much less of a problem.

In July 1986 a National Pecan Marketing Conference was held in Fort Worth, Texas. The main items on the agenda were experts from various producing states estimating pecan production in their state, the number of non - bearing trees, and production 5 years later. Overall, an 82 million pound (in shell) increase in production was projected for 1990, or about 300 million pounds.

Western acreage with irrigation, low humidity that reduces disease problems, and long growing seasons where 2000 pound per acre average yields can be sustained, are the source of much of this growth. In the southeast, a grower may get a 2500 pound/acre yield but due to poor years, averages are around 1000 pounds. Arizona that had 16,000 acres in 1982 had 9,000 non bearing acres by 1986 and was projected to have a 30 million pound crop by 1990. New Mexico, with 21,000 non bearing acres was projected to be producing an extra 32 million pounds by 1990, and in California, where the extension representative to the conference stated that pecans were more profitable to grow than walnuts, and probably more profitable than any other crop in the state at that time, an extra 1 million pounds was expected to be harvested each year for the next 10 years.

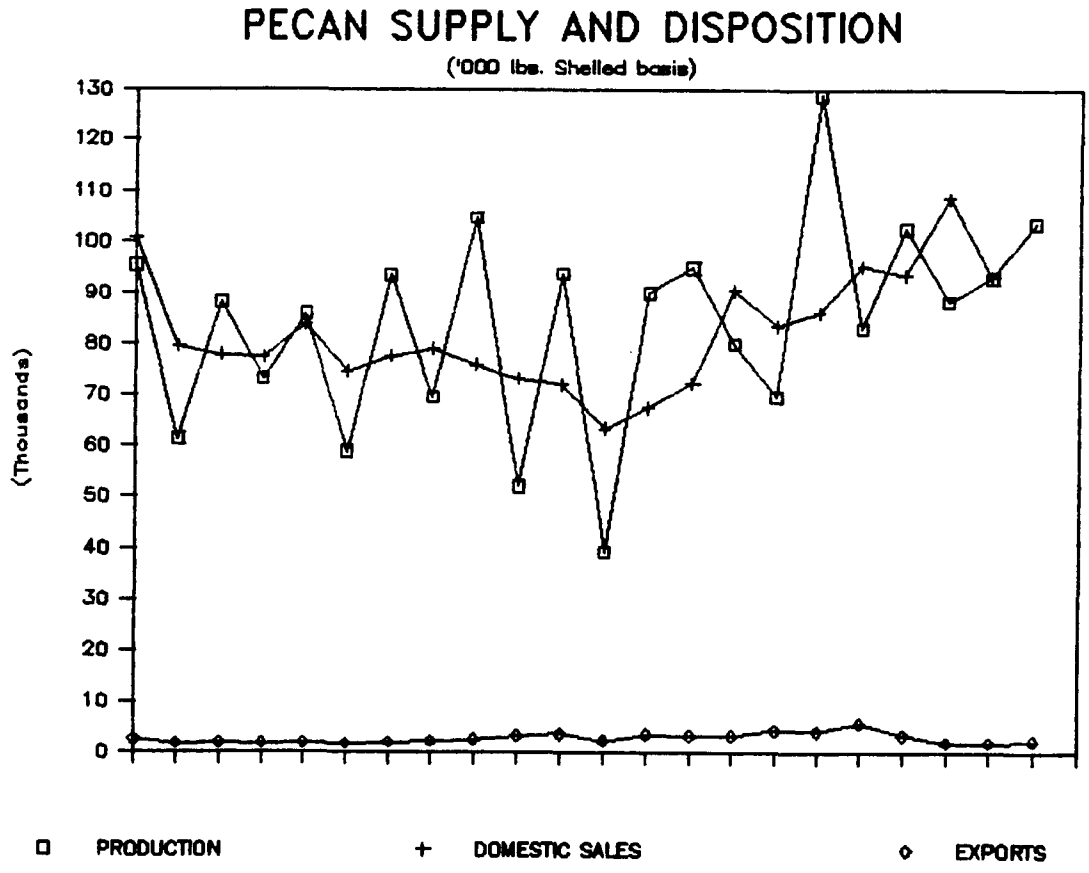


FIGURE 3.8. Pecan Supply And Disposition

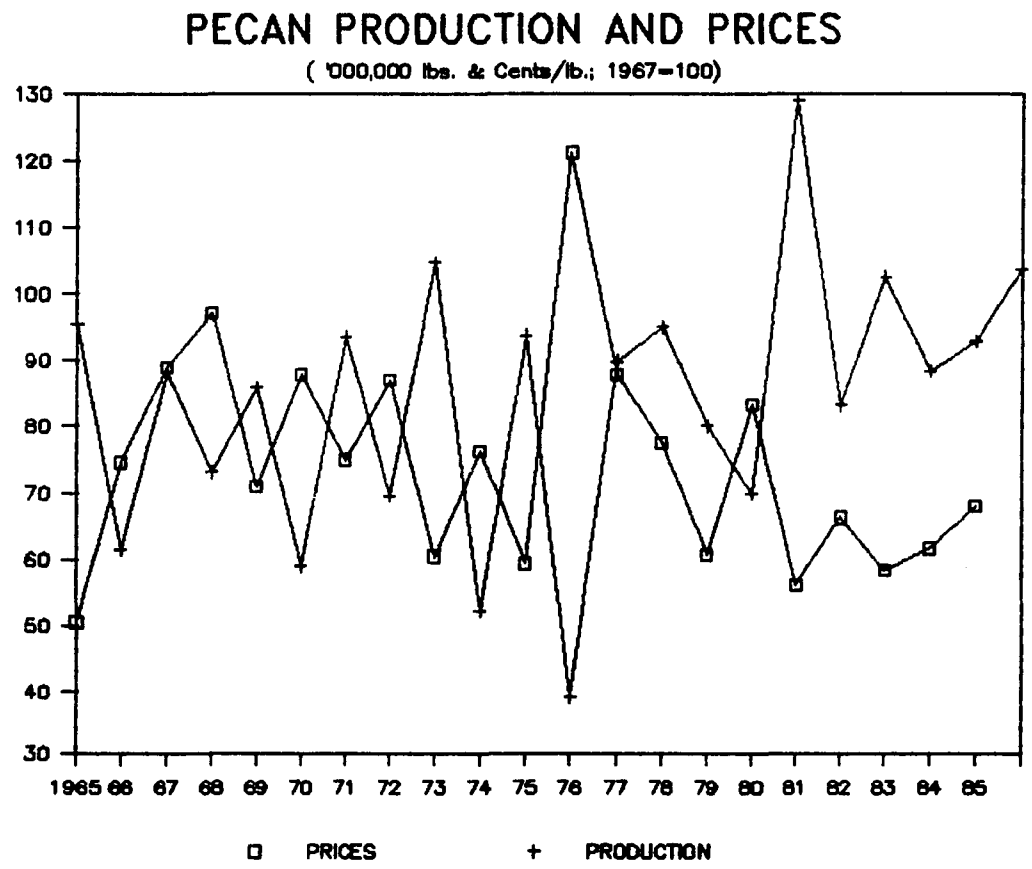


Figure 3.9. Pecan Production And Prices

Growth in production is already outstripping growth in domestic sales. In fact, per capita consumption has actually dropped almost 10% over the 1965-67 to the 1984-86 period as domestic sales have grown more slowly than the rate of growth of population. Some of this reflects a lack of increase in supplies. However, substitution by buyers to other nuts that have been more aggressively promoted is also a factor. Diamond Walnut News and Pecan South both mention manufacturers shifting from pecans to walnuts. Huang et. al. estimated that a 10% increase in the price of walnuts increases pecan grower prices by 2.5%, and in Fruit Outlook and Situation Report, the depressing effect on walnut prices of a large pecan crop is mentioned time after time.

Unit prices of pecans have stayed above the prices of almonds and walnuts. Figure 3.9 shows that in the 1980's, real pecan prices have stayed around 60 cents/pound while almond and walnut prices have fallen to around 30 cents/pound. This is probably due mainly to the fact that a strong dollar and falling exports were not a problem for the pecan industry since it exports so little. Figure 3.8 shows the magnitude of pecan exports. The lack of export growth is a major reason why the industry has not experienced the growth seen in the almond, or walnut, industries.

Pecan growers sell mostly to shellers, processors, truckers or accumulators. Direct retail selling -- mostly by roadside stands or mail order -- provides the highest gross revenues to growers but requires more time and labor; also only a limited quantity can be sold at a given location in a given time period. Direct retail by growers is mostly done by means of roadside stands or mail order.

Most pecans beyond the first handler level are sold shelled. In 1983-84, 82% of them were sold shelled - down from 90% ten years earlier. Much of this reduction can be attributed to a drop in shelled sales to confectioners and bakers - two markets in which the almond and walnut industries have been increasing their promotional efforts. Almost half of all pecans went to bakers and confectioners in 1973-74. In 1983-84, the figure was just 25%. Retail now accounts for 35% of sales. The other 40% goes mainly to ice cream manufacturers, mixers and salters, and a host of other smaller outlets. Only about 3% of all pecans go to export markets. That is about half of the level in the mid 1970's. Reductions in exports of shelled pecans account for the decline.

The Potential For A Marketing Order

The 1986 conference focussed attention on the marketing of pecans that is particularly important in the light of future large supplies. Although the National Pecan Marketing Council has entered into joint promotional efforts with Fleischmans Yeast, Louis Rich Turkey and Hershey's Cocoa to try and boost domestic demand, speakers at the conference felt more needed to be done. There was a realization that different states were just fighting each other for a share of the same market. One speaker felt State Pecan Commissions should be formed to collect assessments that would be turned over to the marketing council to use for promotion. He was sure enough money could not be collected through voluntary contributions to do a good enough job of generic promotion. The Council Secretary warned that it was only housewives demanding pecans in their supermarkets, not southeastern hurricanes,

that should be depended on to improve pecan prices. He also mentioned the need to produce quality pecans since poor quality from one region hurts growers nationwide. (Pecan South, Fall 1986).

In a survey of Georgia pecan growers, done by members of the Agricultural Economics faculty at the University of Georgia (Hubbard et. al.), principal marketing problems were found to be a lack of power to negotiate prices, a lack of knowledge as to the strength of buyer demand, ignorance about market price levels, a belief that buyers had more market information, the drops in prices after the harvest, concerns that shellers were importing nuts from Mexico, the small number of large volume buyers,and a lack of reliable published information. The survey also found 55% of large growers (over 100 acres) and 75 % of small growers to be pessimistic about the future. due to concerns over increasing production and potential oversupply and expectations that only the very large growers would survive.

The same survey found over 70% of both large and small growers favored the formation of a marketing order that would undertake advertising and product promotion as well as set criteria for grade standards. The 25% who were against a marketing order felt that government interference in a market already controlled by very few companies and organizations would make the situation worse. 5% of growers favoured a marketing cooperative.

These results suggest that within the industry there would be support for a marketing order. Concerns about the volume of production that will have to marketed in the future, quality control, and

advertising and promotion all fall within the scope of a marketing order. Perhaps the most convincing argument for a marketing order is its use in promotion. The pecan industry is doing some promotion for the domestic market where sales have been falling, but efforts have been limited by the voluntary nature of contributions to fund this. The poor performance of the industry in export to date, particularly as compared to the other two tree nut industries, suggests that much can be done in the export area as well. Already, countries like South Africa and Morocco are exporting pecans.

SUMMARY

The three tree nut industries are similar in many ways. This is partly due to the similar conditions under which they are grown, and the fairly similar nature of the products. However there are major differences in the marketing sides of the industries that may account for the varied performance and growth of the three industries. This chapter has examined some of those differences.

The major difference is in the marketing side of the pecan industry. Almond and walnut marketing have been dominated by large organizations such as marketing orders and cooperatives. The pecan industry has no such institution. Some in the pecan industry feel this is part of the reason for the lack of growth of their industry. The pecan industry is realizing that it must be more aggressive in marketing and try to resolve future large supply problems before the crisis situations similar to those that led to the formation of the almond and walnut orders many years ago become a reality. The rest of this thesis

will examine some potential implications a move to form a pecan marketing order.

CHAPTER 4

THE ECONOMIC MODEL AND SIMULATION

This chapter describes a model that was developed to estimate parameters of the demand for the three major tree nuts. A theoretical framework based on a utility tree, separable preferences and a two stage budgeting process is used with pooled cross section and time series data to estimate a demand function. This function is then used in simulations to examine, under varying assumptions, what results could be expected from the formation of a pecan marketing order.

THE MODEL

Figure 4.1 shows a utility tree. The utility tree is constructed based on the assumption that consumers preferences are separable so that commodities may be partitioned into groups. Total utility is a function of the quantities of food, shelter, leisure, transportation and other goods that he consumes.

Total Utility = $F(Q_{Food}, Q_{Shelter}, Q_{Leisure}, Q_{Transport}, Q_{Others})$

Following the same logic total utility from food is :

$= F (Q_{Nuts}, Q_{Meat}, Q_{Starchy\ staples}, Q_{Dairy}, Q_{Other\ foods})$

and total utility from nuts is :

$= F (Q_{Almonds}, Q_{Pecans}, Q_{Walnuts}, Q_{Other\ nuts})$

These equations are sub utility functions that when put

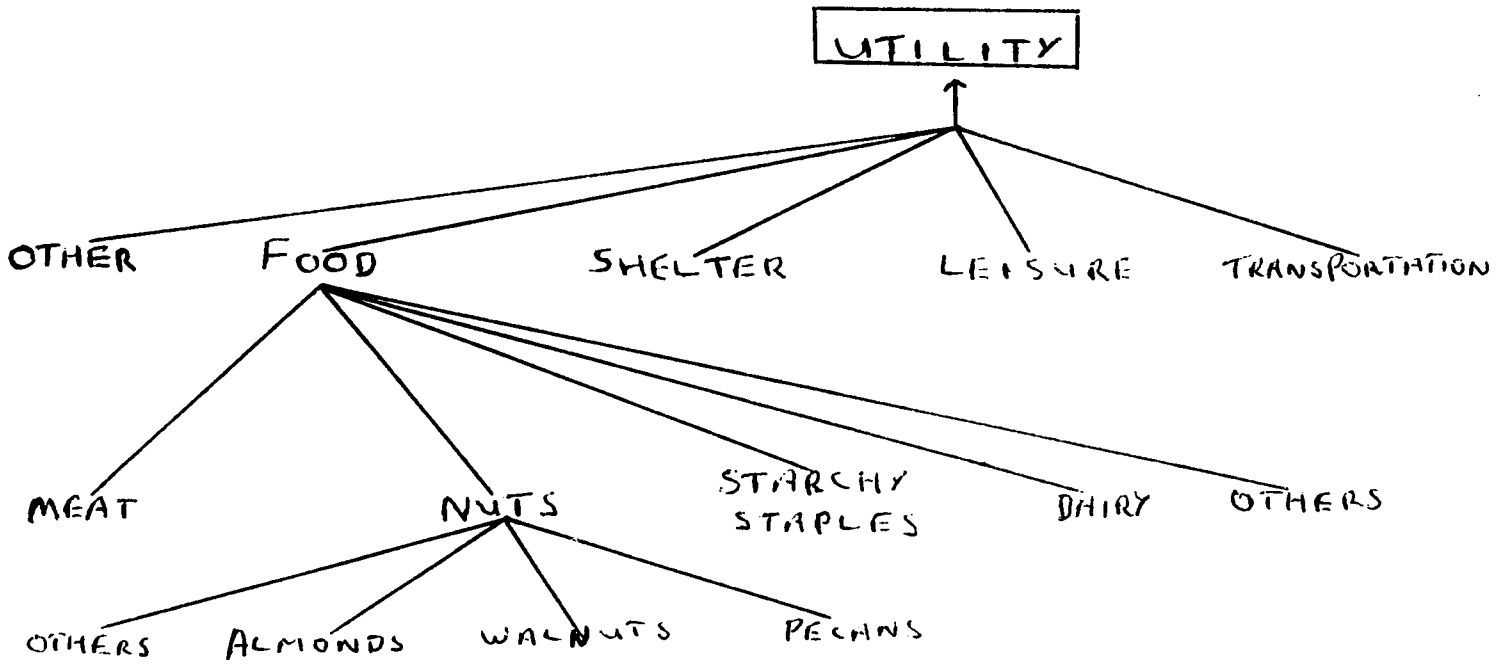


FIGURE 4.1. The Utility Tree.

together form the utility tree.

Inherent in the structure of the utility tree is a multiple stage budgeting process whereby a consumer, at each stage down the tree, must first decide how much to spend on a broad group of commodities and then decide how much money to allocate to sub groups within the broad group.

At each level in the tree, the consumer is maximizing utility subject to a budget constraint. The optimization process can be described for the first stage as follows :

Max. Total Utility = $F (Q_F, Q_S, Q_L, Q_T, Q_{Others})$,

Subject To : Sum $P_i Q_i$ <= Total Income.

This demand for goods can be decomposed into its component parts. For example, the demand for the sub group food is :

$$Q_{Food} = F (P_{Food}, \text{Income}, P_{Leisure}, P_{Transport}, \cdots)$$

with all values in dollars deflated by the CPI.

For the sub group nuts, demand is :

$$Q_{Nuts} = F (P_{Nuts}, \text{Food Expenditure}, P_{Meat}, P_{Dairy}, \cdots)$$

with all values deflated by the food price index (FPI).

For a specific nut, demand is :

$$Q_{Pecans} = F (P_{Pecans}, \text{Nut Expenditure}, P_{Almonds}, P_{Walnuts}, \cdots)$$

all of which are ideally deflated by a nut price index. FPI is used as a proxy for this index.

At each of these levels, the consumer attempts to maximize utility gained from the sub group, subject to the constraint of how much of his budget the consumer has chosen to devote to the group, and independantly of his consumption of all other groups. For nuts, the consumer would be maximizing his utility from the consumption of nuts, subject to how much he has chosen to spend on nuts, and independently of his consumption of anything but nuts.

Assuming that preferences are separable -- rather than having everything related to everything else, e.g. U.S. demand for pecans being partially dependant on the price of coconuts in New Guinea -- makes more tractable the selection of important economic variables for model building. With separable preferences only own price, the prices of closely related substitutes and income are necessary to estimate demand for a commodity. The demand for nuts and its component demands for almonds, walnuts and pecans, are the focus of this chapter.

ESTIMATION AND RESULTS

Table 4.1 shows the form of a combined cross section - time series data set that can used to estimate a demand function for nuts. The model was expanded by the use of dummy variables to test for differences in intercept or slope coefficients among the nuts. Table 4.2 shows how (N - 1) additive dummy variables can be used to test for different intercepts for the three nut demand curves. Table 4.3 shows how multiplicative dummy variables can be used to test for different slope coefficients such as own and cross price elasticities, income elasticities and time trends. The separability model would suggest a

TABLE 4.1 . Form of The Cross Section - Time Series Data Set

```
|      1965 |       |   |       |      1965 |       |      1965 |       |      1965 |       |      1965 |       |      1965 |
|         : |       | 1 |       |         : |       |  0     : |       |         : |       |         : |       |         : |
|         : |       | 1 |       |         : |       |  0     : |       |         : |       |         : |       |         : |
|         : |       | 1 |       |         : |       |  0     : |       |         : |       |         : |       |         : |
| Q ALM   : |       | 1 |       |P ALM    : |       |  0     : |       |P PEC    : |       |P WAL    : |       |MA RY    : |
|         : |       | 1 |       |         : |       |  0     : |       |         : |       |         : |       |         : |
|         : |       | 1 |       |         : |       |  0     : |       |         : |       |         : |       |         : |
|         : |       | 1 |       |         : |       |  0     : |       |         : |       |         : |       |         : |
|      1985 |       | 1 |       |      1985 |       |      1985 |       |      1985 |       |      1985 |       |      1985 |
|      1965 |       | 1 |       |      1965 |       |      1965 |       |      1965 |       |      1965 |       |      1965 |
|         : |       | 1 |       |         : |       |         : |       |  0     : |       |         : |       |         : |
|         : |       | 1 |       |         : |       |         : |       |  0     : |       |         : |       |         : |
|         : |       | 1 |       |         : |       |         : |       |  0     : |       |         : |       |         : |
| Q PEC   : | = A1* | 1 | + A2* |P PEC    : | + A3* |P ALM    : | + A4* |  0     : | + A5* |P WAL    : | + A6* |MA RY    : |  + E
|         : |       | 1 |       |         : |       |         : |       |  0     : |       |         : |       |         : |
|         : |       | 1 |       |         : |       |         : |       |  0     : |       |         : |       |         : |
|         : |       | 1 |       |         : |       |         : |       |  0     : |       |         : |       |         : |
|      1985 |       | 1 |       |      1985 |       |      1985 |       |      1985 |       |      1985 |       |      1985 |
|      1965 |       | 1 |       |      1965 |       |      1965 |       |      1965 |       |      1965 |       |      1965 |
|         : |       | 1 |       |         : |       |         : |       |         : |       |  0     : |       |         : |
|         : |       | 1 |       |         : |       |         : |       |         : |       |  0     : |       |         : |
|         : |       | 1 |       |         : |       |         : |       |         : |       |  0     : |       |         : |
| Q WAL   : |       | 1 |       |P WAL    : |       |P ALM    : |       |P PEC    : |       |  0     : |       |MA RY    : |
|         : |       | 1 |       |         : |       |         : |       |         : |       |  0     : |       |         : |
|         : |       | 1 |       |         : |       |         : |       |         : |       |  0     : |       |         : |
|         : |       | 1 |       |         : |       |         : |       |         : |       |  0     : |       |         : |
|      1985 |       | 1 |       |      1985 |       |      1985 |       |      1985 |       |      1985 |       |      1985 |
```

Q = Quantity; P = Price;
ALM = Almonds; PEC = Pecans; WAL = Walnuts; MA RY = Moving Average of Real Income.

TABLE 4.3. Testing for Differing Intercepts With Dummy Variables.

$$
\begin{pmatrix} 65 \\ . \\ QA\ . \\ . \\ 85 \\ 65 \\ . \\ QP\ . \\ . \\ 85 \\ 65 \\ . \\ QW\ . \\ . \\ 85 \end{pmatrix}
= A1 * \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}
+ B1 * \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}
+ B2 * \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}
+ A2 * \begin{pmatrix} 65 \\ . \\ PA\ . \\ . \\ 85 \\ 65 \\ . \\ PP\ . \\ . \\ 85 \\ 65 \\ . \\ PW\ . \\ . \\ 85 \end{pmatrix}
+ \quad . \quad . \quad .
$$

B1 = 1 if almonds, 0 otherwise.   B2 = 1 if pecans, 0 otherwise.

If B1 is significantly different from zero, then the intercept for almonds is different from that for pecans and walnuts. The same applies for B2 and pecans.

TABLE 4.4. Testing for Different Slope Coefficients With Dummy Variables

$$
\begin{pmatrix} 65 \\ . \\ QA\ . \\ . \\ 85 \\ 65 \\ . \\ QP\ . \\ . \\ 85 \\ 65 \\ . \\ QW\ . \\ . \\ 85 \end{pmatrix}
= A1 * \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}
+ A2 * \begin{pmatrix} 65 \\ . \\ PA\ . \\ . \\ 85 \\ 65 \\ . \\ PP\ . \\ . \\ 85 \\ 65 \\ . \\ PW\ . \\ . \\ 85 \end{pmatrix}
+ C1 * \begin{pmatrix} 65 \\ . \\ PA\ . \\ . \\ 85 \\ 65 \\ . \\ PP\ . \\ . \\ 85 \\ 65 \\ . \\ PW\ . \\ . \\ 85 \end{pmatrix}
+ C2 * \begin{pmatrix} 65 \\ . \\ PA\ . \\ . \\ 85 \\ 65 \\ . \\ PP\ . \\ . \\ 85 \\ 65 \\ . \\ PW\ . \\ . \\ 85 \end{pmatrix}
+ A3 * \begin{pmatrix} 0\ 65 \\ 0\ . \\ 0\ . \\ 0\ . \\ 0\ 85 \\ 65 \\ . \\ PA\ . \\ . \\ 85 \\ 65 \\ . \\ PA\ . \\ . \\ 85 \end{pmatrix}
+ \quad . \quad . \quad .
$$

C1 = 1 if almonds, 0 otherwise.   C2 = 1 if pecans, 0 otherwise.

If C1 is significantly different from 0, then price elasticity of demand for almonds is different from the price elasticity of demand for pecans and walnuts.

If C2 is signficantly different from 0, then the price elasticity of demand for pecans is different from the price elasticity of demand for almonds and pecans.

single price elasticity of demand for all three nuts and statistically significant cross price elasticities, of similar magnitudes.

Alternative specifications of this theoretical model were used to test if coefficients were the same for all nuts, similar for two but different for one nut or different for all nuts. T tests of significance and F tests for joint significance were used together with such factors as corrected R^2, F of the regression, standard error, sum of squared error, number of insignificant variables, predictive power as shown by graphing, as well as what seemed like reasonable results to reach a 'best' model. Beyond a certain point, the choice of a model is a somewhat subjective process. Econometric and statistical tests mentioned above led to the elimination of a large number of specifications. The data used in the final model is presented in an appendix. The final model is presented in Table 4.3.

The equation of demand for nuts from Model 1 is :

LPCQTN = -.217 -.311 [LRPN] + .093 [LRPP] + .114 [LRPW]
+ .265 [LSRY] - .133 [LSRYQA] + .043 [TDA].

Because some of the variables are commodity specific, the equation is clearer when it is broken into its 3 component parts:

QA = -2.17 -.311 [PA] + .093 [PP] + .114 [PW] + .132 [RY]
+ .043 [TDA].

QP = -2.17 -.311 [PP] +.114 [PW] + .264 [RY].

QW = -2.17 -.311 [PW] +.093 [PP] + .264 [RY].

Where:

QA is shelled pounds per capita U.S. consumption of Almonds

QP " " " " " " " " Pecans

QW " " " " " " " " Walnuts.

PA, PP, PW are real prices of almonds, walnuts and pecans.

RY is a centered 5 year moving average of real income using personal consumption expenditure as a proxy.

TDA is a time trend for almonds.

All dollar values are in 1967 dollars; and all variables, apart from the trend, are in natural log form.

The model conforms to the theory of the utility tree as it predicts a single price elasticity of demand for nuts as a group. The - .311 elasticity figure says that demand for the three nuts is price inelastic. This allows for total revenue to be raised by restricting quantities available for sale. Both the almond and walnut orders do this at times - though less often in recent years than in the past.

The most noticeable difference between the three equations that come out of the model is the time trend for almonds. A time trend in econometric models of this type often simply captures the combined effect of variables that were not explicitly accounted for by the other variables in the model. In the almond industry the most important factor is undoubtedly the aggressive advertising and promotion undertaken by the industry.

The low T statistic for LSRY makes reaching conclusions based on that variable hazardous. The model does make a strong case for a

significantly different and lower income elasticity of demand for almonds as compared to walnuts and pecans, though the lower figure may be compensating for the strongly positive almond specific trend variable.

The model was estimated using SORITEC, a statistical computer program. The Cochrane - Orcutt procedure was used, rather than ordinary least squares, due to apparent serial correlation problems. Such problems are common when either time series or cross section data are used. Figure 4.2 shows how the model performed compared to with actual nut consumption over the 1965 - 1985 period. (In Appendix 4.1 of this chapter there is discussion of a model to estimate the demand for nuts using Zellner's seemingly unrelated regression technique. This is included due to the fact that the Durbin Watson statistic that was used in deciding to use the Cochrane - Orcutt procedure cannot be interpreted in the usual manner with the type of stacked time series - cross section data set used here. The results presented there do not change the fundamental conclusions of this thesis.)

Table 4.6 presents a comparison of the 5 models that seemed to best represent the demand for nuts. Model 1 is the 'best ' model, but as the comparisons show, a number of other specifications generated similar results. All the alternatives come reasonably close to meeting the additivity (homogeneity) conditions that state that the sum of income and price elasticities is zero. They also come close to meeting the symmetry conditions -- the elasticity of demand for pecans with respect to a change in the price of walnuts is equal to the elasticity of demand for walnuts with respect to a change in the price of pecans.

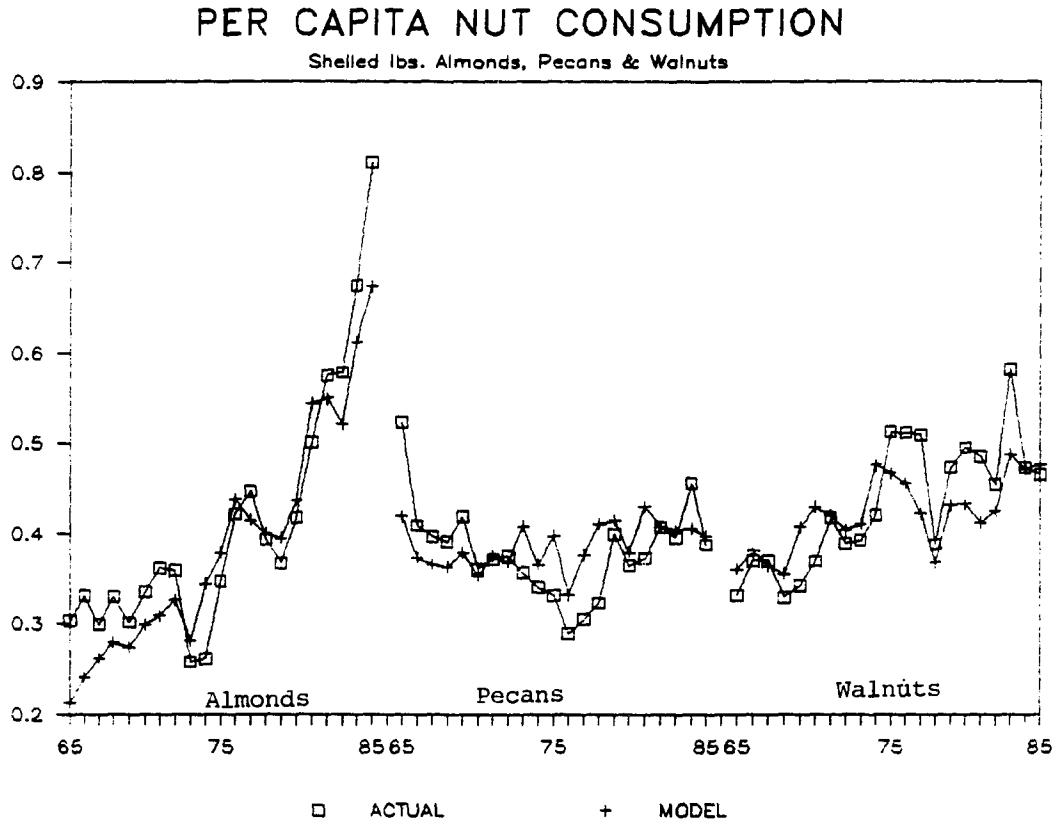


FIGURE 4.2. Per Capita Nut Consumption

TABLE 4.5 Selected Regression Results

VARIABLE	MODEL 1	MODEL 2	MODEL3	MODEL4
CONSTANT	- 2.17	- 2.16	-2.35	- 1.52
	(.256)	(.261)	(.257)	(.492)
LRPN	-0.311	-0.311	-0.309	-0.309
	(.000)	(.000)	(.000)	(.000)
LRPA				-0.04
				(.565)
LRPP	0.093	0.093	0.08	0.095
	(.023)	(.023)	(.048)	(.022)
LRPW	0.114	0.113	0.1	0.115
	(.013)	(.013)	(.026)	(.013)
LSRY	0.265	0.263	0.293	0.199
	(.260)	(.265)	(.251)	(.447)
LSRYQA	-0.132		2.77	-0.152
	(.000)		(.004)	(.002)
TDA	0.043	0.042		0.045
	(.001)	(.001)		(.001)
DCA		-1.04	-22.7	
		(.000)	(.004)	

Significance Level (%) in brackets.

LRPN = log of real price of nuts. (1965 - 1985)
LRPA = log of real price of Almonds.
LRPP = log of real price of pecans
LRPW = log of real price of walnuts
LSRY = log of real income.
LSRYQA = (Log of real income) X (Almond specific dummy variable)
TDA = Time trend for Almonds.
DCA = Dummy for Almond Constant.

The major difference between the alternative models involves their treatment of the demand for almonds. Evidence presented in Chapter 3 about the growth in demand for almonds, and the strong efforts at promotion that the other two industries had not matched over the 1965 - 1985 period suggests that almonds are somehow different from the other nuts. In Model 1, the highly significant time trend, TDA, probably reflects the strong efforts at promotion by the almond industry. Model 2 has a negative value for DCA, the dummy for the constant for almonds, implying that the demand for almonds starts the period at a lower level. Model 1 also suggests a lower income elasticity of demand for almonds of .13 as compared to .263 for all nuts in Model 2. The high level of significance associated with the difference in income elasticity of demand for almonds, LSRYQA, suggests that this is important information, especially given the low significance levels for the income elasticity of demand for nuts, LSRY, in both Model 1 and 2.

Model 3 predicts coefficients similar in magnitude to the first two models. However the low coefficient for the almond specific dummy variable for the constant, DCA, and the large income elasticity of demand for almonds (nearly 3), may be compensating for the absence of the time trend, TDA. Inclusion of TDA seems to provide more plausible results as well as conforming more closely to the historical development of the almond industry. The statistically insignificant cross price elasticity for almonds vis a vis pecans or walnuts (Model 4) of .35 with T statistic of .6 and significance level of .565 further suggests the difference of almonds. Inclusion of other almond

specific variables in equations to further explore this difference produced no further useful results. It is worth noting that none of these alternative specifications significantly affected the parameters that pertain directly to the walnut or pecan markets.

All the models suggest similar magnitudes for cross price elasticities. However, an assymetry appears in the cross-substitution effects. Almond prices do not affect consumption of walnuts or pecans, but walnut and pecan prices affect almond consumption. This suggests that almonds are different enough that consumer substitution to walnuts or pecans does not occur if almond prices are raised, and, when almond prices fall, increased consumption of almonds does not come at the expense of the market shares of the other two nuts. However the results suggest that if the walnut or pecan industries raise prices, consumers will switch among walnuts and pecans, and to almonds. Attempts to include almond prices as causing a substitution effect in the model caused other parameters to become insignificant. This assymetry points out the difficulty of modelling the nut market with data taken from a period of rapid structural change in almond demand.

In the simulations of the pecan market that follow, almond cross price elasticities are assumed to be the same as walnut cross price elasticities (0.1) in the cases where there is a change in almond prices. This procedure is justified by the symmetry condition. Given the wide confidence interval for the income elasticity, such a procedure is also consistent with maintenance of the homogeneity condition.

SIMULATION

Simulation is a procedure in which values of variables are given, or assumed, to see what happens to the value of the variable in the model that is left to adjust. The approach used here is not simulation in the strict econometric sense -- finding the mathematical solution of a simultaneous set of difference equations (Pindyck and Rubinfeld, p356). Instead assumptions are made about price and output behavior in the almond and walnut industries. The impacts of these changes on the pecan industry are then estimated.

The simulation is based on the econometrically estimated model presented above. This model was validated by statistics such as F, t and R^2. Over the simulation period these validating statistics do not apply and therefore the results need to be viewed with some caution. Still, in situations where the relevant data is unobservable and can only be guessed (based on informed opinion and intuition), the process can provide useful insights about the type and magnitudes of adjustments in the industry under examination (Pindyck and Rubinfeld, p. 380).

Simulation will be used here to analyze the impact of a marketing order in the pecan industry. Comparisons are made of gross income under three different situations -- maintaining the status quo of no marketing order in the industry, forming a marketing order that takes 15% of the crop off the market, and forming a marketing order that uses reserves for new market development. Prospects of increasing output, and the long time lags in response to price changes in the pecan industry mean that a focus on demand prospects is of current relevance. Within

the industry itself there has been some interest in forming a marketing order.

The first step in this process, once the econometric model has been chosen, is the selection of a simulation period. The 5 year period 1988 - 1992 was chosen. The period is close to the estimated period, so parameter values are not likely to have changed too much before it is over.

Values of the variables in Model 1 that were not determined within the tree nut industry had to be predicted. Since the model had been estimated in per capita, terms population over the simulation period had to be estimated. From an examination of the rate of growth in population over the 1983 - 1987 period, a population growth rate of 1 % per annum was chosen. Since all prices and incomes were estimated in real terms a similar process led to assuming a 3.5 % rate of inflation for the period. Incomes were assumed to grow at 2 % per year in real terms. Market development through sales of reserve pecans was fashioned after the experience of the almond industry.

Walnut and almond prices were assumed at both a conservative and an optimistic level. This was done so that some idea could be had of the effect that different prices of substitutes (almonds and walnuts) would have on the demand for a commodity (pecans). Projected pecan crops, based on projected yield information presented in Chapter 3, and per capita consumption quantities needed to bring about the desired pecan disappearance were also calculated. All the predetermined and created data are presented in Table 4.7. Pecan prices were assumed to bear the brunt of the adjustment to the simulated conditions.

TABLE 4.7 Additional Data Used In Simulation

YEAR	POPULATION	CPI	REAL INCOME	WALNUT PRICES CONSERVATIVE	WALNUT PRICES OPTIMISTIC	ALMOND PRICES CONSERVATIVE	ALMOND PRICES OPTIMISTIC
1983	236.6	298.4	3215	30.7	30.7	49	49
84	234.8	311.1	3295	35.4	35.4	29	29
85	237	322.2	3388	36.1	36.1	30	30
86	239.3	333.5	3455	40	40	54	64
87	241.7	345.1	3524	40	40	50	55
88	244.1	357.2	3594	40	42	50	60
89	246.6	369.7	3666	40	44	50	60
90	249	382.7	3740	40	46	50	60
91	251.5	396.1	3814	40	48	50	65
92	254	410	3891	40	50	50	65

Pecan Crops And Consumption

YEAR	Crop '000 shd. lbs	Resulting Per Capita consumption.		
1983	93430	0.396		
84	108660	0.456		
85	93280	0.388		
86	103000	0.37	If	*
87	96900	0.401	15 % reserve	
88	105000	0.43	0.366	
89	107000	0.433	0.369	
90	112000	0.449	0.382	
91	117000	0.465	0.395	
92	125000	0.492	0.418	

Population in Millions
CPI = Consumer Price index
Real Income in constant 1967 $.
CP Walnuts = conservative price projection for walnuts.
OP Walnuts = optimistic prices for walnuts.

* = per capita consumption needed to bring about desired year end stocks.

Table 4.3 Simulation Results

BASE CASES. No Marketing order.

A1. Increasing Pecan Supply

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	105000	57.5	60.4	
1989	107000	107000	57.2	61.2	
1990	112000	112000	51.7	58.0	284.4
1991	117000	117000	47.0	55.0	
1992	125000	125000	39.9	49.9	

A2. INCREASING PECAN SUPPLY + HIGHER WALNUT PRICES

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	105000	58.5	61.4	
1989	107000	107000	59.2	63.3	
1990	112000	112000	54.5	61.0	298.7
1991	117000	117000	50.3	58.8	
1992	125000	125000	43.3	54.1	

A3. INCREASING PECAN SUPPLY + HIGHER WALNUT PRICES + HIGHER ALMOND PRICES

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	105000	60.4	63.4	
1989	107000	107000	62.8	67.2	
1990	112000	112000	57.8	64.7	318.1
1991	117000	117000	54.7	64.0	
1992	125000	125000	47.1	58.9	

Table Key: Production and Sales in '000 shelled pounds.
Price is Deflated to 1967 cents per shelled pound.
Revenue is '000,000 1967 dollars.
Total Revenue is the sum of revenue over the 5 year period.

Table 4.8 (Continued).

TRADITIONAL MARKETING ORDER (with 15% Reserve).

B1. CASE A1 + 15% RESERVE

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	89250	96.8	86.4	
1989	107000	90950	95.8	87.1	
1990	112000	95200	86.8	82.6	406.3
1991	117000	99450	79.2	78.7	
1992	125000	106250	67.2	71.4	

B2. CASE A2 + 15% RESERVE

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	89250	98.6	88.0	
1989	107000	90950	99.2	90.2	
1990	112000	95200	91.3	86.9	426.7
1991	117000	99450	84.6	84.2	
1992	125000	106250	72.9	77.5	

B3. CASE A3 + 15% RESERVE

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	89250	101.7	90.7	
1989	107000	90950	105.2	95.7	
1990	112000	95200	96.9	92.2	454.5
1991	117000	99450	92.1	91.6	
1992	125000	106250	79.4	84.3	

Table 4.8 (Continued)

MODERN MARKETING ORDER

C2. CASE B1 + SALES FROM RESERVE AT 50% OF DOMESTIC PRICE

	PRODUCTION	RESERVE	PRICE PRIMARY	PRICE SECONDARY	BLEND PRICE	REVENUE	TOTAL REVENUE
1988	105000	15750	96.8	48.4	89.6	94.0	
1989	107000	16050	95.8	47.9	88.6	94.8	
1990	112000	16800	86.8	43.4	80.3	89.9	442.1
1991	117000	17550	79.2	39.6	73.2	85.7	
1992	125000	18750	67.2	33.6	62.2	77.7	

C2. CASE B2 + SALES FROM RESERVE AT 50% OF DOMESTIC PRICE

	PRODUCTION	RESERVE	PRICE PRIMARY	PRICE SECONDARY	BLEND PRICE	REVENUE	TOTAL REVENUE
1988	105000	15750	98.6	49.3	91.2	95.7	
1989	107000	16050	99.2	49.6	91.7	98.1	
1990	112000	16800	91.3	45.7	84.5	94.6	464.4
1991	117000	17550	84.6	42.3	78.3	91.6	
1992	125000	18750	72.9	36.5	67.4	84.3	

C3.1. CASE B3 + SALES FROM RESERVE AT 50% OF DOMESTIC PRICE

	PRODUCTION	RESERVE	PRICE PRIMARY	PRICE SECONDARY	BLEND PRICE	REVENUE	TOTAL REVENUE
1988	105000	15750	101.7	50.8	94.0	98.7	
1989	107000	16050	105.2	52.6	97.3	104.1	
1990	112000	16800	96.9	48.4	89.6	100.3	494.6
1991	117000	17550	92.1	46.1	85.2	99.7	
1992	125000	18750	79.4	39.7	73.4	91.8	

CASE C3.2. WITH IMPROVED RESERVE SALES TO 75% OF DOMESTIC PRICE

	PRODUCTION	RESERVE	PRICE PRIMARY	PRICE SECONDARY	BLEND PRICE	REVENUE	TOTAL REVENUE
1988	105000	15750	101.7	76.4	97.9	102.8	
1989	107000	16050	105.2	79.1	101.3	108.4	
1990	112000	16800	96.9	72.8	93.3	104.4	514.9
1991	117000	17550	92.1	69.3	88.7	103.8	
1992	125000	18750	79.4	59.7	76.4	95.5	

The base cases portray the simulation of pecan prices and total revenue if the industry maintains the status quo. In cases A1, A2 and A3 there is no marketing order. Case A1 and A2 both suggest that pecan prices, and industry total revenue will fall below the 1981 - 1985 levels. Over that five year period total revenue, at $ 300 million, is more than in all the base cases except A3 where higher prices for both almonds and walnuts are assumed. This total revenue would have to be split up across a larger number of acres (or trees) meaning that economic conditions in the industry will get worse. Within the simulation period itself, prices fall 30% between 1988 to 1992, and average prices over the simulation period are almost 20% below those of the 1981-85 period. This is the effect of the increasing crop size. Only higher prices for both substitute nuts is capable of bringing average price to the level of the historical period.

Case B1 shows the dramatic effect on prices and total revenue that a volume controlling marketing order can have (at least in the short run) in an industry where demand is inelastic. A comparison of A1 and B1 shows total revenue over the simulation period rising 30% following the formation of a marketing order that diverts 15% of production from the market. B2 and B3 show, once again, the effect of higher prices for substitutes.

The 'modern marketing order' depicted in Case C improves returns above Case B by selling the reserve at 50% of domestic prices. This can also be interpreted as selling half the reserve in some secondary market at domestic prices. Once again the higher prices and revenue associated

with the formation of an order are clear. They are improved over B by the $ 7 to 10 million earned each year by sales from the reserve.

Even in Case C, despite prices rising to higher levels, there is still a 30% drop in prices from the beginning to the end of the simulated period. However a combination of C3.1 and C3.2 suggest how this slide may be checked. If, over the years, an increasing amount of the reserve can be sold at domestic prices, or if the entire reserve can be sold at a higher fraction of domestic prices, then prices will not fall as dramatically. This effect was achieved by the almond industry through advertising and promotion.

The simulations also show, though not explicitly, the effect of lower substitute prices on pecan prices and total revenue. This is clear if each strategy - A, B, or C -- is looked at in reverse with the scenarios with higher walnut and almond prices taken as the initial situation. Lower prices for substitutes lower total revenue just as much as higher prices for substitutes raise them. Substitution limits the effectiveness of efforts to raise prices (and farmer income) through artificial restrictions of supply. However, as the simulations show, these indirect effects are smaller than the direct effect of reduced quantities on own-price.

This, along with the simulations, suggests that the pecan industry should not take a passive role in marketing unless it is willing to take a chance on higher prices for substitute nuts (resulting from poor harvests or successful promotion) improving industry revenues. The simulations showed that the status quo results in

the lowest industry revenues of all scenarios simulated. That result could be made even worse by harvests larger than assumed here (such as those projected at the Pecan Marketing Conference) or poor prices in the other tree nut industries.

The benefits associated with forming an order, almost $ 20 million a year, even without sales from the reserve, far outweigh the costs of running an order. The almond and walnut orders only spend around $ 1 million a year (about $ 300,000 in 1967 dollars) for administration and other expenses not related to advertising and promotion. The rate of return over the simulated period is clearly substantial.

SUMMARY

The simplified, comparative static type of analysis undertaken in these cases mean that the results should be seen as giving an idea as to direction and, possibly, relative magnitude of price changes. Based on the weight of the evidence though, it would seem that pecan growers should form a marketing order. Declaration of a reserve to deal with short term problems in the industry, and promotion and market development to develop long term larger markets, seems a strategy that holds promise. If the reserve could be exported to the undeveloped export market, conditions in the industry could be improved even more. Anything that raises almond and walnut prices would also improve conditions in the pecan industry.

APPENDIX 4.1

Demand for the three major tree nuts - almonds, walnuts and pecans can also be estimated using Zellner's seemingly unrelated regressions technique. This improves the efficiency of the coefficients, relative to estimating demand for each nut separately, since it takes into account the extra information in the system. This extra information comes from the fact that in equations that bear a close conceptual relationship to one another (like the demand for the three nuts), there may be correlation between the error terms in the different equations at a given point in time as a result of variables that have either been left out of the model specification, or are not measurable, that cause similar reactions in the dependant variables. For the tree nuts such a factor could be a nationwide drought that would affect per capita consumption for all three nuts due to reduced availability, or a dramatic rise in the prices of sugar and cocoa that would lead to higher prices for confectionary - an important complementary product through which a large proportion of nuts are consumed.

Two separate specifications of the model using seemingly unrelated regressions were used in simulations. In one, Model A, the same variables were used for the demand for pecans as in model one in the body of the thesis. In Model B the model was expanded in an effort to increase its explanatory power.

MODEL A

QP = 5.01 -.402 (PP) + .029 (PW) - .549 (RY)

(.015) (.001) (.740) (.019)

R_2 = .542

MODEL B

QP = 30.2 - .166 (PP) + .048 (PA) - .004(PW) - 3.92 (RY) - .060 (TDP)

(.000) (.045) (.445) (.949) (.000) (.000)

R_2 = .82551

(Significance levels in brackets)

QP = log of per capita consumption of pecans.

PP = " " price of pecans.

PA = " " " " almonds.

PW = " " " " walnuts.

RY = " " per capita real income using food expenditure as a proxy.

TDP = Time trend.

Results of the two models using the same assumptions and simulation method as in the body of the chapter are presented on the following two pages.

Model A1 shows the situation with no marketing order. The results all show total revenue and prices below those of the historical period. In 1982-86 total revenue was $ 300 million. Prices under the no marketing order case fall almost 40 % from the beginning to the end of the simulated period. Under the scenarios where there is a marketing

TABLE 4.9 MODEL A SIMULATION RESULTS

CASE A1. NO MARKETING ORDER

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	105000	38.9	40.8	
1989	107000	107000	37.2	39.8	
1990	112000	112000	33.1	37.0	183.3
1991	117000	117000	29.5	34.5	
1992	125000	125000	24.9	31.2	

CASE A2. NO MARKETING ORDER + Higher Almond and Walnut prices.

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	105000	39.01230	41.0	
1989	107000	107000	37.44462	40.1	
1990	112000	112000	33.09742	37.4	105.1
1991	117000	117000	29.89290	35.0	
1992	125000	125000	25.05152	31.7	

CASE B1. TRADITIONAL MARKETING ORDER.

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	89250	58.2	51.9	
1989	107000	90950	55.4	50.4	
1990	112000	95200	49.3	47.0	232.9
1991	117000	99450	44.2	43.9	
1992	125000	106250	37.4	39.7	

CASE B2. MODERN MARKETING ORDER.(Reserve sales @ 50 %)

	PRODUCTION	RESERVE	PRICE PRIMARY	PRICE SECONDARY	BLEND PRICE	REVENUE	TOTAL REVENUE
1988	105000	15750	58.2	29.1	53.8	56.5	
1989	107000	16050	55.4	27.7	51.3	54.9	
1990	112000	16800	49.3	24.7	45.6	51.1	253.5
1991	117000	17550	44.2	22.1	40.8	47.8	
1992	125000	18750	37.4	18.7	34.6	43.2	

CASE B3. MODERN MARKETING ORDER.(Reserve sales @ 75 %)

	PRODUCTION	RESERVE	PRICE PRIMARY	PRICE SECONDARY	BLEND PRICE	REVENUE	TOTAL REVENUE
	105000	15750	58.2	43.7	56.0	58.8	
	107000	16050	55.4	41.6	53.4	57.1	
	112000	16800	49.3	37.0	47.5	53.2	263.7
	117000	17550	44.2	33.1	42.5	49.7	
	125000	18750	37.4	28.0	36.0	44.9	

KEY: See p. 87.

TABLE 4.10 MODEL B SIMULATION RESULTS

CASE A1. NO MARKETING ORDER

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	105000	31.8	33.4	
1989	107000	107000	27.4	29.4	
1990	112000	112000	19.8	22.1	113.4
1991	117000	117000	14.5	17.0	
1992	125000	125000	9.3	11.6	

CASE A2. NO MARKETING ORDER - Higher Almond and Walnut prices.

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	105000	32.8	34.4	
1989	107000	107000	29.0	31.0	
1990	112000	112000	20.8	23.4	119.8
1991	117000	117000	15.7	18.4	
1992	125000	125000	10.8	12.6	

CASE B1. TRADITIONAL MARKETING ORDER.

	PRODUCTION	SALES	PRICE	REVENUE	TOTAL REVENUE
1988	105000	89250	84.2	75.2	
1989	107000	90950	71.9	65.4	
1990	112000	95200	51.9	49.4	254.1
1991	117000	99450	38.3	38.1	
1992	125000	106250	24.5	26.0	

CASE B2. MODERN MARKETING ORDER.(Reserve sales @ 50 %)

	PRODUCTION	RESERVE	PRICE PRIMARY	PRICE SECONDARY	BLEND PRICE	REVENUE	TOTAL REVENUE
1988	105000	15750	84.2	42.1	77.9	81.8	
1989	107000	16050	71.9	35.9	66.5	71.1	
1990	112000	16800	51.9	25.9	48.0	53.8	276.5
1991	117000	17550	38.3	19.2	35.5	41.6	
1992	125000	18750	24.5	12.3	22.7	28.1	

CASE B3. MODERN MARKETING ORDER.(Reserve sales @ 75 %)

	PRODUCTION	RESERVE	PRICE PRIMARY	PRICE SECONDARY	BLEND PRICE	REVENUE	TOTAL REVENUE
1988	105000	15750	84.2	63.2	81.1	85.1	
1989	107000	16050	71.9	53.9	69.2	74.0	
1990	112000	16800	51.9	38.9	49.9	55.9	287.7
1991	117000	17550	38.3	28.8	36.9	43.2	
1992	125000	18750	24.5	18.4	23.6	29.5	

order a similar 40 % drop in prices is projected. According to the simulations, the formation of a marketing order would improve prices and total revenue over the simulated period. However this model suggests that even with an order that holds 15 % of the crop off the market, total revenue cannot be returned to the levels of the historic period. This is true even if the entire reserve is sold at 75 % of the primary market prices.

These two models predict different levels of prices and total revenue from the model presented in the body of this chapter. However that just goes to show how simulation as undertaken here can only be used as a guide to directions and possibly relative magnitudes of parameters under examination. This very different estimation technique still leads to the same conclusions as those reached above - that the industry could gain from the formation of a marketing order. The same pattern of enhanced revenue and prices from the formation of an order is still evident, as is the extra income from five years worth of sales from the reserve.

CHAPTER 5

SUMMARY AND CONCLUSIONS

This study has focussed on the question of whether or not the pecan industry should consider forming some kind of marketing order. A review of the literature on marketing orders and a critical appraisal of the effects of orders in other industries indicated some of the problems and prospects that could be expected from this kind of organisation. Further information was gained by examining the structure and historical performance of the three major tree nut industries, two of which already have an order. An econometric model of the demand for tree nuts was then developed. This model was used to simulate various types of marketing order in the pecan industry to see how the industry might benefit from such institutions in the near term.

Marketing orders can control output, and thus, prices. The history of marketing orders over the short run, economic theory and the simulations presented above all suggest this. In a market where demand is inelastic, reducing quantities that can reach the market leads to increased total revenue.

There are efficiency losses associated with marketing orders. These are related to the missallocation of resources brought on by marketing order activities : undue price enhancement, over the short run, that results in abnormal profits; the destruction or diversion of edible food products; and costs related to the storing of reserves. It is the problem of mounting reserves that has at times led to both

problems and opportunities for industries under orders.

The history of the almond industry provides perhaps the best example of what can result from judicious use of reserve stocks. The industry was able to declare reserves to overcome short term price problems, while it used those same reserves to develop permanently larger markets for the product. To this day the almond industry continues this pattern. The market development, for example, reserve that can only be used in new markets, or new products.

Selling in new markets or developing new products is not as remunerative, in the short run, as selling in the established channels. A marketing order is an equitable way of getting handlers into the export business. If some percentage of each handlers receipts must be diverted from the main market, then handlers are helping to develop a new market that helps them all in the long run, rather than all competing to sell all their throughput in the regular and higher priced channels. In this way a marketing order helps to overcome a market failure that exists since no single firm would be willing to incurr all the expenses of opening up new markets when competitors can follow soon after and benefit from the market penetration work of the first firm, without having paid any part of the up front costs.

The market promotion attributes of marketing orders could be used by the pecan industry. Although current prices are higher than those in competing tree nut industries, this situation may not last. Already, it is clear that in the 1990's the industry will have to sell more pecans than it normally does if all growers are to stay in the

business. The simulations undertaken in this study predict fairly substantial drops in prices in the not too distant future.

A marketing order cannot stop new production. Given that increasing production is a fact in the pecan industry, growers have several choices. They could do nothing and see some growers, or whole regions go out of the pecan business. They could form a marketing order which would enhance prices immediately, but which would, in the long run, not avoid reduced prices or burdensome stocks. The industry could also go the way that is becoming increasingly popular with groups of agricultural producers and advertise and promote their product.

What the pecan industry needs is some mechanism by which to balance supply and demand at levels that leave growers some profit. A marketing order that takes some of the product off the market provides only a temporary solution to this problem unless larger and larger reserve percentages are declared as output increases. The combination of a pecan marketing order and market support activities, particularly advertising and promotion, seems a promising course of action for the industry. A reserve could enhance prices, and promotion could keep them up through enlarged demand.

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