

AN ANALYSIS OF DEMAND AND PRICE RELATIONSHIPS  
" BETWEEN PEANUTS AND CASHEW NUTS  
IN THE UNITED STATES, WITH EMPHASIS ON THE SALTED NUT TRADE

by

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"

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## SUMMARY OF THE STUDY

This study originated in 1955 from concern expressed in the peanut industry, and in interested government agencies, that peanuts were possibly over-priced in the salted nut market relative to certain other salted nuts believed to be competitive with them. Under the peanut price support and production control program sponsored by the Federal government, the price of peanuts had been supported above the equilibrium level since 1949. Peanut consumption was relatively stable, but cashew consumption was increasing. Peanut prices were increasing at a faster rate than cashew prices. These trends were believed to be largely associated with the price support and production control program for peanuts. Beginning in 1956, these trends were reversed, as a result of the transition to "modernized" parity over a period of 4 years, and the establishment of lower peanut price support levels during the period 1956 to 1959. These changes in price support policy decreased peanut prices, and were associated with small increases in per capita consumption of peanuts during the period 1956 to 1959. During the same period, per capita consumption of cashew nuts ceased its upward trend and tended to decline; similarly, cashew price declined slightly.

This research was limited to the nature of demand and price relationships prevailing for salted peanuts, compared with their supposed major competitor in this usage: cashew kernels.

The primary objective of this study was to conduct a statistical analysis of demand and price relationships for salted peanuts and cashews. The statistical method used was ordinary least squares regression analysis

to derive equations showing the net effect upon demand for peanuts and cashews, as measured by observed consumption data, of each of the following supposed associated factors: (1) price of peanuts, (2) price of cashews, and (3) disposable personal income.

Secondary objectives supporting the demand analysis were: (1) to prepare a description of the entire world cashew nut industry on as complete a basis as possible as a means of appraising potential supplies; and (2) to summarize the relevant information on the United States' patterns of peanut and tree nut production, consumption, and prices, with emphasis on the salted nut trade.

Cashew nuts are produced mainly in South India and East Africa, with East Africa becoming more important in recent years after having been about equal to India as a producer of raw cashews. Total cashew production in India and East Africa grew from an average of about 160 million pounds in the period 1935-1939 to about 365 million pounds in 1960. The crop can be grown only in tropical areas, so none is produced in the United States. Cashews did not become commercially important in world trade, nor in the United States nut trade, until the late 1920's.

As primary supplier of shelled cashew kernels to the United States and the world, India shells and packs for export nearly all of the East African raw nut crop in addition to her domestic crop. Most of her production of cashew kernels moves into export trade, about 70 percent in recent years coming to the United States which is the world's main consumer of cashews.

United States cashew kernel imports (total supply and apparent consumption are also represented by these data) rose steadily from about ten

million pounds in 1931, the first full year for which data are available, to about 64 million pounds in 1960. In most years, about 90 percent of our entire consumption of cashews has been in the form of salted nuts with the remainder being used in candy and baked goods. Total cashew consumption has grown much faster than population, so that average per capita consumption climbed from about .07 pound in 1932 to an all-time high of about .40 pound in 1955. Per capita consumption since 1955 has run slightly under this record, and was about .36 pound in 1960.

About 80 percent of all nuts produced in the United States in recent years have been peanuts. The remaining production, according to available data, has been divided among the four commercially important tree nuts, namely (in order of importance) pecans, English walnuts, almonds, and filberts (hazelnuts).

In addition to domestic nut production, the United States imports, as its entire supply, substantial quantities of these tree nuts: cashews, Brazil nuts, pistachios, pignolias, and chestnuts. Of these, cashews are by far the most important. Some supplemental imports of pecans, walnuts, almonds, and filberts usually occur.

The per capita consumption percentages for peanuts and tree nuts in the United States during 1955-1959 were (approximate percentages): peanuts, 74 percent; cashews, 6 percent; English walnuts, 6 percent; pecans, 6 percent; almonds, 4 percent; filberts, 1 percent; and other tree nuts, 3 percent.

The relative importance of the various kinds of nuts for salted use per capita was as follows during 1947-1959 (approximate percentages):

peanuts, 71 percent; cashews, 22.2 percent; almonds, 2.5 percent; filberts, 1.5 percent; pecans, 1.3 percent; and other nuts, 1.5 percent.

Relative prices of peanuts and important tree nuts at wholesale during recent years have ranked as follows (in ascending order, to the higher priced nuts): Runner peanuts, Spanish peanuts, Virginia type peanuts, cashews, filberts, almonds, English walnuts, and pecans. No long-time series of official statistics is available on retail nut prices.

Because adequate retail price estimates were not available, the analysis was based on "wholesale" prices paid by nut salters and other nut processors for their supplies of peanuts and cashews for salting and other processing into final forms in which sold to consumers. Thus, the demand relationships obtained reflect processors' demand, not demand at the retail level.

The most useful estimates of demand and price relationships for peanuts and cashews, obtained in this study are as follows:

Time Period	Kind of Nut and Form in Which Used	Demand Elasticity with Respect to:		
		Own Price	Price of Other Nut	Income
1947-1959	Salted Peanuts	-0.32	0.19	none
1932-1959	Salted Cashews	-0.43 to -0.50	none	none
1932-1959	All Cashews	-0.40 to -0.50	none	none

(Note: "None" indicates that the related coefficient obtained is not statistically significant.)

For purposes of this thesis, the form of certain relationships was explored, but the precise nature of such relationships was not determined because of the limited scope of the study. Also, certain unknowns regarding observed data must be considered. Therefore, pending further



analysis, tentative conclusions drawn from this demand analysis are:

(1) per capita consumer incomes have no statistically demonstrable effect on demand for salted peanuts or cashews; (2) the existence of a competitive or complementary relationship between peanuts and cashews (as salted nuts) could not be established; and (3) people tend to reduce their per capita consumption of salted peanuts as the price of peanuts rises, but consumption is reduced at a rate much smaller than the rate of price increase, so that rising price more than offsets falling consumption; thus, total receipts to the peanut industry are increased rather than decreased. Further, a similar set of statements may be made concerning demand and price relationships for salted cashews, and cashews in all forms. These statements may be said to apply only within moderate ranges of variation in prices and quantities demanded. They may not apply outside the limits of observed data on which this research is based.

The results of this research, in its present stage, do not suggest that salted peanut consumption is likely to be affected in a manner detrimental to the peanut industry, in the foreseeable future, by moderate price increases, or by competition from cashew nuts, as a result of the peanut price support and production control program. However, a substantial expansion of world cashew production has occurred in the recent past. Prospects for further expansion appear bright in view of the encouragement currently provided by India's plans for total economic growth. African production has also demonstrated capability of substantial expansion. Accordingly, a further increase in cashew imports by the United States might reasonably be expected.

## INTRODUCTION

### Statement of the Problem

Concern that peanuts were possibly over-priced in the salted nut market relative to certain other salted nuts believed to be competitive with them had been expressed by the peanut industry and interested government agencies. Since 1949, the price of peanuts has been supported above the equilibrium level. Uncertainty as to the effect of this policy on salted peanut sales was prevalent (13, pp. 1-11; 31, pp. 1-16; 35, pp. 44-49).

Per capita consumption of peanuts as salted nuts, and in total edible uses, was relatively stable from the end of World War II through 1956, while per capita consumption of cashew kernels, which were believed to be a major competitor of salted peanuts, was increasing. During the same period, peanut prices were increasing, and prices of cashews and other supposed peanut competitors were also increasing, but at slower rates. (Cashews are priced higher than peanuts, but lower than other major tree nuts.) Accordingly, the differential between peanut price and the prices of these competing products appeared to be closing. This relative price-consumption situation for peanuts led to fears that, if it continued, the consumption of salted peanuts would be adversely affected in that their relative price advantage would be weakened, resulting in a relative loss of market to competing products.

Uncertainty centered on the demand relationships existing among salted peanuts and their assumed competitive products; therefore, the investigation was designed to obtain information about the nature of some of these relationships, and thus help to answer the basic question: "Are

sales of salted peanuts being adversely affected, relative to competing products, as a result of the peanut price support program?"

Shelled edible peanuts in the United States are used approximately as follows: peanut butter, 52 percent; candy, 20 percent; salted nuts, 25 percent; and miscellaneous forms, 3 percent. An additional quantity is bought by consumers as roasted in-shell peanuts. Competitive or complementary relationships among the major end uses are not known, except for a general belief that most foods are to some degree competitive with each other. (See Tables 21 and 22.)

The use of peanuts as salted shelled nuts was of particular interest, because the primary production of peanuts in Virginia and North Carolina is of the Virginia type, the most popular type for salting. Salting is the main end-use for Virginias. Thus, the salted nut trade relationships are of greater interest for purposes of this study than the other major end-uses.

For the years 1947 and 1948 the price ratios of the Virginia type peanuts to cashews were 41 and 38 respectively. Similarly, in the years 1953 and 1954 the price ratios were 53 and 58 respectively, thus indicating that the price of peanuts had increased relatively to the price of cashews. The per capita consumption ratios of salted peanuts to cashews in 1947 and 1948 were 410 and 346 respectively. Similarly, these ratios for 1953 and 1954 were 313 and 263 respectively. These comparisons indicated that per capita consumption of cashews was increasing with respect to consumption of salted peanuts. (These ratios were calculated from information in Appendix Tables A and B.)

It should be pointed out that the situation with respect to per capita consumption and price rises of peanuts and cashew nuts has changed somewhat since 1956. At that time, a significant change in the level of farm price support policy was introduced, embodying a shift from "old" parity to "modernized" parity over a period of four years. The net effect of this was to reduce parity levels. In addition, the level of support was reduced during this period, 1956-1959, from 90 percent to 75 percent of parity. (35, pp. 44-49) This change altered the salted peanut-cashew price relationship from one relatively unfavorable to peanut consumption to one more favorable. The price ratio of Virginia type peanuts to cashews fell from 59 in 1956 to 44 in 1959. Meanwhile, the per capita consumption ratio of salted peanuts to cashews rose from 265 in 1956 to 292 in 1959. Since the actual statistical analysis of demand was not performed until 1960, these recent changes were included in the analysis results.

#### Objectives of the Study

The primary objective of this research was to analyze the demand and price relationships between peanuts and their supposed major competitor in the salted nut trade: cashew kernels. Secondary objectives were: (1) to prepare as complete a description as possible of the world cashew industry, because such information is necessary for appraising the prospective supplies of cashews that the United States is likely to import in the foreseeable future (this information is found only in widely scattered sources, and is not readily available to the public); and (2) to summarize relevant information on the United States' patterns

of peanut and tree nut production, consumption, and prices, with emphasis on the salted nut trade. The latter would help to place peanuts and cashews in proper perspective relative to all uses of the major kinds of nuts, especially the importance of each kind of nut in the salted nut trade.

#### Methods of Procedure and Analysis

The methodology used in analyzing demand and price relationships consisted of fitting a series of single linear equations to the data by ordinary least squares procedures for both peanuts and cashews. The primary analysis was concerned with the use of these nuts in the salted nut trade. In the statistical approach, equations were devised which express the effect of the following associated factors, assumed to be relevant, on peanut and cashew consumption as measured by observed data. (1) price of peanuts; (2) price of cashews; and (3) disposable personal income.

The secondary objectives of this research were to be reached by compiling descriptive information from secondary sources. The portions of this information regarded as relevant to this study are presented in the two descriptive sections.

Three hypotheses were formulated to guide this research, namely: (1) changes in per capita consumption of salted nuts vary directly with changes in levels of living (consumer incomes); (2) as the price differential narrows between peanuts and cashews, consumers are led to substitute cashews for peanuts to a degree detrimental to the consumption of salted peanuts, and conversely; and (3) as prices of salted peanuts (or salted

cashews) rise, people tend to reduce their per capita consumption of them at a rate proportionately greater than the rate of rise in price, thus leading to a decline in total receipts to the industry; similarly, as prices of these nuts decline, per capita consumption tends to increase at a rate greater than the rate of decline in price.

In reporting the results of this research, the production and marketing of cashews in world trade is first described with respect to biological and technological considerations together with processing and marketing institutions and practices. This is followed by a summary of information about peanut and tree nut production, consumption, and prices in the United States, with emphasis on the salted nut trade. With basic information related to the problem thus set forth, the report moves to discussion of the analysis of demand for peanuts and cashews, and to the conclusions drawn from this analysis.

DESCRIPTION OF THE WORLD CASHEW INDUSTRY<sup>1/</sup>Physical Characteristics of the Cashew Tree and Nut  
(1; 2, sections 1 and 2; 4, pp. 1-8)

The cashew tree, Anacardium Occidentale, belongs to the Anacardiaceae family of plants with about 60 genera and 400 species. Several economically important plants such as the cashew, the pistachio nut, and the mango are members of the family, along with poison oak, poison ivy, and poison sumac. The cashew shows a strong kinship with these disreputable cousins, in that its nut shells contain cardol, a substance which produces an allergic skin reaction in some persons who handle the raw nuts. This reaction is similar to but more severe than the effect of poison oak.

A native of Brazil, the cashew tree is now distributed widely through the world's tropical regions. Portugese traders and colonizers, early in the 1600's, introduced it into Asia, Africa, and the Far East, to check soil erosion. It has proved so adaptable that many people in these areas think it is a native plant.

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<sup>1/</sup> This section is a synthesis and summary of available material on production, processing, marketing, prices, and consumption of cashew nuts. It is basic background for an understanding of economics of the cashew industry. Citations to available source literature cannot be made for each sentence and paragraph, because of the process of synthesizing and interpreting material from several sources, which the author has followed throughout this section of the study. A general credit citation to the sources is made for each subsection of this section. References used in obtaining this information are listed in the Bibliography--Literature Cited section of this study, under the subheading "Description of the World Cashew Industry." Sources of statistics are credited in footnotes to tables.

The cashew tree is an evergreen which grows from 20 to 40 feet tall, with a spread approaching 60 feet. It is subject to relatively easy damage by strong winds. It has an extensive root system and tolerates wide ranges in moisture, soil type, and soil fertility. It does well in regions where average annual rainfall ranges from 35 to 120 inches, and on soil types from sandy to lateritic. Although resistant to drought, it thrives best with an adequate water supply, and successful commercial cultivation depends on regular seasonal rains (such as the monsoon of India). It cannot withstand frost. It has few pest and disease problems, the main ones being caterpillars, "die-back" disease, and (in old trees) "bleeding" disease. Soil type and fertility requirements for the most efficient cashew production are not known in detail at present. No standard method of cultivation is presently employed, and little research has been conducted on production problems. In a few instances where tried, trees have been observed to respond to cultivation and manuring.

The tree has oval or obovate leaves which are leathery, heavily veined, 4 to 8 inches long, and 2 to 3 inches wide. Flowers are borne at the terminals of the current season's shoots, in clusters 6 to 8 inches long. The cluster is composed of both unisexual (male) and bisexual flowers. The flowering period lasts 2 to 3 months, and the fruit matures about 2 months after bloom.

The cashew fruit consists of the nut (the true fruit) and the cashew apple (a swollen fruit stem, botanically). The nut is borne on the end of the cashew apple. At maturity, the nut is 1 to 1 1/2 inches long,



weighs about one-fifth ounce and usually is kidney shaped. Its shell is about one-eighth inch thick, having a soft, leathery, and oily outer layer, and a thin, hard inner layer. Between these layers is a honeycombed layer with a resinous material which produces a cashew nut shell oil. This oil is of commercial value as a drying oil, in making soap, paint, and other non-food industrial products. On the inside of the shell's inner layer, there is a thin membrane which surrounds and tightly adheres to the kernel, or seed. Each nut has one kernel.

The kernel is the edible "cashew nut" of commercial food value. It is kidney-shaped,  $3/4$  to  $7/8$  inch long, white, and fine textured. Its flavor is pleasing, but delicate and mild compared to other nuts. Kernels are most frequently consumed as salted nuts. Most other consumption is in candy and baked goods. (See Table 1 for a comparative analysis of the nutritional composition of cashew kernels and peanuts.)

The cashew apple, at maturity, is 2 to 4 inches long, and its color varies from red to yellow to white. The mature fruit is juicy, soft, and pleasing in taste. It may be eaten as fresh fruit, but is more highly valued as a jam or preserve. In some producing areas, the natives make a potent wine of the apple. In several areas, natives value the apple far above the kernel as a food.

**Methods of Producing Raw Cashew Nuts**  
(1; 2, section 2; 4, pp. 4-8, 21, 32-33)

No standard, systematic method is presently followed in cultivation of the cashew tree. It is planted in gardens and in house compounds, intermixed with mangoes, coconuts, and arecanuts. Also, it is planted

Table 1. Nutritional Analysis of Cashew Kernels as Compared with Peanuts

Element	Units	Amount	
		Cashew	Peanuts
Protein	grams	18.5	26.9
Fat	grams	48.2	44.2
Food Energy	calories	578.0	559.0
Total Carbohydrates	grams	27.0	23.6
Fiber Carbohydrates	grams	1.3	2.4
Calcium	milligrams	46.0	74.0
Phosphorus	milligrams	428.0	393.0
Iron	milligrams	5.0	1.9
Ash	grams	2.7	2.7
Thiamine	milligrams	6.3	0.30
Riboflavin	milligrams	0.19	0.13
Niacin	milligrams	2.1	16.2
Water	percent	3.6	2.6

Source: U.S.D.A. Handbook 8, "Composition of Foods--Raw, Processed, Prepared," 1950, Bureau of Home Economics and Human Nutrition, Department of Agriculture.

in plantations, mostly in areas which are considered unsuitable for other crops.

The tree is usually propagated by seed, though this may also be done by asexual methods. When plantations are set out, the usual procedure is to dig small pits 25 to 30 feet apart, at the beginning of the monsoon season. Then, one or two dry cashew nuts (in shell) are placed in each

pit, and the pit is covered with soil. The seed germinates rapidly, usually within two weeks.

The crop receives no further attention from planting until harvest time, as a rule. There is seldom any fertilization, watering, or tilling. Sometimes, thinning of seedlings or filling in gaps, as appropriate, is practiced, the object being to have finally about 100 trees per acre. In some areas, seedlings are started, nursery-style, and transplanted to their permanent locations at six months of age.

Cashew planting and harvest seasons in the world's main commercially important producing areas are shown in Table 2.

Table 2. Cashew Planting and Harvesting Seasons

Area	Planting Season	Harvesting Season
India	June and July	February to May
East Africa:		
Mozambique	September to December	September to March
Tanganyika	December to March	October to January

Sources: Foreign Agricultural Service, U. S. Department of Agriculture; U. S. Consulate, Madras, India.

Flowering occurs about three months prior to harvest. Light showers at this critical time are believed to aid in securing good crop yields. Extended cloudy weather at flowering time is thought to reduce yields.

The cashew tree generally begins to bear fruit at 3 or 4 years of age. Yield is relatively poor the first few bearing years, but reaches its maximum level between the 7th and 10th years of tree age. For about 20 years after this point, the tree yields a satisfactory crop. Yield declines sharply after about the 30th year of age, and estimated life of

cashew trees in plantations is estimated to be from 35 to 40 years. Trees which no longer bear fruit are usually cut for fuel, charcoal making, and other purposes such as boat building and making packing material.

Cashew yields vary widely, depending upon factors such as condition of tree, weather, and crop handling methods. A fair annual average yield from a good mature tree is about 100 to 150 pounds of cashew apples and nuts together. This is composed of from 80 to 125 pounds of apples and from 20 to 25 pounds of cashew nuts (raw unshelled basis). These raw nuts yield from 6 to 8 pounds of cashew kernels after processing. The African crop is not gathered until it ripens and falls to the ground. Much of the Indian crop, however, is plucked from the trees before being fully ripe, resulting in the production of many immature, not fully formed kernels, and in a 10 to 15 percent weight loss from the subsequent drying. Indian cashew experts would like to discourage early plucking. This practice is caused by tapering off of movement of African nuts to the processing factories, before the Indian nuts are fully ripe, and the heavy demand of processors at this time. Reported yields per acre, even from the same locality, vary so widely as to have little meaning. One report from India, however, does suggest an average per acre yield of 1,120 pounds of raw nuts.

**Production Estimates for Raw Nuts**  
(2, section 2; 4, pp. 2-12; 9; 10)

The cashew tree is grown commercially in greatest volume in South India and East Africa. Only in the last half-century, however, has it become commercially important. It is also grown in substantial amounts

on the west coast of Africa, on Madagascar, and in tropical America from Mexico to Peru and Brazil, including the West Indies. Brazil and Haiti are the heaviest producers in tropical America.

Production of raw cashew nuts (unshelled basis) in India and East Africa is indicated in Figure 1 and Table 3. Portuguese Mozambique is the most important producing area in East Africa. British Tanganyika, Zanzibar, and Kenya produce most of the remainder of the East African nuts. South India produces 80 to 85 percent of the Indian domestic crop, the remainder being produced in Bombay State and in the Portuguese colony of Goa (located on the Malabar, or southwest, coast of India). Production in India by States is indicated approximately by Table 4, showing data for the 1951-1952 crop season.

India's total supply and disposition situation for cashew nuts (raw unshelled basis), for 1955 through 1960, is indicated in Table 5. India imports most of the East African crop in raw, unshelled form, processes it along with her own crop, and thus moves into trade channels most of the world's supply of cashew kernels.

Cashew nut production statistics for areas other than India and East Africa (and for regions within India and East Africa) are scarce. The same statement applies to domestic cashew consumption figures in producing countries. The reported total production figures for India and East Africa are considered to be reasonable estimates, however, A rough approximation of commercial cashew production in areas other than India and East Africa can be obtained from the data in Table 8, which shows United States imports of cashews by countries of origin

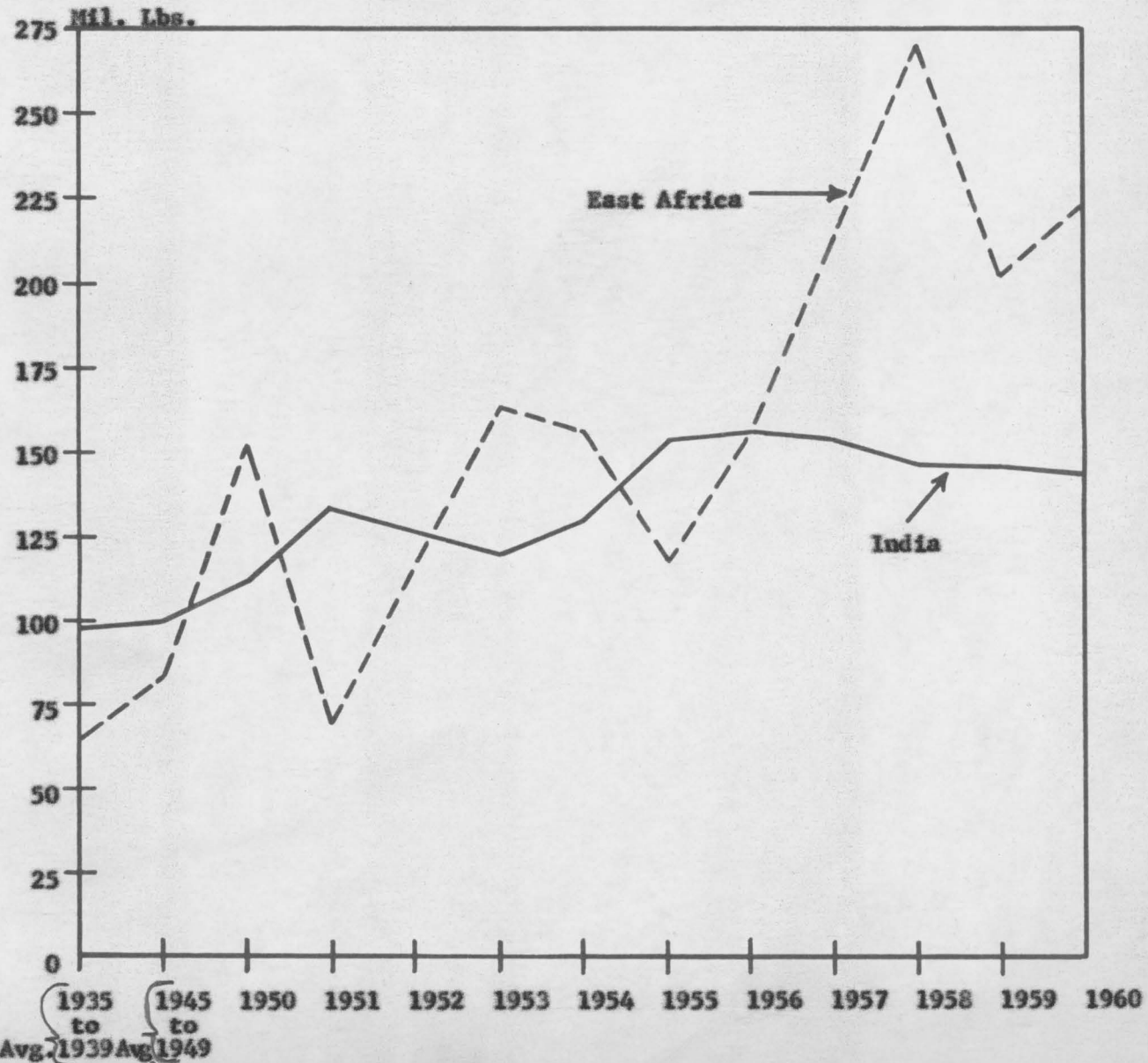


Figure 1. Production of Raw Cashew Nuts in India and East Africa, 1935-1960.

Source: Table 3.

Table 3. Production of Raw Cashew Nuts (Unshelled Basis) in India <sup>1/</sup> and East Africa. Calendar Years, 1935-1960.

Year	India <sup>2/</sup> (1000 lbs.)	East Africa <sup>3/</sup> (1000 lbs.)
1935-39 Average	98,800	65,900
1945-49 Average	100,400	83,800
1950	112,000	151,700
1951	134,000	70,000
1952	126,000	118,000
1953	120,000	164,000
1954	130,000	156,000
1955	154,000	117,600
1956	156,000	155,400
1957	154,000	214,800
1958	146,000	269,600
1959	146,000	202,400
1960	144,000	223,000

<sup>1/</sup> 1965-1966 production goal of India's third Five Year Plan: 336 million pounds.

<sup>2/</sup> Includes Portugese colony of Goa (on Indian West Coast).

<sup>3/</sup> Indian imports as raw nuts from East Africa.

Source: Foreign Agricultural Service, U. S. Department of Agriculture (9; 10).

Table 4. Production of Raw Cashew Nuts (Unshelled Basis) in India, by States. Crop Year, 1951-1952.

State	Production (1000 lbs.)
Madras <sup>1/</sup>	66,000
Kerala <sup>2/</sup>	40,000
Bombay	9,000
Others	5,200
<b>Total</b>	<b>120,200</b>

<sup>1/</sup> Madras State divided in 1956 into Andhra and Madras States. Under this division, most cashew production is located in what is now Andhra State.

<sup>2/</sup> Kerala State was known as Travancore-Cochin before 1956.

Source: Report of Indian Council of Agricultural Research, New Delhi (2).

(on the shelled, or kernel, basis). The United States consumes most of the world's supply of cashews, so these data are the best estimators available for cashew production outside of India and East Africa. These data show that in 1956, for example, the United States received the following quantities of shelled cashew kernels from areas other than India. Indian shipments represent most of the East African as well as Indian production of raw cashew nuts. Production of raw cashew nuts in these areas can be estimated by multiplying the quantities of shelled kernels by a conversion factor of 3.81, based on 2000 pounds of raw nuts equal to 525 pounds of kernels (9).

United States Imports of Shelled Cashews (other than from India), 1956

Area	Pounds
Mozambique	1,490,918
Portuguese Asia	1,108,150
Brazil	384,991
British East Africa	324,350
Haiti	74,945
Other Countries	114,968

Processing of Cashew Kernels  
(2, section 2; 4, pp. 21-30)

The most important area for commercial production of cashew kernels is South India, not only because of its large domestic raw nut production, but also because it processes and moves into world trade most of the world's supply of cashew kernels. In addition to handling the domestic crop, the Indian cashew processors import the major portion of the East African crop in the raw, unshelled form and process it. The Indian and East African crops, roughly equal in size, together account for most of



the world's commercial supply of cashews. Thus, South India is, in effect, the world's major supplier of cashew kernels.

Following harvest of raw cashew nuts in India, a major part of the crop is sold by farmers to itinerant dealers who go from house to house during the marketing season. A small quantity is disposed of by farmers at the primary market centers, but most farmers feel that they have too little produce and too long a distance to go, to justify the trip. Farmers who make this trip sell their produce to itinerant dealers, also.

Wholesale merchants and agents of processors are set up for business in the primary markets, to obtain raw nut supplies for the factories to process. These agents provide keen competition among themselves. They contact the itinerant merchants who have acted as assembly firms, usually through brokers, and arrange for purchases. The itinerant merchants arrange to supply specific quantities, and they receive immediate payment. These deals are closed without the purchasing agents seeing a sample or otherwise checking the quality of the nuts. Buyers in the primary markets dry the nuts before sending them on to the processing factories.

The brokers and itinerant merchants in this market structure practically dictate the price, since competition between processing firms is so strong. Farmers who grow the nuts receive little benefit from this competition, however. Lack of market information and little competition between itinerant merchants when buying the farmers' produce place the farmers at the merchants' mercy in price determination.

The African raw cashew nut crop moves into the hands of Indian processors through a few importing firms located in Bombay. Competition

is weak among these firms. In addition, the strong competition between processors and the lack of other market alternatives for East African growers (little processing industry being available to the growers other than that in India) give to the Bombay importers most of the bargaining power in determining prices of raw African cashew nuts. Processors' demand for African nuts varies somewhat from year to year, and it depends mainly on Indian domestic nut production and on the world export demand for cashew kernels.

Owners of processing factories place their orders for raw nuts with the import firms. These then arrange the required import amounts through their branches in East Africa. The transactions are settled on a forward delivery basis in August and September, before the African harvest season opens.

Most of the Indian cashew processing factories are located at Quilon, which has 150 of them. Most of the rest are at Calicut and Mangalore. These factories are operated by small firms, using mostly hand labor methods. They usually operate for only nine to ten months per year. Processing begins with the arrival of the first African nuts, usually in November or December. The African crop is finished by the time the Indian crop begins to move in March. The processing season ends about September. This seasonal processing pattern has caused a serious labor problem for the industry, since laborers desire to have year-around employment. One solution being proposed for the dilemma by the Indian Council of Agricultural Research and some members of the cashew trade calls for the growing of more cashew nuts in India, to help make possible a full year of operation. A fear exists that the time may come when a

processing industry is developed in East Africa, and the African raw nut supply lost to the Indian processors (2, section 2; 9; 10).

Lack in East Africa of a large supply of cheap labor comparable to that in India has so far prevented the development of an African cashew processing industry. Cashew nuts, because of their kidney shape, have thus far resisted the perfection of a machine shelling process. Only hand shelling seems to yield unbroken kernels. Even so, there are produced many broken kernels which sell at heavy discount. Thus, a large supply of cheap hand labor remains an essential factor of production in the cashew nut processing industry, and keeps it centered in India. Most of the industry's laborers are women.

The steps in processing cashew nuts are as follows:

(1) Roasting. Roasting is done to remove cashew shell oil, save as much of it as possible, and make shelling easier to accomplish. Four methods of roasting are used: open pan, earthenwares, rotary cylinders, and oil baths. The first two methods are quite simple and are the most widely adopted in processing factories. They are cheap and involve little capital outlay. They provide no satisfactory way to recover the nut shell oil, or to protect workers from the oil and fumes which escape during roasting. Some improvement results from using the rotary cylinder roasting method. It provides efficient roasting and hygienic working conditions, but loses most of the shell oil. It requires considerable investment of capital. The oil bath roasting method combines good roasting, sanitary working conditions, and maximum shell oil recovery. In spite of this efficiency, it is at present too costly to be widely adopted by processing firms. Its acceptance is retarded by

the necessity for heavy capital investment in machinery, and by the abundant supply of cheap labor in India. The oil bath roasting method involves a bath of cashew shell oil, whose temperature is maintained at about 425° Fahrenheit. The raw cashew nuts being roasted are held in wire trays and passed through the hot oil bath for about one minute. During this time, the heat of the bath causes the oil cells of the raw nut shells to burst and release their oil into the oil already in the bath. As this occurs, the oil bath overflows and excess oil is collected for sale. About .015 ounce of oil is recovered from each nut, on the average. This represents slightly less than half the oil content of cashew nut shells. Simultaneously, the nut shells are roasted to a degree which aids in their removal from the kernels.

(2) Shelling. Shelling follows roasting, in the cashew processing sequence. It must, so far, be done by hand to minimize kernel breakage. Even by hand, it calls for special care and skill. The kernels, as removed from the shells, are covered with a thin, brownish skin (or pellicle) which must be removed before the kernels will be fit for human consumption.

(3) Blanching. Blanching is then performed, to loosen the pellicles. This is done by drying the kernels in either the sun or specially constructed hot air chambers.

(4) Pellicles are then easily removed. Yield of kernels, by weight, is roughly equivalent to 31.1 percent of the weight of raw, unshelled nuts.

(5) Grading of kernels is next. Kernels are now very dry and brittle, so they are treated with moisture to minimize breakage during grading. Grading is then done by hand. Kernels are sorted first as to whole kernels, broken pieces, and scorched (over-roasted) kernels. Subsorts are

then made by size of wholes on a count per pound basis, largest kernels being considered top quality. Pieces are divided into fancy and small pieces, butts, and splits. Scorched nuts are sorted into wholes, butts, splits, and pieces. (See Table 5 for an indication of how yield typically runs, by grades. The percentages shown are based on the run of cashew kernels imported to the United States through New York in early 1950. Since the United States is the world's main consumer of cashew kernels, and New York is her main entry port for cashews, this is considered a fairly accurate indicator of cashew kernel grade yield in general.) The overall average breakdown by grades of cashew kernels may be roughly summarized as follows:

	Percent
All whole grades of kernels (except scorched)	60.9
All grades of pieces (except scorched)	26.4
All scorched kernels	12.7
320 - count wholes (the most numerous grade)	34.1
Fancy pieces (the second most numerous grade)	15.2

This grading system has been widely adopted and appears to be satisfactory.

(6) Packing. Kernels are now packed for the export trade (into which most of them move). They are packed in 25-pound tins (from which air is removed and replaced by carbon dioxide gas to prevent spoilage). Spoilage due to insect damage was a serious problem in the cashew trade until the middle 1920's. Moths and beetles were laying their eggs in the kernels, and these eggs were hatching while the kernels were being shipped, leading to worminess, spoilage, and poor acceptability to the trade and to consumers. Introduction of sealed tins with air replaced by carbon dioxide gas greatly eased the insect problem, and the cashew trade multiplied, with a product highly desirable to consumers. In spite of the improved packing method, however, buyers of cashew kernels still sometimes complain about worminess.

Processors are being urged to remedy this situation by (1) improving factory sanitation, (2) more use of improved tin cans, (3) more use of the improved packing method, and (4) adopting uniform grade standards in all processing plants.

(7) The final step in cashew kernel processing is packing for shipment, into wooden boxes. Each box contains two 25-pound sealed tins. Kernels are shipped to the United States and other consuming countries in this form.

Table 5. Cashew Nuts (Kernels): Percentage of Total Quantity Imported Falling into Each Grade; New York, Average of January, March, and April, 1950.

Grade	: Percentage of : total quantity
Wholes (approximate maximum count per pound):	
210	1.9
240	4.7
280	1.9
320	20.4
400	3.4
450	4.2
Butts	2.7
Splits	3.2
Fancy Pieces	9.1
Small Pieces	0.8
Scorched	
Wholes	4.8
Butts	0.2
Splits	0.4
Pieces	2.2
Undetermined as unselected <sup>1/</sup>	40.0
Total	100.0

<sup>1/</sup> It can be assumed that this group consists largely of grades of nuts in the proportion of grades shown.

Source: U. S. Tariff Commission, "Edible Tree Nuts" reports.

**World Cashew Trade Patterns**  
(1; 2, sections 1 and 2; 4; 5; 7; 8; 9; 10; 11; 12)

The world's commerce in cashew kernels--production, processing, exporting, importing, and consumption--can be described with fair completeness by discussing the data in Figures 2, 3, 4, and 5, and in Tables 6, 7, and 8. India processes and exports the major share of the world's supply, and the United States is the world's main importer and consumer of cashew kernels.

Production of raw cashew nuts is concentrated mainly in India and East Africa (primarily Mozambique, with lesser quantities from Tanganyika, Zanzibar, and Kenya), as indicated above in Figure 1 and in Tables 2, 3, 4, and 6 and the accompanying text. East Africa does little processing of its cashew crop, but exports most of it to India for processing and distribution of kernels and nut shell oil. The Indian industry handles these functions for both Indian and East African raw cashew nut crops.

Small quantities produced and processed in certain other countries are believed to be indicated with fair accuracy by the data in Figure 5 and in Table 8, showing amounts of cashews imported by the United States from various countries of origin of imports, since the United States is the main importer and consumer.

The world picture of cashew kernel imports and consumption, by countries, is indicated with a fair degree of completeness in Table 7 and Figures 2 and 3, showing India's exports of cashew, by countries importing them, since India is the main processor and exporter of cashews in the world. The United States, the United Kingdom, Canada, Australia,

the Soviet Union, and certain countries of the Communist Bloc are the main importers and consumers of cashews, with the United States using the largest portion. Cashew kernel import figures must be accepted as the measure of "apparent consumption", since no statistics are available, for the importing countries, on beginning and carryover stocks, and there is no domestic production in these countries receiving cashews from India. Thus, these "imports from India" data are the best (and only) available measure of cashew consumption in most countries which import their supply from India. The consumption-import picture for the United States is available in slightly more complete detail, since this country does receive a few cashews from countries other than India, and maintains statistics thereon (see Figures 4 and 5 and Table 8). Data on internal consumption of cashews in producing countries are quite scarce. (See Table 6 for an indication of India's internal cashew consumption.)

Table 6. Cashew Nuts (Unshelled Basis): Indian Supply and Disposition, 1955-1960 Calendar Years.

:Opening:		:Imports:		:Ending			
:Stocks :	Indian	: (from	:Total :	: Internal	:Stocks		
Year:Jan. 1	:Production <sup>1/</sup> :	Africa):	Supply:	Exports:	Consumption:	December 31	
- - - - - Thousands of Pounds - - - - -							
1955	54,000	154,000	117,600	325,600	296,800	13,200	15,600
1956	15,600	156,000	155,400	327,000	311,000	14,000	2,000
1957	2,000	154,000	214,800	370,800	325,200	21,600	24,000
1958	24,000	146,000	269,600	439,600	372,969	11,200	55,431
1959	55,431	146,000	202,400	403,831	358,871	11,200	33,760
1960	33,760	144,000	223,000	400,760	341,152	11,200	48,408

<sup>1/</sup> Includes Goa.

Source: Foreign Agricultural Service, U. S. Department of Agriculture (9; 10).



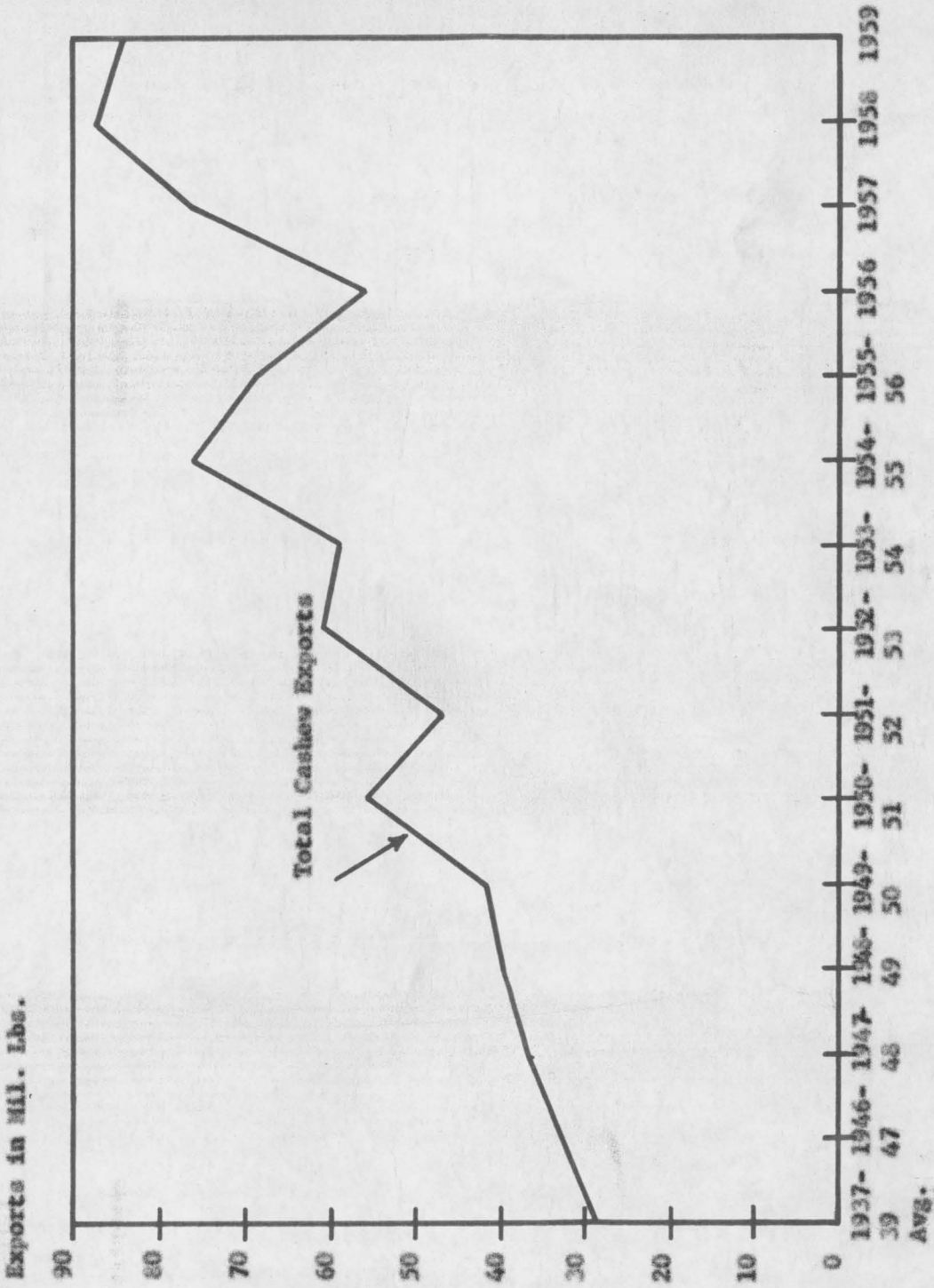
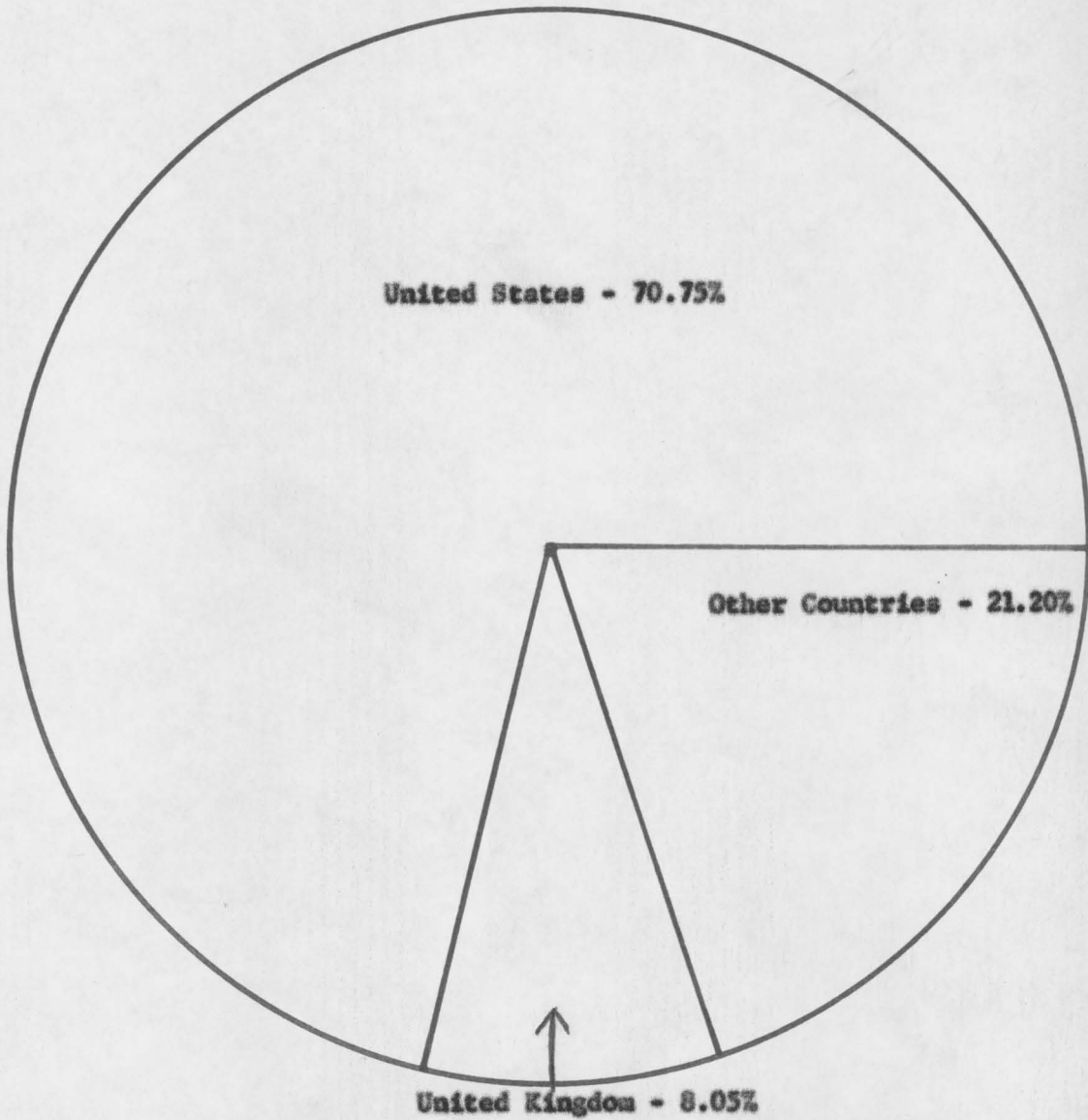


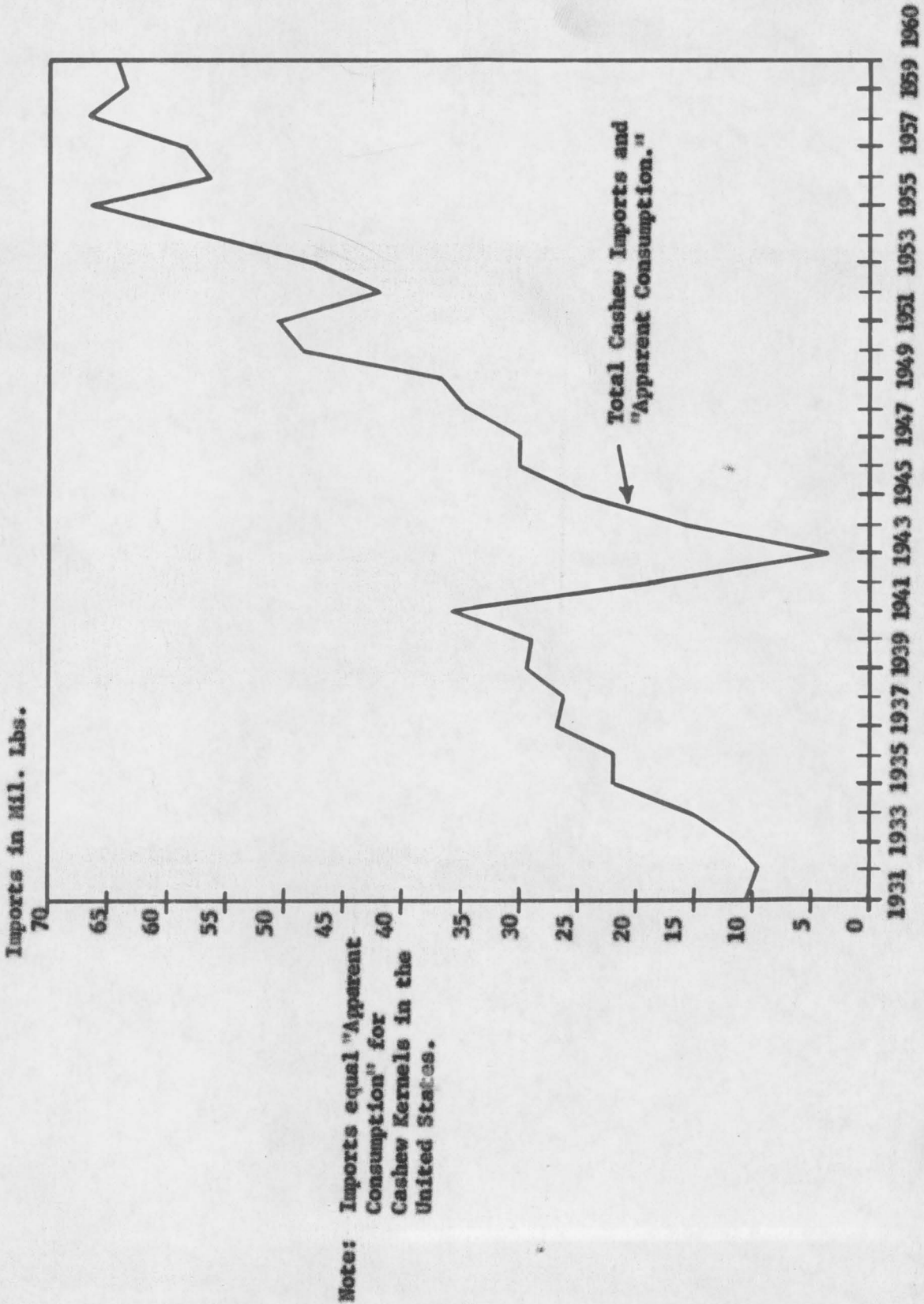
Figure 2. Total Exports of Cashew Kernels from India, 1937-1959.

Source: Table 7



**Figure 3. Exports of Cashew Kernels from India, by Countries of Destination, Annual Average Percentage to Each, 1956-1959.**

**Source: Table 7.**



Note: Imports equal "Apparent Consumption" for Cashew Kernels in the United States.

Figure 4. Total United States Imports of Cashew Kernels, 1931-1960.

Source: Table 8.

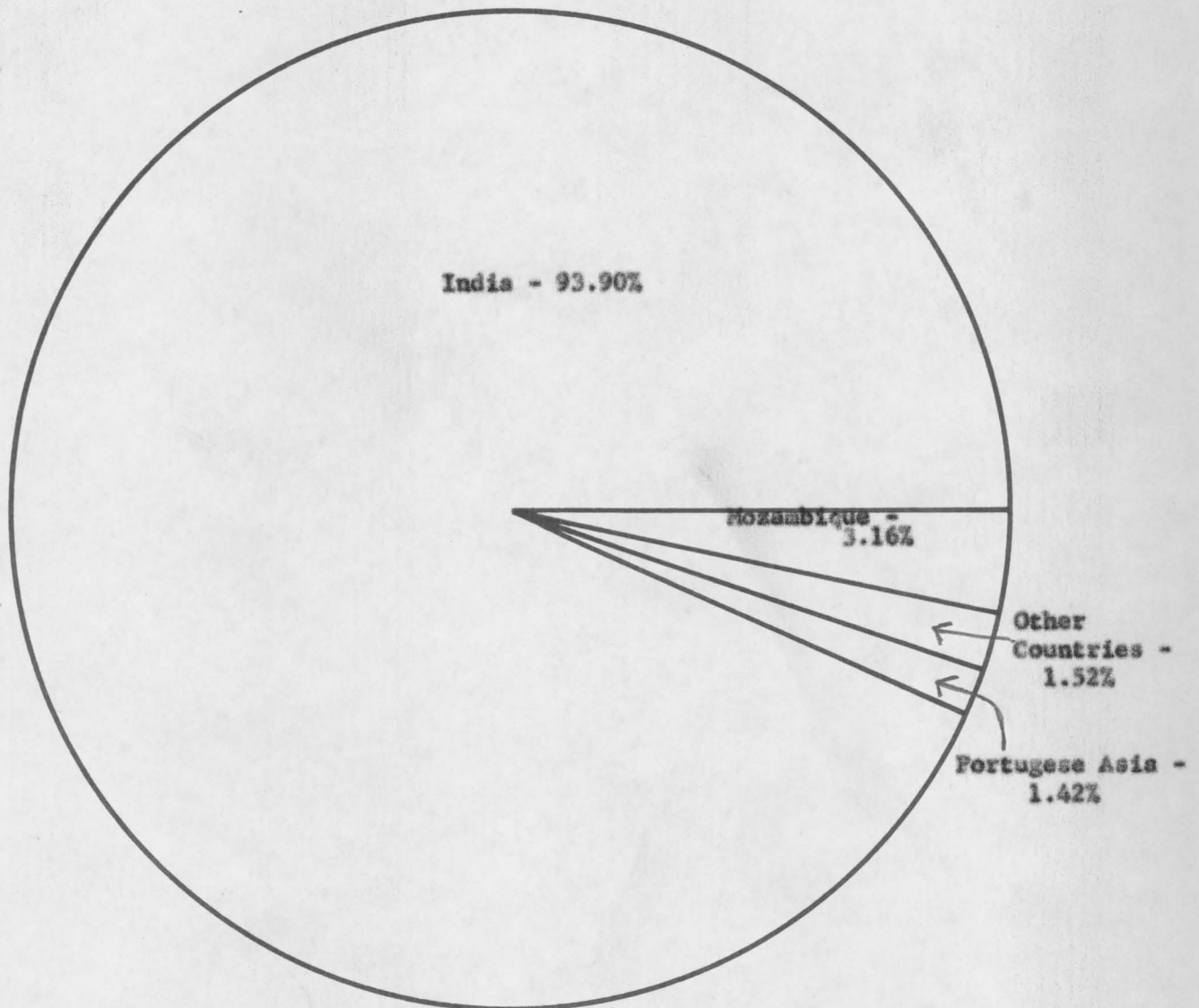


Figure 5. Imports of Cashew Kernels to the United States, by Countries of Origin, Average Percentage from Each, 1956-1960.

Source: Table 8

Table 7. Cashew Kernels<sup>1/</sup>: Exports from India, by Countries of Destination, 1937-1959.  
(Quantities in thousands of pounds.)

Year <sup>2/</sup>	Exports to:												
	Total Exports	United States	as % of Total	United Kingdom	as % of Total	Canada	as % of Total	Australia	as % of Total	U.S.S.R.	as % of Total	Other Countries	as % of Total
1937-39 <sup>4/</sup>	28,868	23,962	83.0	1,472	5.1	713	2.5	169	0.6	5/	5/	2,552	8.8
1946-47	33,367	28,978	86.8	1,162	3.5	1,474	4.4	931	2.8	5/	5/	823	2.5
1947-48	36,608	24,114	65.9	10,523	28.7	319	0.9	719	2.0	5/	5/	933	2.5
1948-49	40,227	36,201	90.0	2,143	5.3	627	1.6	5/	3/	5/	5/	1,256	3.1
1949-50	41,741	33,299	79.8	5,309	12.7	1,247	3.0	5/	3/	5/	5/	1,885	4.5
1950-51	55,865	45,133	80.8	8,510	15.2	746	1.3	598	1.1	5/	5/	878	1.6
1951-52	46,776	32,120	68.6	11,777	25.2	979	2.1	770	1.6	5/	5/	1,131	2.4
1952-53	61,373	43,072	70.2	15,462	25.2	2,189	3.6	108	0.2	5/	5/	543	0.9
1953-54	58,586	42,218	72.0	12,005	20.5	2,361	4.0	909	1.6	5/	5/	1,093	1.9
1954-55	76,186	60,884	79.9	9,592	12.6	2,125	2.8	1,056	1.4	5/	5/	2,529	3.3
1955-56	69,133	54,673	79.1	6,836	9.9	2,493	3.6	1,241	1.8	5/	5/	3,890	5.6
1956	56,056	39,073	69.7	6,446	11.5	5/	5/	5/	5/	5/	5/	10,538	18.8
1957	76,227	56,773	74.4	6,142	8.1	5/	5/	5/	5/	4,636	6.1	8,677	11.4
1958	87,461	61,234	70.0	5,990	6.8	5/	5/	5/	5/	11,232	12.8	9,005	10.3
1959	84,155	57,956	68.9	4,847	5.8	5/	5/	5/	5/	9,824	11.7	11,527	13.7

<sup>1/</sup> These figures must be accepted as representing (for countries other than the United States) total cashew kernel import and consumption data (since India is the world's primary processor and exporter). Import figures are the best available measure of "apparent consumption."

<sup>2/</sup> Indian fiscal years, April 1 to March 31, through March 31, 1956. 1956 figures are for March 31 to December 31. 1957 through 1959 figures are for calendar years.

<sup>3/</sup> "Other Countries" include (especially) East Germany and certain other Communist Bloc countries; also, for certain years where separate breakdown is not available. Canada, Australia, and U.S.S.R.

<sup>4/</sup> Average of fiscal years 1937-38 and 1938-39. No earlier statistics are available.

<sup>5/</sup> Figures not available.

Sources: United States Bureau of Foreign Commerce (11); Letter to author from the "Cashew and Pepper Export Promotion Council," Cochin, India, 1957.



Table 8. Cashew Kernels<sup>1/</sup>: United States Imports<sup>2/</sup> (and Apparent Consumption)<sup>3/</sup>, by Countries of Origin of Shipment<sup>4/</sup>. 1931-1960.  
(Quantities in Thousands of Pounds).

Year:	: United States Imports by Countries of Origin of Shipment:						
	U.S. :	India :	Portuguese:	Mozambique	Total :	as % of:	as % of
Imports:	India:	Total :	Asia	of Total :	Mozambique:	Total	
1931	10,524	10,398	98.8	7	0.1	--	---
1932	9,799	9,722	99.2	---	---	34	0.3
1933	11,691	11,408	97.6	176	1.5	17	0.1
1934	14,899	14,611	98.1	151	1.0	--	---
1935	22,376	22,225	99.3	42	0.2	--	---
1936	22,102	21,804	98.7	---	---	4	---
1937	26,848	26,748	99.6	13	---	--	---
1938	26,069	26,002	99.7	6	---	2	---
1939	29,466	29,440	99.9	---	---	--	---
1940	28,940	28,717	99.2	6	---	--	---
1941	35,592	35,322	99.2	74	0.2	--	---
1942	17,721	17,662	99.7	---	---	--	---
1943	3,542	3,116	88.0	347	9.8	--	---
1944	15,779	14,736	93.4	492	3.1	--	---
1945	24,502	23,151	94.5	153	0.6	11	---
1946	29,898	28,514	95.4	620	2.1	16	0.1
1947	29,902	29,939	94.3	742	2.3	--	---
1948	34,712	33,268	95.8	994	2.2	7	---
1949	36,650	35,723	97.5	799	2.2	--	---
1950	48,482	46,776	96.5	1,443	3.0	--	---
1951	50,504	48,171	95.4	1,712	3.4	478	0.9
1952	42,071	40,365	95.9	925	2.2	727	1.7
1953	47,709	45,715	95.8	830	1.7	1,072	2.2
1954	56,551	53,579	94.7	877	1.6	1,772	3.1
1955	66,396	62,751	94.5	1,470	2.2	1,535	2.3
1956	56,279	52,780	93.8	1,108	2.0	1,491	2.6
1957	58,396	55,142	94.4	387	0.7	2,588	4.4
1958	66,771	62,855	94.2	987	1.5	1,846	2.8
1959	63,351	60,331	95.3	279	0.4	1,940	3.1
1960	64,339	59,085	91.8	1,592	2.5	1,897	2.9

Table 8. (continued).

: United States Imports by Countries of Origin of Shipment:									
: Year:	: Brazil:	: Total	: Africa <sup>5/</sup> :	: Total	: British E. Africa:	: Total	: Haiti: Total	: Other Countries:	: Total
:	: as % of:	:	: as % of:	:	: as % of:	:	: as % of:	: as % of:	:
1931	2	---	---	---	43	0.4	75	0.7	
1932	14	0.1	---	---	3	---	25	0.3	
1933	---	---	---	---	32	0.3	58	0.5	
1934	---	---	11	0.1	106	0.7	20	0.1	
1935	18	0.8	35	0.2	56	0.3	---	---	
1936	153	0.7	33	0.2	65	0.3	42	0.2	
1937	37	0.1	14	0.1	22	0.1	16	0.1	
1938	1	---	4	---	45	0.2	3	---	
1939	---	---	14	---	13	---	---	---	
1940	203	0.7	---	---	14	---	---	---	
1941	---	---	18	---	177	0.5	---	---	
1942	47	0.3	11	0.1	---	---	---	---	
1943	---	---	---	---	79	2.2	---	---	
1944	462	2.9	23	0.1	65	0.4	---	---	
1945	926	3.8	66	0.3	195	0.8	---	---	
1946	490	1.6	99	0.3	159	0.5	---	---	
1947	1,005	3.2	26	0.1	26	0.1	---	---	
1948	377	1.1	4	---	32	0.1	30	0.1	
1949	83	0.2	---	---	40	0.1	5	---	
1950	82	0.2	---	---	172	0.4	9	---	
1951	20	---	---	---	123	0.2	---	---	
1952	23	0.1	---	---	30	0.1	1	---	
1953	26	0.1	40	0.1	7	---	20	---	
1954	25	---	292	0.5	7	---	---	---	
1955	50	0.1	585	0.9	5	---	---	---	
1956	385	0.7	324	0.6	75	0.1	115	0.2	
1957	8	---	272	0.5	---	---	---	---	
1958	7	---	404	0.6	100	0.1	572	0.9	
1959	149	0.2	393	0.6	1	---	257	0.4	
1960	1,203	1.9	334	0.5	140	0.2	86	0.1	

<sup>1/</sup> All world trade in cashews is handled in the kernel form, according to available statistics, except for Indian imports of raw East African nuts for processing and reentry into world trade as kernels. Primary producing countries in East Africa are Mozambique and Tanganyika.

Table 8. (continued).

2/ Import figures are based on "general imports" data for 1931, 1932, 1933, and 1947, and on "imports for consumption" data for all other years. "General imports" are merchandise entered for immediate consumption on arrival, plus merchandise entered for storage in bonded warehouses. "Imports for consumption" are merchandise entered for immediate consumption, plus withdrawals from bonded warehouses for consumption. "Imports for consumption" differ from "general imports" to the extent that merchandise entered for storage differs from warehouse withdrawals for consumption in any given period of time. This difference is usually small in the case of cashew kernels, and the differences from one year to another tend to offset each other.

3/ Cashew kernel import figures are accepted in the United States as the measure of "apparent consumption." No statistics are available on beginning and carryover stocks, there is no domestic cashew production, and any re-exports of imported kernels are removed from these data. Thus, they are the best (and only) available measure of American cashew consumption.

4/ "Countries of origin of shipment" import data serve as approximate indicators of production and processing of cashews in countries other than India, since the United States is the main consuming country for cashew kernels. Data on imports by U. S. from India indicate the largest share of cashews processed in India (see Table 7 for U. S. share of all cashew exports from India). Indian processing of cashew kernels is based about equally on domestic crop production and on the East African crop (which is imported to India for processing). Thus, Tables 7 and 8 together approximately indicate the world pattern of production and processing of cashews.

5/ Figures on "British East Africa" include imports from Tanganyika, Zanzibar, and Kenya.

Source: United States Bureau of the Census (7; 8).

India and United States Cashew Trade Channels and Procedures  
(2, section 2; 4, pp. 30-32; 5; 9; 10; 12)

Marketing of Indian cashew kernels through export channels is carried out by the processing firms, as a general rule. Some of the larger processors have their own brokers in major importing ports, such as New York. Other processors combine for coordinated marketing arrangements on a similar basis. Still others use the services of export brokers in Bombay to market their kernels in the export trade.



Agents of processors contact (and are contacted by) agents of importers of the consuming countries, especially those of the United States, to negotiate orders. Processors' agents also keep their principals informed as to cashew kernel stocks, demand trends, and price trends. Typical brokerage fees paid by processors for their agents' services run from 1 1/2 to 2 1/2 percent of total value of sales made by the agents.

Importers' agents are of two types: (1) buyers for large salters and other final processors, who purchase a large portion of their cashews directly through Indian processors' brokers without dealing with any intermediate importing firms; and (2) importing firms which obtain entire supplies for smaller final processors and supplemental supplies for larger final processors.

The primary cashew export center is Cochin, on the Indian West Coast. The primary cashew kernel import center is New York City. Indian cashew processors and their brokers, working with the Government of India's advice and encouragement, and with Indian pepper interests, formed "The Cashew and Pepper Export Promotion Council," with headquarters at Cochin in 1955. The Council's purposes are to advertise its products better in world markets, increase export sales, and coordinate trade more efficiently.

When agents of Indian cashew processors and United States importers contact each other, they negotiate orders primarily on a "C.I.F. New York (or other importing port) Basis". This means that the prices agreed on by seller and buyer include cost of the processed kernels in India, plus insurance and freight charges for shipment from India to the importing port. These negotiations are most frequently carried on in the importing ports (especially New York), but some of them are settled in the exporting ports.

Importers usually place their cashew kernel orders several months in advance of desired delivery dates. For example, orders for March delivery may be placed during December, January, and February, at different price levels over time of order placement for each grade of cashews. Indian shippers (processors) usually process and pack cashew kernels only after receiving such orders. They do not usually prepare stocks in advance of receipt of definite orders.

As previously stated, the larger salters and other final processors of cashew kernels in the United States purchase much of their supply (about half) directly through brokers working as agents of Indian processors, without dealing through any intermediate United States importing firms. Such importing firms do, however, obtain supplemental cashew supplies for the larger end-users, and entire supplies for smaller and medium-sized salters and other end-users. These importers sell cashews directly to medium and large-sized end-users, and also use the services of domestic brokers in the United States to sell cashews to smaller-sized salters, candy makers, and bakers. Some sales to medium-sized end-users are also made in the latter way. Importers sell dock-side as many of their cashews as possible, placing the rest into cool storage until a buyer is found.

Most American cashew importers handle a number of other commodities also. Most of them handle all kinds of nuts (both shelled and in-shell), and many also handle dried fruits and other items. The importance of any single firm in the cashew import trade is difficult to judge. Percentage of the total cashew trade handled by each firm varies greatly from year to year. In some years, a single firm may bring in as much as 15 percent

of the total cashew kernel imports of the United States. Most importers are referred to by the nut trade as "medium sized" firms. They finance their operations largely with borrowed capital.

Most cashew kernels imported to the United States are consumed as salted nuts. Nut salting firms obtain an average of about 90 percent of each year's supply of cashew kernels (through channels described above), process them, and move them into retail channels to consumers. The salting companies are quite varied in size. Their capitalizations range from a low of about \$25,000 up to many millions.

Market channels from salters to retail consumers take several different paths. Some salting firms market cashews and other salted nuts by dealing directly with retail food chains and food wholesaling organizations. Other salters send their products into food stores via wagon jobbers. Still other salters market through drug stores, department stores, variety shops, "dime stores", and other types of outlets. Finally, several salters market through special nut and/or candy shops. Some salting firms make use of several of the various market channels described, instead of confining themselves to only one type of outlet. Consumer surveys indicate that grocery stores, delicatessens, and other food shops are the most widely patronized retail outlets for salted nuts.

Prices of Cashews at All Market Levels  
(3; 5; 7; 8; 9; 10; 12)

Prices of cashew nuts at all levels of the market are indicated in Tables 9 through 16, and summarized in Table 17. Prices paid to Indian and African cashew growers by assembling agencies are not available.

Reported price quotations in India of domestic and African-grown raw nuts ranged from 4.5 to 12.2 cents per pound between 1952 and 1960 (Table 9). Basic price quotations in rupees per long ton are converted to cents per pound at the official exchange rate of 21 cents per rupee.

Table 9. Prices<sup>1/</sup> of Raw Cashew Nuts, Paid by Processors, India, 1952-1960.

Year	African Nuts <sup>2/</sup>		India-grown Nuts	
	Rupees <sup>3/</sup> //long ton <sup>4/</sup>	Cents/lb.	Rupees <sup>3/</sup> //long ton <sup>4/</sup>	Cents/lb.
1952	860	8.1	5/	5/
1953	666	6.2	5/	5/
1954	478	4.5	533	5.0
1955	777	7.3	5/	5/
1956	855	8.0	5/	5/
1957	747	7.0	779	7.3
1958	1,248	11.7	1,301	12.2
1959	683	6.4	704	6.6
1960	843	7.9	5/	5/

<sup>1/</sup> These are price quotations, not actual sales prices. Sales prices fluctuate in the general neighborhood of the quotations.

<sup>2/</sup> Mostly from Mozambique.

<sup>3/</sup> One rupee = 21 U. S. cents.

<sup>4/</sup> One long ton = 2,240 lb.

<sup>5/</sup> Price quotations not available.

<sup>6/</sup> Price quotations not available for years before 1952.

Source: Reports of Foreign Agricultural Service, U. S. Department of Agriculture (9; 10).

These quotations for raw nuts are equivalent to a range of 14.5 to 39.2 cents per pound of cashew kernels, when raw nut basis is converted to kernel basis at the approximate yield rate. One pound of raw nuts yields .311 pounds of kernels, or raw nut price multiplied by 3.2154 equals kernel basis price (see Table 10).

Table 10. Prices of Raw Cashew Nuts (in-shell), Paid by Processors in India, Converted to Kernel Basis, 1952-1960<sup>1/2/</sup>.

Year	African Nuts, C.I.F. Indian Ports		Indian-grown Nuts	
	Raw Nut Basis : cents/lb.	Kernel Basis : cents/lb.	Raw Nut Basis : cents/lb.	Kernel Basis : cents/lb.
1952	8.1	26.0	<u>3/</u>	<u>3/</u>
1953	6.2	19.9	<u>3/</u>	<u>3/</u>
1954	4.5	14.5	5.0	16.1
1955	7.3	23.5	<u>3/</u>	<u>3/</u>
1956	8.0	25.7	<u>3/</u>	<u>3/</u>
1957	7.0	22.5	7.3	23.5
1958	11.7	37.6	12.2	39.2
1959	6.4	20.6	6.6	21.2
1960	7.9	25.4	<u>3/</u>	<u>3/</u>

<sup>1/</sup> Conversion made on basis of typical kernel outturn from raw nuts ratio. One pound of raw nuts yields approximately .311 pound of kernels. Price conversion formula is: Raw Nut Basis Price x 3.2154 = Kernel Basis Price.

<sup>2/</sup> Price quotations, not actual sales prices.

<sup>3/</sup> Price quotations not available.

Source: Data in Table 9.

These are prices quoted to Indian cashew processors for raw nuts. Such quotations for Indian-grown nuts are made by itinerant dealers, who assemble the supply of nuts from farmers, to processors' agents and wholesale merchants in the primary markets. The quotations for African-grown nuts are made to processors' agents by importing firms located mainly in Bombay, on a C.I.F. (cost, insurance, and freight), to Indian ports basis.

Prices of processed cashew kernels have ranged from 32.6 to 45.9 cents per pound, from 1952 through 1960 (Table 11). These prices are on the basis F.O.B. (free on board) Cochin and other Indian exporting ports, and represent average values of all shipments during any given time period, from Indian processors to United States importers (shipments based on prior orders for future delivery at various time intervals and at various negotiated prices). The extreme range of these prices, from 1931 (the first year for which statistics are available) through 1959, is from a low of 12.8 cents (in the depression year of 1933) to a high of 67.0 cents (in 1945, during World War II). All grades of cashew kernels are averaged together in these prices. The variation by grades of prices on this basis during early 1950 is indicated in Table 15, as a sample of such variation.

Table 11. Cashew Kernel Prices F.O.B. Cochin, India (and Other Indian Exporting Points); 1931-1960.

Year	cents/lb.	Year	cents/lb.	Year	cents/lb.
1931	20.0	1941	16.5	1951	39.6
1932	16.2	1942	22.0	1952	45.9
1933	12.8	1943	31.5	1953	42.2
1934	15.8	1944	57.6	1954	32.6
1935	16.4	1945	67.0	1955	35.2
1936	16.8	1946	55.4	1956	42.7
1937	15.3	1947	39.6	1957	41.7
1938	13.5	1948	37.9	1958	38.1
1939	13.7	1949	38.1	1959	38.9
1940	14.1	1950	32.2	1960	43.6

Source: Import statistics, U. S. Bureau of the Census (7; 8).

Prices quoted to United States importers by Indian processors for cashew kernels are indicated in Figure 6 and Table 12. These quotations

are made on C.I.F. (cost, insurance, and freight) basis to New York (or other United States ports). This is the standard basis for negotiations between importers and processors. Actual prices at which deals are closed fluctuate in the general neighborhood of these quotations, being determined by bargaining between the parties. Orders are placed, on this basis, for forward delivery at various future time intervals.

The average prices F.O.B. Indian exporting ports, referred to above, are the result of these negotiations, and information about these prices is taken from import statistics compiled by the United States Bureau of the Census from import invoices.

Price quotations given in Table 12 are for the two most important grades of cashews brought into the United States. "320-count whole kernels" account for from 30 to 35 percent of the total United States cashew supply. This statement is based upon a Tariff Commission analysis of general imports invoices for early 1950, wherein the Commission estimated the percentages of cashews falling into each of the various grades (see Table 15). It is confirmed for validity over time by salted nut trade sources (5). "Fancy (Large) Pieces", the second most important grade, includes about 15 percent of all cashews imported, according to the Tariff Commission's analysis. Other important grades, and their percentages of total cashews according to the same study, are as follows:

	Percent
"240-count wholes"	7.5
"450-count wholes"	7.0
"Scorched Wholes"	8.0

According to the Tariff Commission's study, the more important cashew grades listed in this paragraph accounted for a total of about 72 percent

of all cashew kernels imported to the United States during January, March, and April of 1950. This research, although covering only one short time period, is the only indication available of how cashews break down into the various grades. There is extra evidence, however, on the importance of "320-count wholes". While the Tariff Commission says that 34 percent of the cashews imported in early 1950 were "320's", trade sources suggest that this grade takes in from 30 to 35 percent, over time. One trade source offers the opinion that, over time, cashew imports consist of about 35 percent "320's", 20 percent 450's", 10 percent other whole kernel grades, and the rest broken grades (butts, splits, and pieces).

Table 12. Cashew Kernel Price Quotations by Indian Processors to U. S. Importers, Selected Grades<sup>1/</sup>, C.I.F. Basis, New York, 1947-1960.

Year	320-Count Whole Kernels cents/lb.	Fancy Pieces of Kernels cents/lb.	Average of All Grades cents/lb.
1947	43.0	28.0	<sup>2/</sup>
1948	45.0	26.0	<sup>2/</sup>
1949	42.0	20.0	<sup>2/</sup>
1950	38.0	29.0	36.1
1951	47.0	37.0	45.1
1952	34.0	38.0	48.9
1953	45.0	34.0	<sup>2/</sup>
1954	37.0	25.0	38.6
1955	48.0	34.0	38.9
1956	50.0	44.0	46.7
1957	<sup>2/</sup>	<sup>2/</sup>	48.0
1958	<sup>2/</sup>	<sup>2/</sup>	46.0
1959	<sup>2/</sup>	<sup>2/</sup>	47.5
1960	<sup>2/</sup>	<sup>2/</sup>	54.8

<sup>1/</sup> "320-Count Wholes" and "Fancy (Large) Pieces" grades account for about 30 to 35 percent and 15 percent, respectively, of the total cashew kernel supply of the United States.

<sup>2/</sup> Not available.

Source: Foreign Agricultural Service, U. S. Department of Agriculture (9; 10).



It is generally believed that nearly all the whole kernels are salted, as well as many of the brokens, with the remaining brokens going to the candy and baking industries.

In Figure 7 and Table 13, wholesale price quotations for the more important grades of cashew kernels are indicated. These quotations are made by cashew importers to nut salting firms and other nut processors, on basis F.O.B. (free on board) New York, at importers' warehouses, with all import duties and shipping charges paid, and including importers' margins. Such quotations often remain unchanged for several months at a time, and do not necessarily reflect short-time changes in the market. Actual sales prices fluctuate in the general neighborhood of the quotations, however. Similar quotations are made F.O.B. other receiving ports, but New York is the primary receiving port and wholesale market (see Table 14). Therefore, quotations on New York basis are believed to be representative of wholesale prices charged throughout the cashew trade by importers to salters. For that portion of the cashew supply which is directly imported by salters, these price quotations do not directly apply. They do have an important meaning, however, in that they indicate (in an opportunity cost sense) the approximate value to salters of directly imported kernels, when landed at the primary receiving port with all charges, accruing up to this point, paid.

Wholesale prices for salted cashews charged by salters to retail outlets and their wholesale supply sources are not available.

Retail prices of salted cashews (and other salted nuts) are not available in any continuous series of representative statistics (over time and place) for the United States. As a rough approximation to the

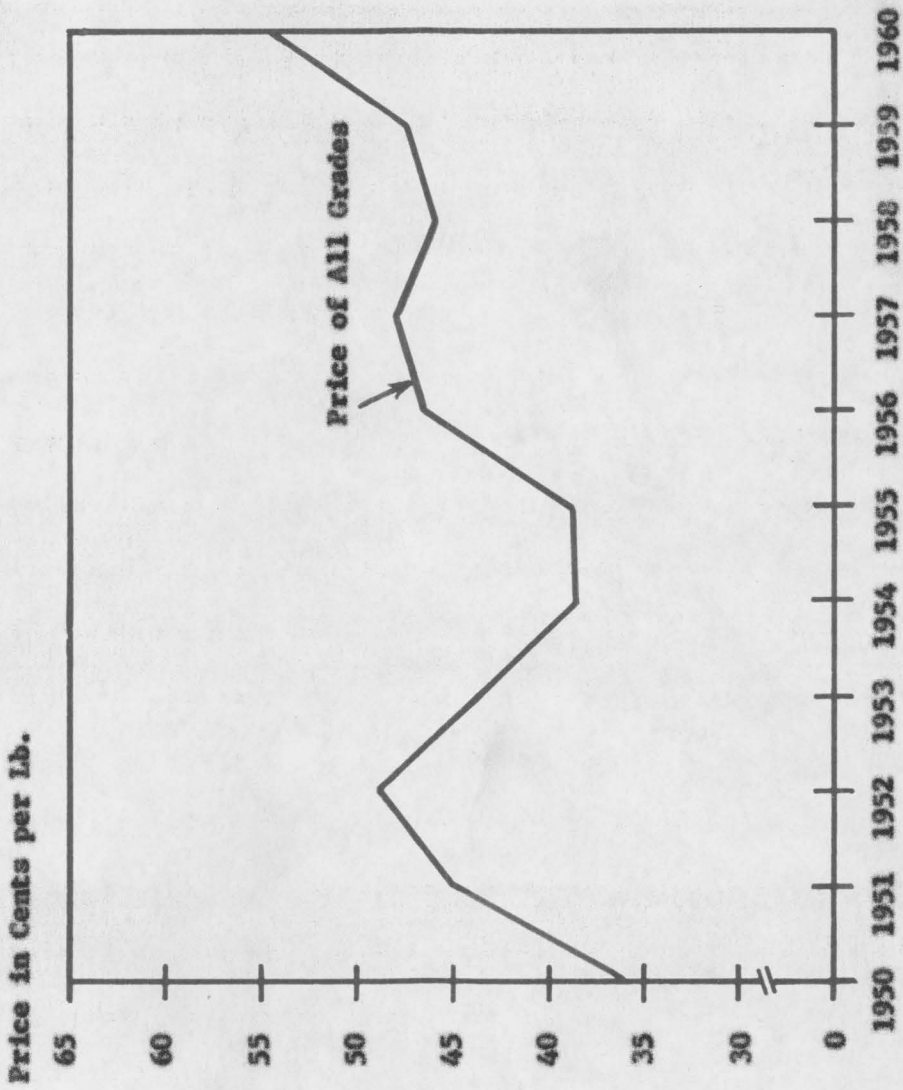


Figure 6. Prices of Cashew Kernels, Basis C.I.F. New York, Average of All Grades, 1950-1960.

Source: Table 12.

Table 13. Cashew Kernel Prices, Selected Grades, Wholesale Quotations by U. S. Importers to Nut Salters and Other Processors, F.O.B. New York, 1932-1960.

Year:	Standard Whole Kernels: cents/lb.	Standard Pieces of Kernels: cents/lb.	320-Count <sup>2</sup> Whole Kernels: cents/lb.	Fancy Pieces: of Kernels: cents/lb.	240-Count <sup>3</sup> Whole Kernels: cents/lb.	450-Count <sup>3</sup> Whole Kernels: cents/lb.	Scorched <sup>5</sup> Whole Kernels: cents/lb.
1932	28.8	14.0	6/	7/	---	---	---
1933	23.7	16.0	6/	7/	---	---	---
1934	28.1	16.9	6/	7/	---	---	---
1935	27.0	18.4	6/	7/	---	---	---
1936	26.5	19.5	6/	7/	---	---	---
1937	23.7	19.2	6/	7/	---	---	---
1938	24.2	14.9	6/	7/	---	---	---
1939	23.1	14.7	6/	15.4	---	---	---
1940	22.0	17.6	6/	19.0	---	---	---
1941	29.4	5/	6/	25.7	---	---	---
1942	53.5	5/	6/	33.5	---	---	---
1943	4/	5/	99.6	72.0	100.4	98.1	---
1944	4/	5/	94.4	69.0	95.7	97.0	96.0
1945	4/	5/	96.3	60.0	98.4	---	---
1946	4/	5/	72.7	44.1	75.7	58.3	---
1947	4/	5/	53.9	37.4	64.0	46.8	---
1948	4/	5/	54.9	32.4	62.1	50.9	---
1949	4/	5/	54.9	27.0	58.4	50.2	---
1950	4/	5/	46.3	35.6	51.6	40.1	---
1951	4/	5/	54.8	41.8	58.7	51.4	---
1952	4/	5/	63.2	41.8	67.1	60.2	---
1953	4/	5/	53.3	41.8	57.8	50.4	---
1954	4/	5/	44.3	33.0	47.9	40.6	---
1955	4/	5/	52.9	38.7	55.4	49.6	---
1956	4/	5/	55.6	50.6	56.9	54.4	---
1957	4/	5/	57.7	43.7	---	---	---
1958	4/	5/	52.0	33.3	---	---	---
1959	4/	5/	51.9	36.3	---	---	---
1960	4/	5/	59.8	42.8	---	---	---

Table 13. (continued) Footnotes

1/ "320-Count Wholes" grade (the most common grade) accounts for about 30 to 35 percent of the total cashew kernel supply of the United States. "Fancy Pieces," "240-Count Wholes," "450-Count Wholes," and "Scorched Wholes" grades accounted for about 15 percent, 7.5 percent, 7 percent and 8 percent, respectively, of total cashew supply, in early 1950, according to the United States Tariff Commission.

2/ "320-Count Wholes" are the primary single grade of cashew kernels used in salting. Nearly all whole kernels are salted, as well as many broken kernels. All whole kernels (including scorched) account for about 69 percent of the cashew supply, according to the U. S. Tariff Commission.

3/ Quotations on these grades not available prior to 1943, and not secured for this study after 1956. Quotation on "Scorched Wholes" available only in 1944.

4/ Quotations on this grade not available after 1942.

5/ Quotations on this grade not available after 1940.

6/ Quotations on this grade not available before 1943.

7/ Quotations on this grade not available before 1939.

8/ Estimates of percentages of cashew kernels falling into each grade specified in footnotes 6 and 7 are based on U. S. Tariff Commission analyses of general imports invoices for January, March, and April, 1950. (See Table 14). The estimate on "320-Count Wholes" is confirmed over time by trade sources. For most grades, a considerable variability in percentage distribution by grades arises from kernel size variation resulting from differences in growing season weather from one season to another.

Source: "Journal of Commerce," New York, N. Y. (as compiled in unpublished tabulations by Agricultural Marketing Service, U. S. Department of Agriculture).

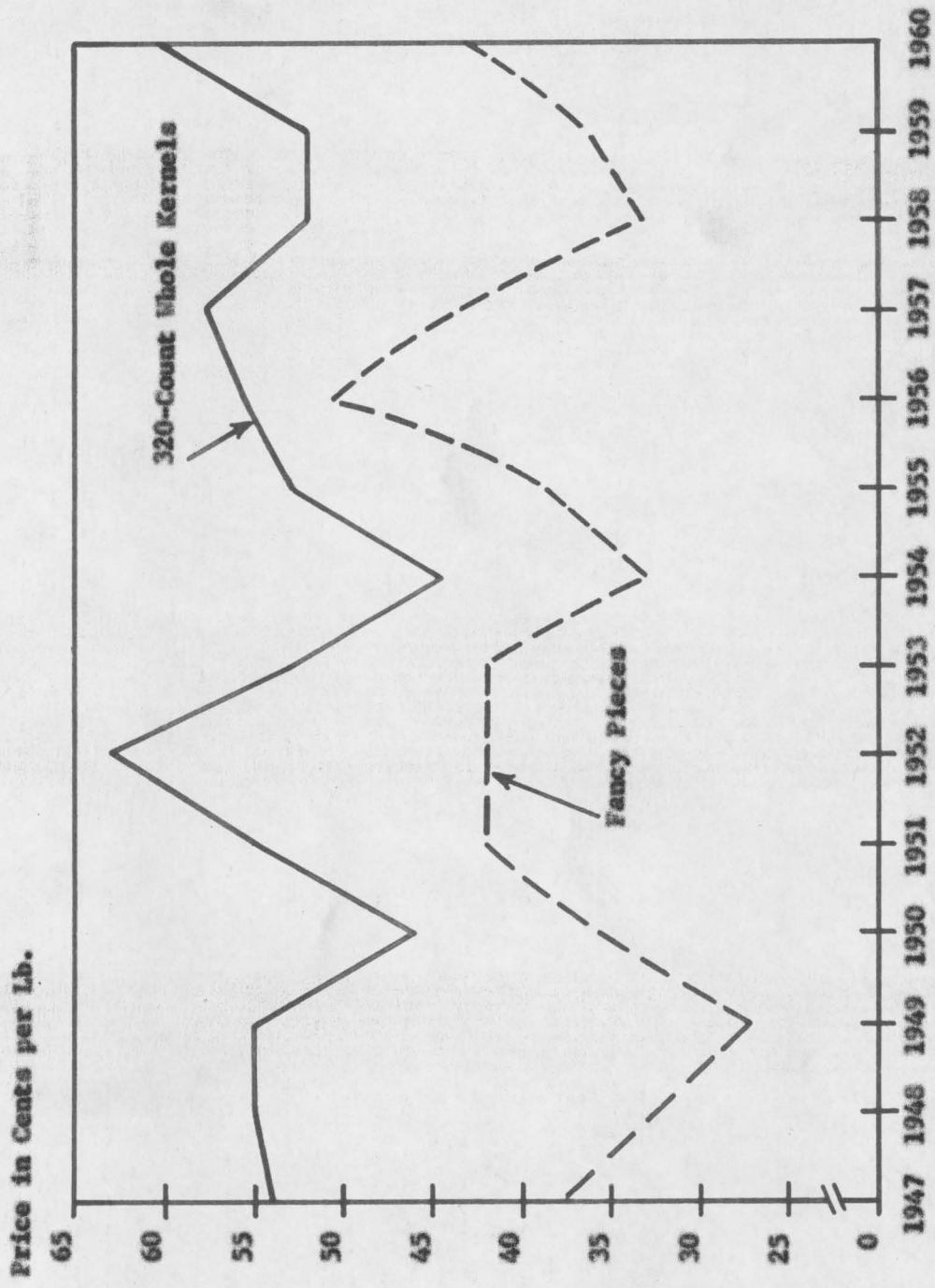


Figure 7. Prices of Cashew Kernels, Basis Wholesale at New York, Selected Grades, 1947-1960.  
 Source: Table 13.

Table 14. Cashew Kernels: United States Total Imports, Imports Through New York Customs District<sup>1/</sup>, Percentage of Total Imports Entering Through New York, and Tariff Rate. 1931-1960.

Year	Total Imports (1000 lb.)	Imports through New York (1000 lb.)	Percentage of Total Imports through New York <sup>1/</sup> (%)	Tariff Rate (cents/lb.) <sup>2/</sup>
1931	10,524	8,596	81.7	2.0
1932	9,799	8,086	82.5	"
1933	11,691	9,747	83.4	"
1934	14,899	12,627	84.7	"
1935	22,376	20,015	89.4	"
1936	22,102	19,213	86.9	"
1937	26,848	22,185	82.6	"
1938	26,069	22,390	85.9	"
1939	29,466	25,127	85.3	"
1940	28,940	24,318	84.0	"
1941	35,592	30,053	84.4	"
1942	17,721	16,596	93.7	"
1943	3,542	3,504	98.9	"
1944	15,779	15,159	96.1	"
1945	24,502	23,407	95.5	"
1946	29,898	28,803	96.3	"
1947	29,902	29,243	97.8	"
1948	34,712	33,682	97.0	2.02 <sup>2/</sup>
1949	36,650	36,236	98.9	1.5
1950	48,482	47,641	98.3	"
1951	50,504	49,447	97.9	"
1952	42,071	40,232	95.6	"
1953	47,709	45,664	95.7	"
1954	56,551	51,613	91.3	"
1955	66,396	61,556	92.7	"
1956	56,279	50,437	89.6	"
1957	58,396	48,778	83.5	"
1958	66,771	55,654	83.4	"
1959	63,351	53,595	84.6	"
1960	64,339	54,282	84.4	"

<sup>1/</sup> New York Customs District includes these ports: New York, New York (headquarters port); Albany, New York; Newark, New Jersey; and Perth Amboy, New Jersey. Data herein clearly indicate predominance of New York, as the main cashew import center (and wholesale market). Other cashew receiving ports (customs districts) include San Francisco, Massachusetts, Chicago, Los Angeles, Philadelphia, Virginia, Maryland, Oregon, New Orleans, and several others of lesser importance.

<sup>2/</sup> Basic tariff rate on cashews is 2¢ per pound, under the Tariff Act of 1930. It was applied without exception until July 9, 1948, when a reduction to 1.5¢ per pound (made under provisions of the General Agreement on Tariffs and Trade) went into effect.

Source: U. S. Bureau of Census import statistics (7;8).

general level of retail prices for salted cashews in recent years, however, the author has made some random observations in various chain food stores and "dime stores" in Maryland and Virginia. These observations, covering the period from early 1956 to early 1961, are reported in detail (by type and size of package and by type of store) in Table 16. They indicate that retail prices of salted cashews (as well as other salted nuts) have remained relatively stable during the period of the survey. Based on these observations, it appears that the overall average retail price of cashew kernels (equivalent per pound) for the period surveyed has fallen into the approximate range of \$1.15 to \$1.20. Cashew prices at various market levels are summarized in Table 17.

Table 15. Cashew Kernels: Proportionate Quantities and Unit Value of Imports, by Grades, New York; Average of January, March, and April, 1950.

Grade	: Percentage : of total : Quantity	: Price per lb. : F.O.B. Cochin, India
Whole (approximate maximum count per lb.):		
210	1.9	40.2
240	4.7	39.2
280	1.9	36.5
320	20.4	36.4
400	3.4	32.8
450	4.2	30.6
Butts	2.7	27.0
Splits	3.2	25.1
Fancy Pieces	9.1	20.0
Small Pieces	0.8	19.5
Scorched:		
Wholes	4.8	30.1
Butts	0.2	21.5
Splits	0.4	20.5
Pieces	2.2	18.6
Undetermined or Unselected <sup>1/</sup>	40.1	--
Total or Average	100.0	31.1

<sup>1/</sup> It can be assumed that this group consists largely of graded nuts in the same proportion as those shown.

Source: U. S. Tariff Commission - invoice analyses of general imports (12).

Table 16. Salted Cashew Kernels: Retail Prices in Selected Chain Food Stores and "Dime Stores," Eastern United States; 1956-1961 Average.

Type and Size of Package : Price per Package : Equivalent Price per Pound

In Chain Food Stores - Prepackaged:

Bag - 3 1/8 oz.	29¢	\$1.48
Can - 4 3/4 oz.	39¢	1.31
Bag - 5 1/2 oz.	49¢	1.43
Can - 5 1/2 oz.	45¢	1.31
Can - 6 3/4 oz.	45¢ & 49¢	1.07 & 1.16
Bag - 7 oz.	49¢	1.12
Bag - 9 oz.	69¢	1.23
Can - 13 oz.	89¢	1.10
Can - 14 oz.	66¢ & 89¢	.75 & 1.02

In Chain "Dime Stores" - Salted on Premises, Held and Displayed in Bulk, and Sold in Bag or Box:

Bag - 4 1/2 oz.	39¢	1.39
Box - 8 oz.	69¢	1.38

Approximate Overall Average Retail Price<sup>1/</sup> per Pound, from 1956 to 1961 = \$1.21<sup>2/</sup>

<sup>1/</sup> Simple average of package prices reported above.

<sup>2/</sup> Observations indicate that retail prices of salted cashews have remained relatively stable during the period of the observations.

Source: Random observations in various stores in Maryland and Virginia, by the author, from Spring 1956 to Winter 1961.

Prices at the wholesale (from importer to salter) level are discussed further in the demand analysis (for cashews and peanuts) section to this study. Because of the very sketchy price information available on salted cashews and salted peanuts at the retail level, it is necessary to make demand measurements based on New York wholesale prices, about which reasonably accurate and representative information is available. (See Figures 8 and 9 for an indication of the relationship between cashew consumption and New York wholesale prices.)



Table 17. Cashew Price Ranges at Various Market Levels - Summary Table

Time Period	Market Level	Price Range	1960 Average Price
(Prices Paid to Growers for Raw Nuts by Assembly Agencies-Not Available)			
		4.5 to 12.2 cents/lb.	
		(Raw Nut Basis)	
1952-1960 (Raw Nut and Kernel Bases)	Raw Nuts Being Sold to Indian Processors	14.5 to 39.2 cents/lb. (Kernel Basis)	7.9 cents/lb. (Raw) 25.4 cents/lb. (Kernel)
1952-1960 (Kernel Basis)	Processed Kernels (Basis F.O.B. Indian Exporting Ports) - Average Prices be- tween Indian Process- ors and U.S. Importers	32.6 to 45.9 cents/lb.	43.6 cents/lb.
1952-1960 (Kernel Basis)	Average of All Grades of Processed Kernels (Basis C.I.F. New York) - Quotations of Indian Processors to U.S. Importers, and Basis of Negotiations Between Them.	38.6 to 54.8 cents/lb.	54.8 cents/lb.
1952-1960 (Kernel Basis)	"320-Count Wholes" - Wholesale Quotations by U.S. Importers to Nut Salters, F.O.B. New York	44.3 to 63.2 cents/lb.	59.8 cents/lb.
(Wholesale Prices from Salters to Retail Outlets-Not Obtained)			
1956-1961 (Kernel Basis)	Retail Prices of Salted Cashews, Eastern U.S.	75¢ to \$1.48/lb.	\$1.21/lb.

Source: Data of Tables 9 through 16.

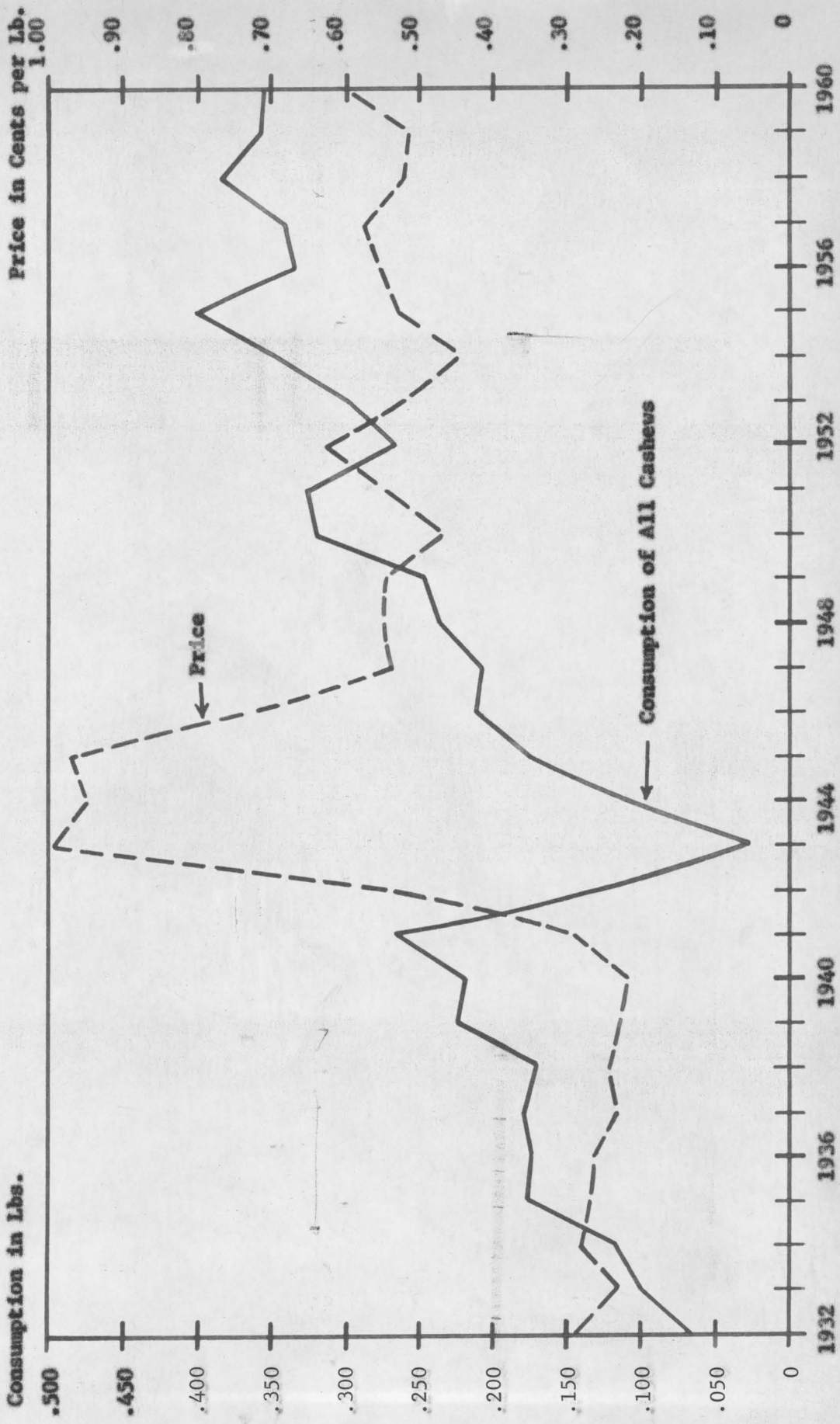


Figure 8. Per Capita Quantity of Cashews Consumed (Imported) in All Uses, and Price of Cashew Kernels, United States, 1932-1960.  
 Price of Cashew Kernels, "320-Count Wholes" Grade, Wholesale, F.O.B. New York ("Standard Wholes" Grade before 1943).  
 Source: Tables 13 and 18.

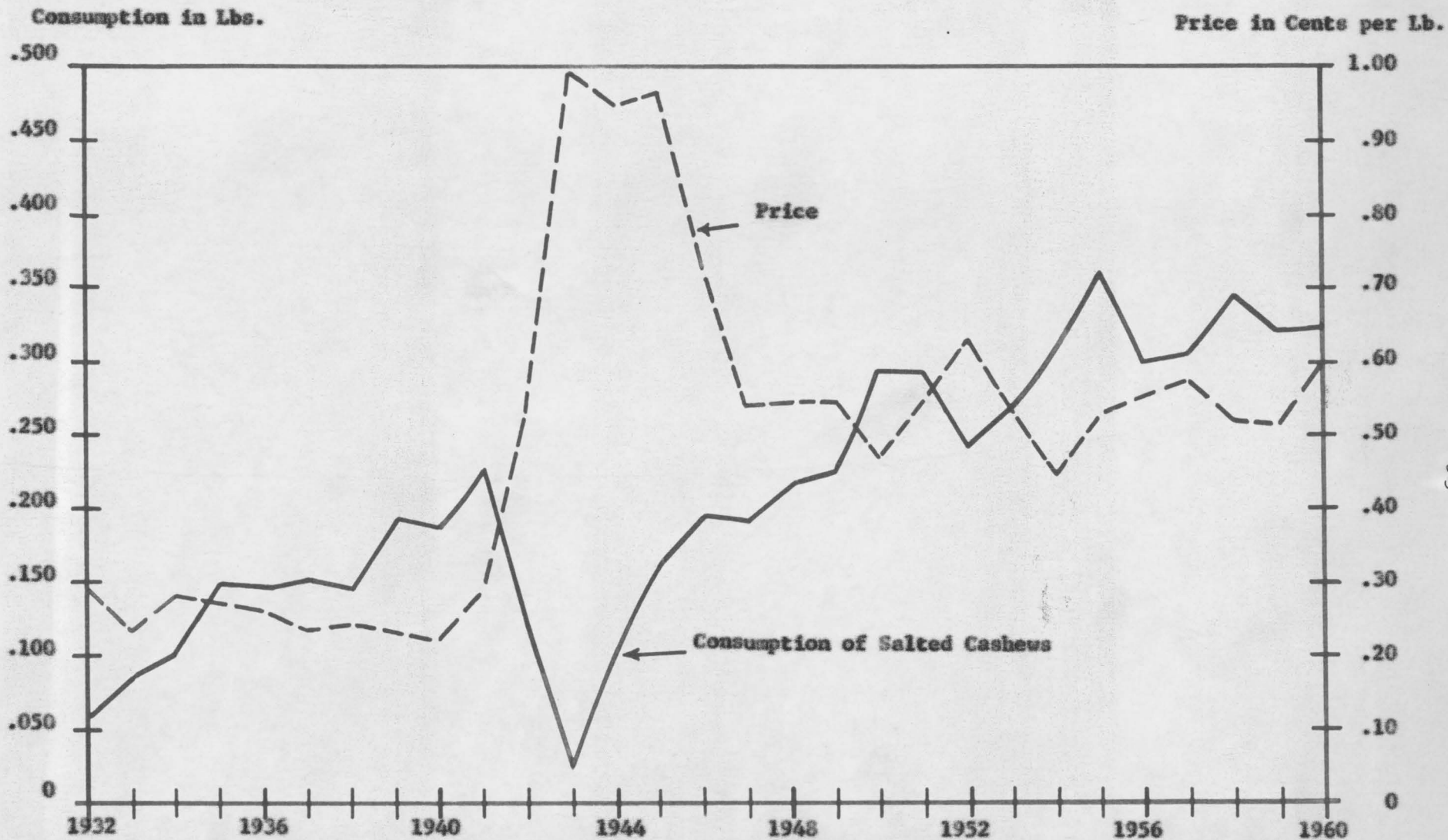


Figure 9. Per Capita Quantity of Cashews Consumed as Salted Nuts, and Price\* of Cashew Kernels, United States 1932-1960.  
 \*Price of Cashew Kernels, "320-Count Wholes" Grade, Wholesale, F.O.B. New York ("Standard Wholes" Grade before 1943).  
 Source: Tables 13 and 18.

Usage of Cashew Kernels in the United States -  
Forms and Quantities Consumed (12)

Of all cashews imported into the United States (the entire supply available, and the only measure of apparent consumption, since there is no domestic production), an average of about 90 percent goes to the salted nut trade each year (see Table 18). "Salted nuts" are defined as shelled nut kernels which have been "roasted in hot vegetable oil with salt added". Of the remaining 10 percent, about 6 percent are used in candy and about 4 percent in baked goods, on the average.

Of the cashews salted, about half are sold in mixtures with other salted nuts (including domestic tree nuts, imported tree nuts, and peanuts). The remainder are sold as salted cashews alone. Cashews constitute about 75 percent of all tree nuts used in the salting trade. They usually sell at lower prices than other tree nuts, but at higher prices than peanuts.

Figures showing quantities of cashews imported to the United States must also represent the apparent total consumption of these nuts. This is because there is no domestic production, and no statistics are collected to show retail sales, stocks on hand, and carryover from one season to the next (to aid in making a closer estimate of consumption).

Figures representing quantities of cashews salted in the United States are based upon estimated percentages of the total imports, believed to be used by the nut salting industry. Percentages used in obtaining annual estimates of salted cashews are based on percentages periodically determined in surveys of the nut industry by the United States Tariff Commission. The Commission has made surveys and determined percentages

for periods as follows: 1935 to 1937, 85 percent of all cashews estimated to be salted; 1946 to 1949 (average of years beginning October 1), 91.667 percent; 1950 to 1952 (average of years beginning October 1), 89.583 percent. As of June 1960, no further information of this type had been collected on cashews by the Tariff Commission (to cover periods since September 1953). However, the Commission's staff informed the author in June 1960 that it believes the average percentage of cashews being salted has undergone little change since 1953. Based upon percentages found in the surveys, the following percentages have been used in this study to estimate the number of cashews being salted, by years: 1932 to 1941, 85 percent; 1942 to 1946, 90.625 percent; 1947 to 1950, 91.667 percent, 1951 to 1953, 89.583 percent; and 1954 to 1960, 90.625 percent.

Figures showing quantities of cashews estimated to be salted must also represent the apparent consumption of salted cashews in the United States. No statistics are available for retail sales, stocks on hand, and carryover, to aid in making a closer estimate of consumption.

Quantities of cashews imported to the United States (apparent total cashew consumption figures) are given in Table 18 and Figures 8 and 9. Estimated quantities of cashews used by the salted nut industry (apparent consumption of salted cashews) are also shown. Both series of data are given on total and per capita bases.

Until the early 1920's cashew kernels were of little commercial importance in the United States and around the world. They were consumed primarily in areas where they grew. Commercial development on an extensive scale began in the early 1920's after a modern packing

method was developed. This method (described in detail previously, along with other steps in cashew processing) provided a solution to the serious problem of insect damage to kernels. The introduction of sealed tin cans (with air evacuated and replaced by carbon dioxide gas) greatly eased this problem. After this innovation, the cashew trade grew rapidly, with a product highly desirable to consumers.

Statistics presented earlier indicate that the main development of cashew growing has taken place in India and in East Africa, with nearly all processing of the crops from both areas taking place in India. Minor commercial cashew production has developed in other areas.

Consumption of cashew kernels has had its major development in the United States, which takes about three-fourths of the world's supply (according to available figures). Consumption in the rest of the world has grown at a faster rate, although on a smaller scale, than consumption in the United States. Growth in this country is shown in Table 18. This growth was rapid and steady from the early 1920's until World War II. It assumed large enough importance to become the subject of separately published statistics in the early 1930's, reaching a prewar peak of 35.6 million pounds in 1941.

American cashew consumption suffered a severe, but temporary, setback during World War II. This arose from the shortage of shipping space for non-strategic materials during the war. This shortage, accompanied by a Federal Government order which restricted cashew imports (except as linked with shipments of strategic cashew-shell oil) first came into being in late 1941. As a result, imports (and resulting consumption) for 1942 were less than half of what they had been in 1941. In 1943,

Table 18. Cashew Kernels: Quantities Used in the United States: Total and Per Capita Imports (Apparent Total Consumption); Total and Per Capita Estimates of Quantities Salted (Apparent Salted Cashew Consumption). 1932-1960

Year	Total Imports and Consumption (1000 lb.)	Per Capita Imports and Consumption (lb.)	Total Salted Cashews (1000 lb.)	Per Capita Salted Cashews (lb.)
1932	8,623	0.069	7,330	0.059
1933	12,526	0.100	10,647	0.085
1934	14,899	0.118	12,664	0.100
1935	22,376	0.176	19,020	0.149
1936	22,102	0.172	18,787	0.147
1937	26,848	0.177	19,421	0.151
1938	26,069	0.170	18,759	0.144
1939	29,466	0.225	25,046	0.191
1940	28,940	0.219	24,599	0.186
1941	35,592	0.267	30,253	0.227
1942	17,721	0.131	16,244	0.120
1943	3,542	0.026	3,247	0.024
1944	15,779	0.114	14,467	0.105
1945	24,502	0.175	22,460	0.161
1946	29,898	0.211	27,407	0.194
1947	29,902	0.208	27,410	0.190
1948	34,712	0.237	31,819	0.217
1949	36,650	0.246	33,596	0.225
1950	48,482	0.320	44,442	0.293
1951	50,504	0.327	45,243	0.293
1952	42,071	0.268	37,688	0.240
1953	47,709	0.299	42,739	0.268
1954	56,551	0.348	50,660	0.312
1955	66,396	0.402	59,480	0.360
1956	56,279	0.335	50,416	0.300
1957	58,396	0.341	52,313	0.306
1958	66,771	0.384	59,815	0.344
1959	63,351	0.358	56,752	0.320
1960	64,339	0.356	58,307	0.323

Source: For imports (and total consumption data - U. S. Bureau of the Census import statistics; for salted quantities - calculations by the author based on estimated percentages salted (as periodically determined by U. S. Tariff Commission surveys of the nut salting industry). Per capita data are calculations based on U. S. Census Bureau population estimates.

they hit an all-time low (since separate cashew statistics were first kept) of about 3.5 million pounds. The situation began to ease in 1944. By the middle of that year, cashew-shell oil had ceased to be classified as a strategic commodity, and the shipping space situation had eased considerably. In 1945, all cashew import restrictions were lifted.

The war-caused inability of the United States to import cashews depressed the Indian and African cashew industry. Shipping space shortages and restrictions, coupled with limited domestic consumption, caused a large portion of India's 1942 and 1943 crops to remain unsold. This led, in April 1943, to an Indian ban on imports of raw cashew nuts from Africa, so that maximum amounts of Indian nuts could be sold. As a result, no appreciable commercial cashew harvest took place in East Africa while the ban was in effect, since the African growers depend on India for processing and further marketing of cashews. The Indian ban was lifted in middle 1945, and both Indian and African segments of the industry began to return to normal.

United States cashew imports (and consumption) returned to fairly normal quantities in 1946, the first full year free of import restrictions. Prices did not fully drop from their artificially high wartime level to a more normal range until 1947, however, (See Table 13). Quantities imported (and consumed) did not surpass the prewar peak of 35.6 million pounds (established in 1941), until 1949. They grew, rapidly but somewhat erratically, until 1955, when the comparatively huge record of 66.4 million pounds was established. Since 1955, cashew imports (and consumption) have shown a fairly stable trend, with no



clear tendency toward a longer-run, rise or fall. The all-time record level of 66.8 million pounds was achieved in 1958 (see Figure 4).

Per capita imports (and consumption) of cashew kernels in the United States (see Figures 8 and 9) grew steadily in each prewar year (except 1936, 1938, and 1940, when only slight relapses were suffered). Years of largest growth were 1935, 1939, and 1941. The prewar record of 0.267 pounds of kernels per person was set in 1941. World War II caused a setback, as indicated previously. Substantial quantity recovery came in 1946, but the prewar record was not broken until 1950, when the figure reached 0.320 pounds per capita. After relapses in 1952 and 1953, an all-time record of 0.402 pounds per capita was imported (and consumed) in 1955. Per capita quantities have run somewhat under this record in the years since it was set, but they are holding up well.

**Research and Future Prospects in the Cashew Industry**  
(1; 2, sections 3 and 4; 4, pp. 34-38; 6)

Research aimed at improving the cashew industry in India was begun in 1931, following the beginning of rapid commercial growth (which was set off by development of the improved method for export packing of cashew kernels, as previously described). Such research has been generally conducted on a limited basis, due to lack of adequate financial support.

A new emphasis has come in recent years, however, following the establishment of India's independence in 1947 and the adoption of her present constitution in 1949 and 1950. The vehicles for guiding economic progress are the "Five Year Plans", adopted in 1951, 1956, and 1961, and

covering the periods 1951-1956, 1956-1961, and 1961-1966, respectively. Each Plan had placed considerable emphasis on growth and development of the Indian cashew industry, as a prominent factor in India's export trade and her capacity to earn foreign dollar exchange (which is a critical factor in her foreign trade). For example, the preliminary draft of the Third Five Year Plan (June 1960) calls for a cashew production target of 336 million pounds by 1965-1966. This goal, if achieved, will represent a 133 percent increase over India's 1960 cashew production of 144 million pounds (figures are in-shell basis).

Cashew research in India before World War II covered the following topics: (1) Improvement of the cashew tree (vigor, breeding, selection, and bearing capacity); (2) morphological studies (of variations in botanical forms of different parts of the tree to provide better adaptability to different soil and climate conditions); (3) improvement in size and quality of the cashew nut; and (4) work on the few pests and diseases to which the cashew is subject (primarily caterpillars, "die-back" disease, and "bleeding" disease). This prewar research, however, was conducted on a very limited scale, due to lack of adequate financial support, and it merely scratched the surface in comparison to the research work needed to develop a truly efficient commercial cashew industry.

Research since the adoption of India's first Five Year Plan in 1951 has been covering (or planning the future coverage of) the following topics concerning the production of raw cashew nuts: (1) survey of existing cashew plantations in South India, classification and description of different types of cashew operations; (2) selection of promising cashew varieties, both Indian and foreign; (3) standardization of propagation

methods; (4) study of factors influencing flowering, fruit setting, and bearing; and (5) study of effects of soil type, soil moisture, and plant nutrients on flowering and fruit setting. More emphasis than in prior years is being placed on cashew research since India's independence and embarkation on economic planning.

In addition to the research efforts described, India's government and members of the cashew industry are also working in efforts to develop new and larger markets, improve processing efficiency, improve working conditions for laborers, establish more equitable and efficient pricing and marketing of domestic and African raw nuts, and make the Indian processing industry less dependent on the East African raw nut crop (by growing more domestic nuts).

"The Cashew and Pepper Export Promotion Council" was set up in 1955 under joint auspices of government and industry, with headquarters at Cochin, to enlarge existing export markets, open up new ones, and settle complaints arising in the trade.

Indian experts believe that programs to advertise the food value of the cashew kernel will help to increase demand for the product in both export and domestic markets. They also think that further efforts to standardize and improve quality of cashew kernels should be made in order to encourage additional trade and consumer acceptance. Some kernels are still processed, packed, and marketed in ways which fall short of the best accepted technology, leading to an inferior product which does unfair damage to the cashew industry as a whole.

The industry is being urged toward greater adoption of the oil bath processing method, which gives greater yields and higher quality of

kernels, and provides for greater recovery of cashew shell oil (as a valuable byproduct), than other processing methods do. Initial investment in the equipment required, however, is quite expensive compared to financial resources of most of the small cashew processing plant owners. To overcome this obstacle, the small processors are being urged to combine themselves into associations to secure government loans of the necessary capital. In addition, the Indian "Council of Scientific and Industrial Research" has been urged by the "Council of Agricultural Research" to investigate possibilities for developing cheaper, efficient processing methods.

Litte information is available regarding research and future prospects in the East African cashew industry. This industry, concentrated in Portuguese Mozambique and British Tanganyika, Zanzibar, and Kenya, is predominantly a raw nut producer. No extensive development of processing has been made in this area, because of lack of a large supply of cheap hand labor, such as exists in India. (Shelling cashew nuts has so far resisted mechanization, due to the kidney shape of the nuts and poison effects of the shell oil. Thus, a large supply of cheap hand labor is, for the present, a necessary basis for the cashew processing business.) For this reason, East Africa has developed a large scale of production of raw nuts to supply the demand arising from the Indian processing industry and export trade (in excess of India's domestic raw nut supply). Only a few cashew kernels are processed and moved toward consumers from East Africa, or other producing areas besides India. The Portuguese government has been reportedly trying to develop a cashew processing industry in Mozambique.

Summarizing future prospects for the cashew industry, it is most likely that its expansionary trend will continue indefinitely into a bright future. Demand for cashew kernels has been growing in the United States. As other countries of the world make progress in economic growth, and satisfy their more basic needs and desires, they may be expected to present an ever-growing demand for cashew kernels. Such growth in demand will probably be met always by an ample supply, as India, East Africa, Brazil, and other producers develop their cashew industries to greater size and efficiency. This development may also be expected to produce the byproducts - cashew nut shell oil and cashew apples - in an ever-increasing supply for ever-increasing uses.

DESCRIPTION OF NUT SUPPLIES, CONSUMPTION AND PRICES  
IN THE UNITED STATES<sup>2/</sup>

General

This study attempts to explore the market relationships between cashews and peanuts in the United States, especially in their use as salted nuts. The cashew nut industry of the world, and the trade in, and use of, cashews in the United States, have been described in some detail. Comparable description of the peanut industry may be found in other research reports (13; 14; 15; 25; 31; 35; 36). It should be helpful, however, to point out some of the more significant facts concerning production, consumption, and prices of peanuts in the United States. This information, along with that already presented on cashews, establishes a foundation for the following analysis of demand for both peanuts and cashews. Descriptive information about production and consumption of other nuts is presented also, in order to place peanuts and cashews in proper perspective in relation to other nuts and the total nut price, production and consumption picture in the United States.

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<sup>2/</sup> This section is an overall summary of information available on United States patterns of production, imports, exports, consumption (by forms in which purchased by consumers), and prices, of peanuts, cashews, and other important tree nuts. Citations to source literature cannot be made for each sentence or paragraph, because of the process of synthesizing and interpreting material from several sources which the author has followed throughout this section of the study. A general credit citation to the literature is made for each subsection of this section. References used in obtaining this information are listed in the Bibliography - Literature Cited section of this study, under the sub-heading "Description of Nut Supplies, Consumption, and Prices in the United States". Sources of statistics are credited in footnotes to tables.

Production, Imports, and Exports  
(13, pp. 38-47; 14; 16; 17; 18; 19; 35; 36)

Several distinct types of peanuts are produced in the United States. Each has certain particular physical characteristics and a distinct pattern of consumer usage in various forms. The primary types are Virginias, Spanish, and Runners. Some less important types are also recognized: Valencias, Tennessee Red, and Tennessee White.

Three peanut production areas are recognized. The Virginia-Carolina area, which includes peanut areas of Virginia, North Carolina, and Tennessee, produce mostly the Virginia type, along with small amounts of Tennessee Red and Tennessee White. The Southeastern Area produces Spanish and Runner types, and includes peanut areas of Georgia, Alabama, Florida, South Carolina, and Mississippi. The Southwestern area produces Spanish type peanuts in Texas, Oklahoma, and Arkansas, and Valencias in New Mexico.

Tree nuts produced in the United States are pecans, walnuts, almonds, and filberts (hazelnuts). Pecans are grown commercially (in order of importance of States) in Georgia, Texas, Oklahoma, Alabama, Louisiana, Mississippi, Arkansas, Florida, South Carolina, New Mexico, and North Carolina. Two types of walnuts are grown. English (or Persian) walnuts are grown in California and Oregon. A few black walnuts are grown, mostly in the East, but no statistics are available on their production. Almonds are grown in California, while Oregon and Washington produce filberts in commercial volume.

The states listed as producers of peanuts and tree nuts are those of commercial importance. Minor quantities of the various nuts are produced in certain other states, but the total of such production is believed to be negligible.

The United States carries on a small amount of import and export trade in peanuts, almonds, filberts, walnuts, and pecans. Most of the production of these nuts is consumed domestically, with only a little augmentation by imported supplies.

Large quantities of cashews, brazils, chestnuts, pignolios, and pistachios (none of which is produced in the United States in commercial volume, if at all) are imported. Cashews are of primary importance among the imported tree nuts. During recent years they have been imported in larger amounts than the combined total of brazils, chestnuts, pignolios, and pistachios.

The primary source countries for United States nut imports during recent years have been: for peanuts, Mexico; almonds, Spain; Brazil nuts, Brazil; filberts, Turkey; chestnuts, Italy; pistachios, Iran, Turkey, and Afghanistan; walnuts, Iran and India; and for cashews, India.

As indicated in Figure 10, peanuts from all production areas accounted for nearly 80 percent of the United States' total production of all nuts from 1955 through 1958. The domestically grown tree nuts (almonds, filberts, pecans, and walnuts) accounted for the remaining 20 percent. Peanuts grown in the Virginia-Carolina area accounted for 25.6 percent of our total nut production. Southeastern area peanuts amounted to 40 percent of all nut production. Southwestern area peanuts accounted for 14.3 percent of the total United States production of nuts. Pecans, walnuts, almonds, and filberts accounted for 7.9, 7.6, 3.8, and 0.8 percent, respectively, of all United States nut production.



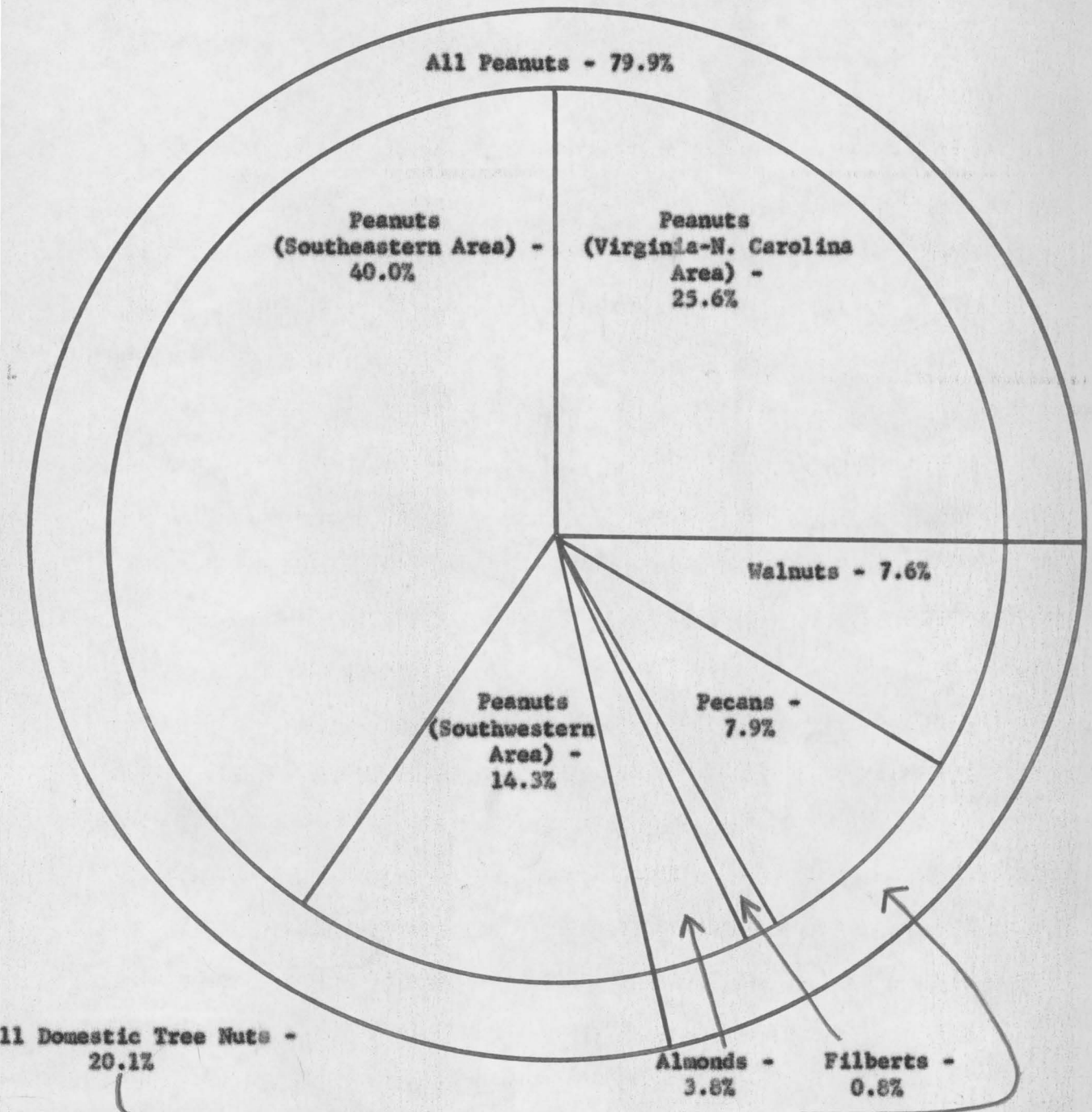


Figure 10. Peanuts and Tree Nuts: Production\* by Kinds, as Percentages of Total Nut Production, United States, Average of Years 1955-1958.

\*Farmers' stock basis of weight for peanuts; in-shell basis for tree nuts.

Source: Table 19.

Table 19. Peanuts and Tree Nuts: Production, Imports, Exports, Supply, Disposition, and Total Domestic Consumption, United States, Average of Years, 1955-1958.

Item	Quantity (Thous. lbs.)
<b>Peanuts:</b>	
Production (Farmers' Stock Basis):	
Total	1,606,891
Virginia-Carolina Section	515,106
Southeastern Section	804,019
Southwestern Section	286,379
Imports (Farmers' Stock Basis)	19,163
Stocks at Beginning of Year:	
Shelled Peanuts (All Grades)	180,250
Cleaned (Roasting Stock) Peanuts (In-Shell)	19,500
Exports (Farmers' Stock Basis)	56,870
Domestic Consumption (Disappearance):	
Edible Consumption of Shelled Peanuts	658,250
Edible Consumption of Cleaned Peanuts	65,750
Crushings of Shelled Peanuts for Oil	193,500
<b>All Tree Nuts:</b>	
Production (In-Shell Basis)	400,403
Imports (In-Shell Basis)	385,776
Total Supply (In-Shell Basis)	786,179
Exports (In-Shell Basis)	29,780
Domestic Consumption (Disappearance) (In-Shell Basis)	756,399
Loss in Shelling Process (Weight of Shells)	494,551
Domestic Consumption (Shelled Basis)	261,848
<b>Cashews:</b>	
Imports (Shelled Basis)	61,961
Apparent Domestic Consumption (Shelled Basis)	61,961
<b>Pecans (In-Shell Basis):</b>	
Production	159,165
Imports	1,325
Exports	2,330
<b>Walnuts (In-Shell Basis):</b>	
Production	152,250
Imports	13,780
Exports	5,916
<b>Almonds:</b>	
Production (In-Shell Basis)	77,100
Imports (In-Shell Basis)	14,484
Exports (Shelled Basis)	(Usually small)
<b>Filberts (Hazelnuts) (In-Shell Basis):</b>	
Production	15,375
Imports	13,320
Exports	(Usually small)

Sources: "Fats and Oils Situation" (peanut data); "Fruit Situation" (tree nut data). These are recurring periodic reports of Agricultural Marketing Service, U. S. Department of Agriculture. "Marketing Tree Nuts - Trends and Prospects," Marketing Research Report No. 139, Agricultural Marketing Service, U. S. Department of Agriculture. "Agricultural Statistics - 1959", U. S. Department of Agriculture.

Table 19 shows 1955-1958 averages for peanuts and tree nuts in the United States, as to quantities produced, imported, exported, carried over in stock from one year to the next, and consumed. These figures indicate the supply and disposition picture for peanuts, all tree nuts combined, and the following tree nuts separately: cashews, pecans, walnuts, almonds, and filberts. (Note: average import figures on peanuts, pecans, walnuts, almonds, and filberts should be considered in light of the fact that such quantities vary widely from year to year.

#### Nut Consumption Patterns

(13, pp. 1-13, 43-44; 16; 17; 18; 19; 20; 22; 23; 24)

The relative importance in per capita consumption in the United States of peanuts, cashews, almonds, filberts, pecans, walnuts, and miscellaneous tree nuts in all forms is shown in Figure 11 and Table 20. Expressed as percentages of per capita consumption of all nuts during the period 1955 to 1959, peanuts consumed amounted to 72.9 percent, cashews - 6.3 percent, almonds - 4.3 percent, filberts - 1.2 percent, and other tree nuts - 3.3 percent. (These data are all on shelled basis.) Table 20 shows actual per capita consumption figures in pounds for the period 1938 to 1959. The predominant place of peanuts, and second place held by cashews in the nut consumption picture, are clearly indicated.

Consumption of peanuts and the more important tree nuts, considered according to the various forms in which consumers buy them, is shown in Tables 21 and 22. Peanut figures are given for the period from October 1, 1950 to July 31, 1959. They show little percentage change over time in the breakdown of edible peanuts into the various final forms sold to

consumers. The most recent figures available on tree nut breakdowns as to final forms are those shown for the period October 1, 1950, to September 30, 1953. These statistics, as collected, refer directly to estimated sales of each nut through various outlets (types of processing for final consumer products). They thus infer the forms and quantities of each nut purchased by consumers. Shelled edible peanuts of all types were consumed, in the various final forms by percentages, as described below.

Of all peanuts consumed as salted nuts during the 1950-1958 period, 71.7 percent were Virginia type, 25.4 percent were Spanish, and 2.9 percent were Runners. Of all peanuts consumed in candy, 30.8 percent were Virginias, 54.0 percent were Spanish, and 15.2 percent were Runners. Peanuts consumed in peanut butter were 17.1 percent Virginias, 32.5 percent Spanish, and 50.4 percent Runners.

From the foregoing statistics, it is apparent that Virginia type peanuts are the most popular type for salting, and that more of them are consumed as salted nuts than in any other form. Spanish type peanuts are more popular in candy than other types, but candy use does not require as many of them as does use in peanut butter. Runner peanuts find their greatest popularity and use in peanut butter.

Cashew nuts, the entire United States supply of which is imported in the shelled form, are mostly consumed as salted nuts. During the period October 1, 1950, to September 30, 1953 (latest statistics available), an average of 89.6 percent of all our cashews were consumed as salted nuts. The remainder were used in candy and baked goods. As

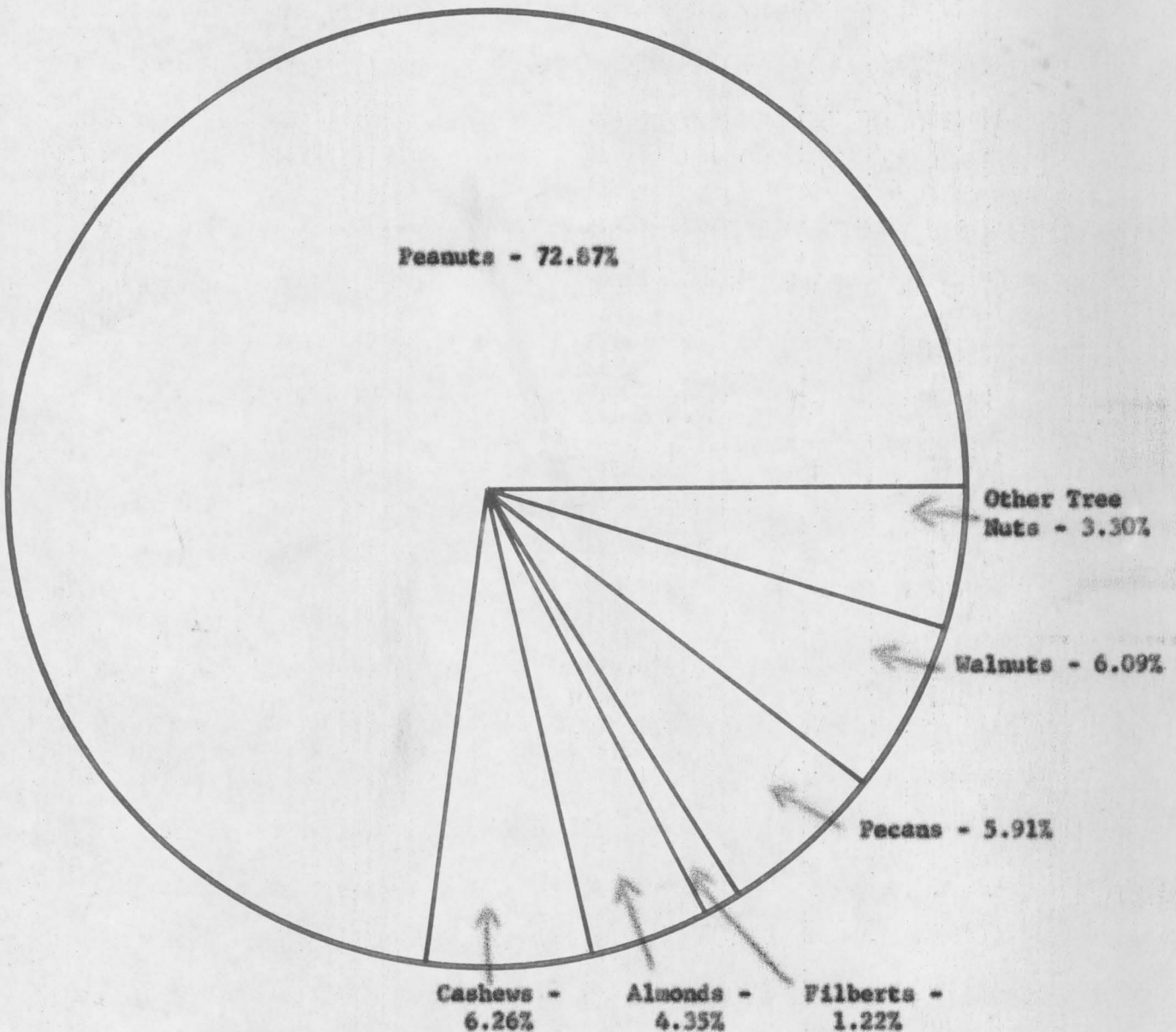


Figure 11. Per Capita Consumption of Edible Peanuts and Specified Tree Nuts as Percentages of Per Capita Consumption of All Nuts, United States, Average 1955-1959. (Data on Shelled Basis.)

Source: Table 20.

Table 20. Edible Peanuts and Tree Nuts: Per Capita Consumption in the United States, 1938-1959<sup>1/</sup>  
(Shelled Basis Except as Specified)

Year <sup>2/</sup>	In-Shell								Other	All	All
	(Cleaned) : (lbs.)	Shelled : (lbs.)	All : (lbs.) <sup>3/</sup>	Cashews : (lbs.)	Almonds : (lbs.)	Filberts : (lbs.)	Pecans : (lbs.)	Walnuts : (lbs.)	Tree Nuts : (lbs.) <sup>4/</sup>	Tree Nuts : (lbs.)	Nuts : (lbs.)
1938	.54	3.70	4.09	.17	.14	.03	.20	.32	.31	1.17	5.26
1939	.51	3.70	4.07	.23	.20	.05	.27	.37	.22	1.34	5.41
1940	.54	4.20	4.59	.22	.11	.03	.34	.32	.32	1.34	5.93
1941	.50	4.30	4.66	.27	.09	.04	.33	.44	.12	1.29	5.95
1942	.43	5.80	6.11	.13	.22	.03	.23	.34	.01	.96	7.07
1943	.56	5.60	6.00	.03	.23	.05	.37	.37	.04	1.09	7.09
1944	.74	6.10	6.63	.11	.35	.10	.40	.41	.05	1.42	8.05
1945	.57	5.40	5.81	.18	.33	.10	.37	.38	.06	1.42	7.23
1946	.45	4.20	4.53	.21	.35	.13	.20	.38	.19	1.46	5.99
1947	.46	3.80	4.13	.21	.30	.08	.30	.33	.23	1.45	5.58
1948	.46	3.90	4.23	.24	.29	.09	.43	.37	.24	1.66	5.89
1949	.42	3.50	3.80	.25	.26	.10	.30	.41	.27	1.59	5.39
1950	.43	3.90	4.21	.32	.32	.06	.30	.36	.23	1.59	5.80
1951	.49	3.90	4.25	.33	.29	.08	.37	.42	.13	1.62	5.87
1952	.49	3.80	4.15	.27	.25	.09	.35	.41	.21	1.58	5.73
1953	.46	3.80	4.13	.30	.24	.06	.48	.32	.18	1.58	5.71
1954	.41	3.70	4.00	.35	.22	.08	.21	.38	.22	1.43	5.43
1955	.37	3.60	3.87	.40	.20	.07	.33	.42	.18	1.60	5.47
1956	.30	3.90	4.12	.34	.27	.04	.40	.35	.15	1.50	5.62
1957	.41	4.00	4.30	.34	.19	.09	.30	.32	.25	1.50	5.80
1958	.40	3.90	4.19	.38	.18	.07	.38	.39	.18	1.60	5.79
1959	.40	4.20	4.49	.36	.42	.08	.27	.28	.18	1.60	6.09

<sup>1/</sup> Data do not include inventory adjustments, except for peanuts.

<sup>2/</sup> For peanuts, year begins September 1 through 1947, August 1 after 1947. For cashews, year is calendar year. For other tree nuts, year is crop year.

<sup>3/</sup> Sum of shelled peanuts, and in-shell (cleaned) peanuts as converted to shelled (kernel) basis by multiplying by an average conversion factor of 72.28%.

<sup>4/</sup> "Other tree nuts" include Brazils, chestnuts, pignolias, pistachios, and miscellaneous tree nuts.

Source: Agricultural Marketing Service, U. S. Department of Agriculture: "Fats & Oils Situation" and "Fruit Situation" (18; 19).

stated previously, the United States Tariff Commission's staff feels that the proportion of cashews salted has not changed significantly since 1953.

Consumption of shelled pecans during the periods October 1, 1950, to September 30, 1953, (latest statistics available) has run as follows: salted - 7.3 percent, household (unsalted) - 12.2 percent, ice cream - 12.2 percent, candy - 19.5 percent, baked goods - 43.9 percent, and other uses - 4.9 percent. These uses of shelled pecans accounted for about 65.2 percent of all pecan consumption (shelled basis).

Consumption of shelled walnuts was divided among forms as follows, during the 1950-1953 period (latest statistics available): baked goods - 39.3 percent, candy - 10.7 percent, household (unsalted) - 39.3 percent, and other uses (ice cream and miscellaneous) - 10.7 percent. These uses of shelled walnuts accounted for about 46.6 percent of all walnut consumption (shelled basis). Walnuts are seldom salted.

Consumption of shelled almonds was divided among forms during 1950-1953 (latest statistics available) as follows: salted - 1.8 percent, candy - 64.1 percent, and other uses (baked goods, household, and ice cream, mainly) - 23.1 percent. These uses of shelled almonds accounted for about 95.6 percent of all almond consumption (shelled basis).

Consumption of shelled filberts was divided among forms during 1950-1953 (latest statistics available) as follows: salted - 42.9 percent, candy - 28.6 percent, and baked goods - 28.6 percent. These uses of shelled filberts accounted for about 58.2 percent of all filbert consumption (shelled basis).

Consumption of shelled Brazil nuts was divided among forms during 1950-1953 (latest statistics available) as follows: salted - 50 percent,

candy - 33 percent, and other uses (mostly baked goods) - 17 percent.

The quantity of each nut going into each form is shown in Tables 21 and 22.

The relative importance of peanuts, cashews, and other nuts in the consumption of salted nuts is shown in Figure 12. Over the 1947-1959 period, salted nut consumption has run 70.96 percent peanuts, 22.28 percent cashews, 2.52 percent almonds, 1.48 percent filberts, 1.26 percent pecans, and 1.5 percent other nuts (mostly Brazil nuts and pistachios). Yearly data are shown in Table 23. The outstanding importance of peanuts (especially Virginia type) and cashews in the United States pattern of salted nut consumption is clearly shown.

Consumer purchases of salted peanuts and tree nuts, as divided between salted mixed nuts and salted nuts purchased unmixed, were estimated by the United States Tariff Commission for the period October 1, 1950, to September 30, 1953. Also estimated were proportions of each kind of nut and nut product sold at retail in various types of packages.

Proportions of each kind of salted nut sold in mixtures were as follows: peanuts - 5 percent, cashews - 50 percent, almonds - 85 percent, filberts, and Brazil nuts - 99 percent. There are two general types of salted nut mixtures sold: comparatively expensive mixtures of tree nuts alone, and cheaper mixtures of tree nuts with peanuts. Only salted cashews and salted peanuts are sold unmixed in large amounts.

The quantity of nuts sold according to the type of packaging in which each kind of nut and nut product was sold at retail was estimated by the Tariff Commission for the 1950-1953 period (estimates include amounts of each nut sold in mixed nut packages) (Table 24). The table also shows



Table 21. Consumption of Edible Peanuts and Tree Nuts in Various Forms.  
United States, Annual Average of Years Beginning October 1, 1950-1952

Form in Which Sold to Consumers:	(mil. lbs.)	(mil. lbs.)	(mil. lbs.)	(mil. lbs.)	(mil. lbs.)	(mil. lbs.)	(mil. lbs.)
<b>Shelled Nuts:</b>							
Salted	155	43	5	3	3	--	3
Candy	125	3	25	2	8	3	2
Baked Goods	5	2	3	2	18	11	1
Household (Unsalted)	--	--	4	<u>1/</u>	5	11	<u>1/</u>
Ice Cream	--	--	2	<u>1/</u>	5	1	<u>1/</u>
Peanut Butter	315	--	--	--	--	--	--
Other	5	<u>1/</u>	<u>1/</u>	<u>1/</u>	2	2	<u>1/</u>
<b>Total Shelled</b>	<b>605</b>	<b>48</b>	<b>39</b>	<b>7</b>	<b>41</b>	<b>28</b>	<b>6</b>
<b>In-Shell Nuts</b>	<b>74</b>	<b>--</b>	<b>10</b>	<b>10</b>	<b>35</b>	<b>82</b>	<b>16</b>
<b>Total Shelled and In-Shell</b>	<b>679</b>	<b>48</b>	<b>49</b>	<b>17</b>	<b>76</b>	<b>110</b>	<b>22</b>

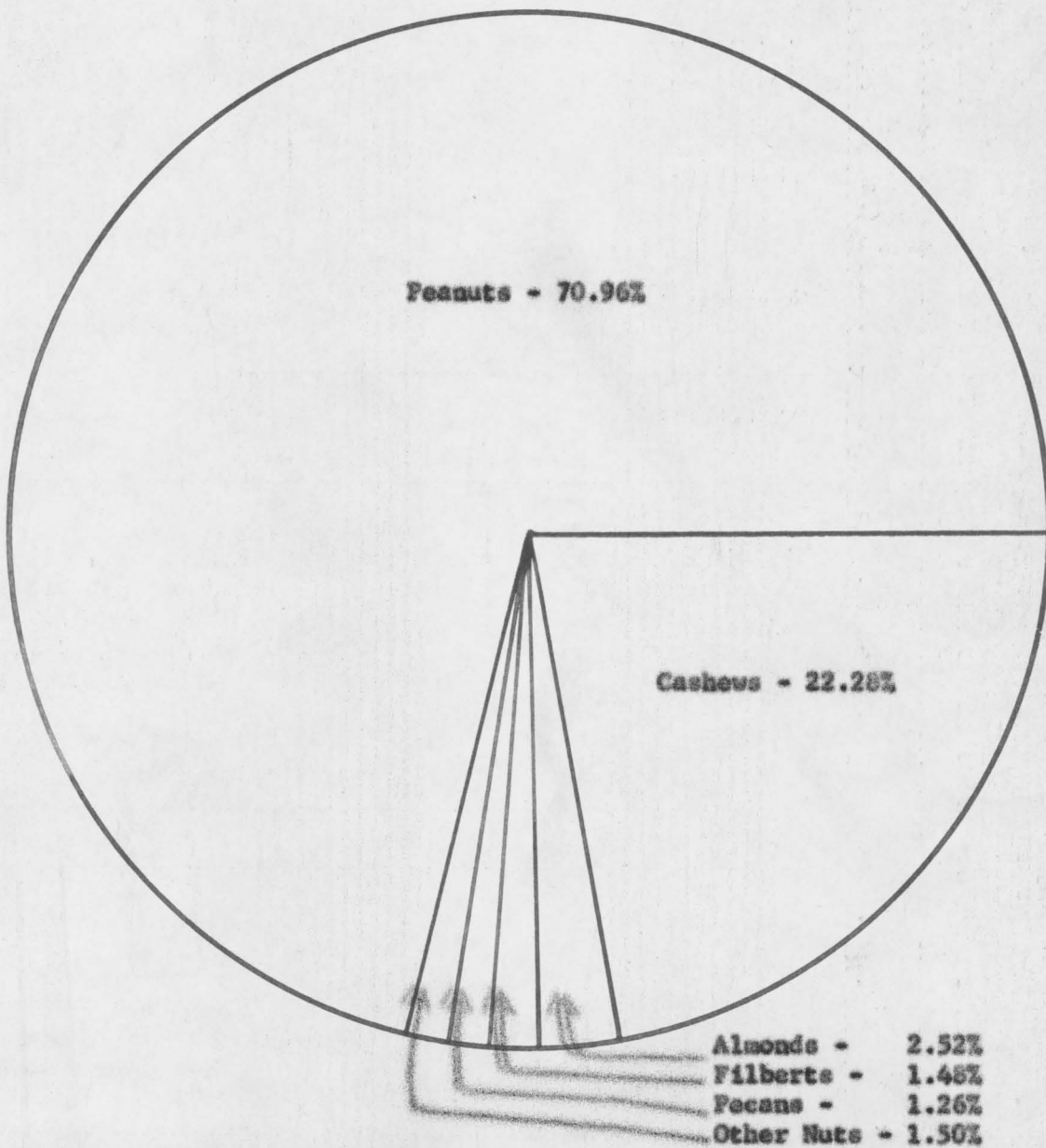
1/ Probably less than  $\frac{1}{2}$  million pounds.

Source: United States Tariff Commission information collected from brokers, shellers, and representatives of consuming industries, for tree nuts; peanut data from United States Department of Agriculture. Data as collected refer to estimated sales through various outlets (types of processing for final consumer products) (12).

Table 22. Consumption of Edible Peanuts in Various Forms, United States, Annual Average of Years Beginning August 1, 1953-1958

Form in Which Sold to Consumers	Quantity (mil. lbs.)
<b>Shelled:</b>	
Salted	159
Candy	126
Peanut Butter	335
Other Uses and Unreported	<u>29</u>
<b>Total Shelled</b>	<b>649</b>
<b>In-Shell (Cleaned Roasting Stock)</b>	<b><u>68</u></b>
<b>Total Shelled and In-Shell</b>	<b>717</b>

Source: "Fats & Oils Situation", Agricultural Marketing Service, U. S. Department of Agriculture (18).



**Figure 12.** Consumption of Peanuts and Tree Nuts as Salted Nuts, by Kinds, Expressed as Percentages of Total Salted Nut Consumption, United States, Annual Average 1947-1959.

**Source:** Table 23.

Table 23. Consumption of Peanuts and Tree Nuts as Salted Nuts, United States, 1947-1959. (Quantities in Thousands of Pounds)

Year	Peanuts	Cashews	Almonds	Filberts	Pecans	Other Nuts	Total Salted Nuts
1947	123,966	27,410	5,292	2,880	2,057	2,456	164,061
1948	121,937	31,819	5,205	3,296	3,000	2,512	167,769
1949	119,073	33,596	4,749	3,728	2,130	2,482	165,758
1950	118,160	44,442	5,943	2,274	2,166	2,629	175,614
1951	138,806	45,243	5,481	3,086	2,718	2,969	198,303
1952	142,034	37,688	4,805	3,531	2,615	2,898	193,571
1953	150,101	42,739	4,689	2,392	3,645	3,094	206,660
1954	148,986	50,660	4,374	3,246	1,623	3,175	212,064
1955	143,255	59,480	4,047	2,891	2,596	3,226	215,495
1956	151,493	50,416	5,560	1,681	3,201	3,228	215,579
1957	169,122	52,313	3,982	3,850	2,444	3,522	235,233
1958	173,121	59,815	3,836	3,045	3,149	3,693	246,659
1959	186,652	56,752	9,106	3,540	2,276	3,927	262,253

<sup>1/</sup> Peanut and cashew data on calendar year basis; other nuts data on crop year basis.

Sources: Peanut data from unpublished tabulations by the Crop Reporting Board, U. S. Department of Agriculture; cashew data from Table 18; data on other nuts from per capita data in Table 20, as multiplied by population estimates from U. S. Bureau of the Census, and as further multiplied by average percentages salted of almonds, filberts, pecans, and other nuts as shown in Table 21.

Table 24. Edible Nuts: Form in Which Sold and Type of Packaging for Nuts Sold at Retail; United States, 1950-1952, and 1954-1955

Type of Nut and Outlet <sup>1/</sup>	Estimates for Annual Av. Quantities, Av. of Years Beginning October 1, 1950-1952					Types of Containers in Which Consumers Had Bought Nuts, 1954-1955, As Reported in Consumer Survey <sup>3/</sup>				
	Approximate Quantity Sold At Retail <sup>2/</sup> Mil. Lbs.	Type of Packaging in Which Retailed				Cellophane Bags Pct.	Vacuum Cans Pct.	Bulk & Into Paper Bags Pct.	Glass Boxes Pct.	Glass Jars Pct.
		Bulk including vending Machines and paper bags Pct.	Transparent Film Bags Pct.	Glass Cans Pct.	Glass Jars Pct.					
<b>Peanuts</b>										
Salted	155	40	40	20		63	53	46	12	7
Peanut butter	315				100					
In-shell peanuts	74	60	40							
<b>Almonds</b>										
Salted	5	70	10	20						
Household <sup>4/</sup>	4	5	20	75						
In-shell	10	10	90							
<b>Filberts</b>										
Salted	3	70	10	20						
In-shell	10	10	90							
<b>Pecans</b>										
Salted	3	70	10	20						
Household <sup>4/</sup>	5	10	25	65						
In-shell	35	20	80							
<b>Walnuts</b>										
Household <sup>4/</sup>	11		20	70	10					
In-shell	82	10	90							
<b>Cashews</b>										
Salted	43	50	35	15						
<b>Brazils</b>										
Salted	3	70	10	20						
In-shell	16	10	90							
<b>Shelled Tree Nuts, Generally</b>						74	44	32	10	6

Table 24. (Continued)

1/ Breakdown as to type of packaging for salted and in-shell nuts includes quantities retailed as mixed nuts.

2/ These quantities may overstate the retail sales of peanut butter by perhaps 20% and of salted and in-shell nuts by perhaps 10% in that a portion of the nuts in these outlets is sold to food processors or institutional users. Because of the roughness of these estimates no attempt is made to adjust these quantities for an overstatement of retail sales.

3/ Percentages add to more than 100, because some consumers had bought nuts in more than one type of container in 1954-1955.

4/ Household (unsalted)

Sources: For 1950-1952 data, United States Tariff Commission information obtained from brokers, shellers and representatives of consuming industries. (12) 1950-1952 data for peanuts from U. S. Department of Agriculture (12). Percentage breakdown as to the type of packaging estimated. For 1954-1955 data on packaging, source is Marketing Research Report 203, Agricultural Marketing Service, U. S. Department of Agriculture (24).

estimates for salted peanuts and shelled tree nuts (salted and unsalted - all kinds in general) made by the United States Department of Agriculture for the 12 month period preceding a 1955 consumer survey.

Consumer Survey Results  
(24)

Consumers' use of and opinions concerning peanuts, tree nuts, peanut butter, and candy containing nuts were studied by the United States Department of Agriculture in a survey made in 1955 among a nationwide sample of homemakers. This research, based on homemakers' use (or non-use) of nuts and their products during the year preceding the survey, is reported in detail in the Department's Marketing Research Report No. 203, "Homemakers' Use of and Opinions About Peanuts and Tree Nuts", published in 1957. Important answers given by homemakers in the sample are summarized in percentage terms in Table 25. (For detailed breakdown of answers by size of family income, education and age of homemaker, number of children in family, and size of community lived in, consult the original research report.) Homemakers' answers will only be discussed here as they pertain to salted peanuts and cashews. Their answers concerning cashews should be considered as dealing with salted cashews, since 90 percent of all cashew consumption is estimated to be in the form of salted nuts, and cashews not purchased by consumers as salted nuts and bought in candy and baked goods.

About 70 percent of the homemakers interviewed said they occasionally used salted peanuts. Among the users, 36 percent used them every week or two, 28 percent used them about once or twice a month, 22 percent used

them less than once a month but more than three times a year, and 14 percent used them three times a year or less.

The most common way in which salted peanuts were used by homemakers was in snacks; 99 percent of the salted peanut users used them in this way. Other uses were in salads, toppings, making candy, baking and other cooking.

Homemakers who said they did not use salted peanuts gave a variety of reasons for non-use. The most common reasons were: 1) someone in the family had a specific physical ailment (ulcers, allergies, eczema, false teeth, etc.); 2) salted peanuts are hard to digest; 3) did not like them (for unspecified reasons); and 4) dislike their taste.

Only four percent of the non-users interviewed thought that salted peanuts were too expensive to use. Similar results were obtained for roasted (in-shell) peanuts and peanut butter, indicated that expensiveness was of minor concern to consumers. Only three percent of the non-users of each of these products felt that they were too expensive to use. It thus appears that peanuts and their products are not unduly expensive in relation to their usefulness to consumers, in the opinion of the homemakers interviewed in the sample survey.

Turning to cashew nuts (salted), about 43 percent of the homemakers in the sample told interviewers that they occasionally used them. Among the users, 15 percent used them every week or two, 24 percent used them about once or twice a month, 27 percent used them less than once a month but more than three times a year, and 34 percent used them three times a year or less.

No information was obtained regarding ways in which homemakers used salted cashews. The author believes, however, that the pattern of salted cashew usage would probably be quite similar to the use pattern reported for salted peanuts. If this is true, then the primary use of salted cashews would be in snacks, with other uses being in salads, toppings, making candy, baking, and other cooking.

Homemakers who said they did not use salted cashews gave a number of different reasons, the most common among which were: 1) too expensive; 2) never tried them, or never think of using them, 3) did not like them (for unspecified reasons), and 4) dislike their taste.

Users of peanuts and tree nuts reported that they most frequently purchased nuts at food stores, markets, and delicatessens. Other points of purchase reported were "dime stores", department stores, special nut or candy shops, and drug stores. (This information was obtained for peanuts and tree nuts in general, and is not available for salted peanuts and cashews, specifically.)

Major items of consumer information about nuts and nut products other than salted peanuts and cashews may be learned by studying Table 25.

Prices  
(18; 19)

Prices received by United States growers for peanuts and domestic tree nuts are shown in Table 26, covering crop years 1929 through 1960. Among peanuts, Virginia type usually bring the highest average farm prices, followed (in descending order) by Spanish and Runner types.



Table 25. Consumer Use of and Opinions About Peanuts and Tree Nuts, United States, Survey of Homemakers, 1955.  
 (Responses to Questions are Given in Terms of Percent of Homemakers Making Specified Replies to Specific Questions  
 about Specified Products.)<sup>1/</sup>

Questions Asked of Homemakers, and Types of Responses Given	Homemakers' Responses to Questions, by Nuts and Nut Products (Percentages Making Responses):															
	Any	Any	Raw	Roasted	Salted	Peanut	Tree	Any	Cashews <sup>2/</sup>	Almonds	Filberts	Walnuts	Walnuts	Pecans	Nuts	Candy
	Nuts	Peanuts	Peanuts	Peanuts	Peanuts	Butter	Nuts	Cashews <sup>2/</sup>	Almonds	Filberts	Walnuts	Walnuts	Pecans	Nuts	Nuts	
Percentage of users, among those inter- viewed	90	74	28	43	70	84	86	43	33	20	69	22	56	61	82	
Frequency of use, among users:																
Every week or two				24	36	68	15	8	6	19	12	17	9			
About once or twice a month				18	28	15	24	15	8	18	14	20	15			
Less than once a month, but more than 3 times a year				24	22		27	26	18	24	28	26	22			
3 times a year or less				34	14		34	51	68	39	46	37	54			
Less than once a month							17									
Ways in which used, among users, at home, during pre- ceding 12 months:																
Snacks				97	99			68	85	61			69			
Salads				5	11			18	6	40			34			
Toppings				4	17			15	5	22			25			
Making Candy				12	18			20	8	42			42			
Baking				12	19		48 <sup>3/</sup>	54	25	77			74			
Other Cooking				2	4			15	6	15			15			
Spread							98									

Table 25 (cont'd). Consumer Use of and Opinions About Peanuts and Tree Nuts, United States, Survey of Homemakers, 1955.  
 (Responses to Questions are Given in Terms of Percent of Homemakers Making Specified Replies to Specific Questions  
 about Specified Products.)<sup>1/</sup>

Questions Asked of Homemakers, and Types of Responses Given	Homemakers' Responses to Questions, by Nuts and Nut Products (Percentages Making Responses):														
	: Any :	: Any :	: Raw :	: Roasted :	: Salted :	: Peanut :	: Tree :	: English :	: Black :	: Mixed :	: Candy :				
	: Nuts :	: Peanuts :	: Peanuts :	: Peanuts :	: Peanuts :	: Butter :	: Nuts :	: Cashews <sup>2/</sup> :	: Almonds :	: Filberts :	: Walnuts :	: Walnuts :	: Pecans :	: Nuts :	: Nuts :
Kinds of Nuts in Candy Bought by Users:	80						13	74	8	28	1	42			
Reasons for Non-use, among non-users:															
Have specific physi- cal ailment		17	34	13	43	4	5	3	2		4	7			
Hard to digest		8	14	10	14	.5	2	2	2		3	6			
Too fattening		3	7	7	5	3	1	1	1		2	1			
Hard to chew					1	2	6	4	1		4/				
Too rich					1	6	1	4/	2		2				
Don't like (no reason specified)		15	16	19	16	12	15	15	10		14	28			
Dislike taste		8	11	18	4	10	24	17	22		9	2			
Shells are a nuis- ance		26			4/		1	1	7		3	1			
Don't have occasion to use		4	5		15	9	11	9	6		10	11			
Too expensive		3	4	3	13	21	18	6	4		18	20			
Never tries use, or never think of use		5	4		5	15	8	20	13		6	9			
Not available in area		6	4/			6	4	10	21		3	5			
Don't know, or no answer		5	5	4	2	8	7	8	5		6	9			
Sticks to teeth or roof of mouth					15										
Too dry					6										
Too oily or greasy					5										
No children at home					12										

Table 25 (cont'd). Consumer Use of and Opinions About Peanuts and Tree Nuts, United States, Survey of Homemakers, 1955.  
 (Responses to Questions are Given in Terms of Percent of Homemakers Making Specified Replies to Specific Questions  
 about Specified Products.)<sup>1/</sup>

Questions Asked of Homemakers, and Types of Responses Given	Homemakers' Responses to Questions, by Nuts and Nut Products (Percentages Making Responses):													
	: Any	: Any	: Raw	: Roasted	: Salted	: Peanut	: Tree	: Any	: English	: Black	: Mixed	: With	: Candy	
	: Nuts	: Peanuts	: Peanuts	: Peanuts	: Peanuts	: Butter	: Nuts	: Cashews <sup>2/</sup>	: Almonds	: Filberts	: Walnuts	: Walnuts	: Pecans	: Nuts
Where purchased by users:														
Food store, market, or delicatessen		86						92						
Special nut or candy shop		20						15						
Drug store		17						10						
"Dime store"		30						15						
All others		4						3						
Where purchased most often, by users:														
Food store, market, or delicatessen		74						85						
Special nut or candy shop		7						6						
Drug store		5						2						
"Dime stores" and department stores		12						5						
Others		1						1						
Not ascertained		1						1						

<sup>1/</sup> Percentages of homemakers answering add to more than 100 in case of certain questions, because some homemakers gave more than one type of response in their answers.

<sup>2/</sup> Refers to salted cashews, except for those cashews in candy bought by consumers.

<sup>3/</sup> Includes use of peanut butter in other food preparation besides baking.

<sup>4/</sup> Less than 0.5 percent.

Source: "Homemakers' Use of and Opinions About Peanuts and Tree Nuts", Marketing Research Report No. 203, Agricultural Marketing Service, U. S. Department of Agriculture, November 1957.

Among tree nuts, almonds usually have been highest-priced, followed by pecans, walnuts, and filberts. All domestic tree nuts are priced higher than peanuts of each type.

Prices paid by nut salters for representative grades and kinds of peanuts and tree nuts are indicated in Table 27, covering the years 1933 through 1959.

Prices given on peanuts are for the grade most highly desired by salters: Extra Large Virginia Type. Virginia type peanuts are more highly desired for salting than any other type, and more of them are consumed as salted peanuts than in any other form of consumption. During the period from 1950 to 1958, 71.7 percent of all peanuts salted were Virginia type. The Virginia type peanut crops of 1949 through 1954 yield an average of 26.63 percent Extra Large kernels, according to information compiled by the Commodity Stabilization Service of the United States Department of Agriculture. Prices of Extra Large and Medium Virginias (the main grades of Virginias which are salted) tend to move together in about the same pattern over time and to maintain a very small spread between grades. These peanut prices are averages paid on the basis F.O.B. important shelling and shipping points in the Virginia-Carolina area, and are for shelled, raw, unblanched peanuts.

Cashew prices are for 320-count whole kernels (kernel count per pound equals 300 to 320). More cashews fall into this size grade than into any other, and these large whole kernels are highly desired by salters. Basis of these cashew prices is F.O.B. New York quotations by importers to nut salters, for shelled, blanched kernels.

Prices listed for almonds, filberts, and pecans are F.O.B. New York quotations by primary distributors, for shelled kernels.

No official time series of retail price statistics is available for nuts and their products (except peanut butter). As an indication of retail salted nut prices in recent years, however, the author has made some random observations in various stores in Maryland and Virginia. These observations cover the period from Spring, 1956, to Winter, 1961, for certain types of packages of peanuts and cashews. In addition, there are some observations of prices during Winter 1961 only, for certain types of packages of peanuts and cashews which were not followed during the period since 1956. Also, there are Winter, 1961, observations of prices for salted mixed nuts, salted pistachios, and the following unsalted nuts: shelled almonds, walnuts, and pecans; roasted (in-shell) peanuts; in-shell almonds, walnuts, and Brazil nuts; and in-shell mixed nuts (without peanuts). These observations are reported in Table 28, showing types and sizes of packages, actual prices for each kind of nut and type of package, equivalent price per pound for each kind of nut and type of package, and approximate overall average retail prices per pound for each kind of nut and nut mixture observed in retail stores by the author.

The dominance of peanuts and cashews in the pattern of consumption of salted nuts in the United States, and the dominance of Virginia type peanuts among all salted peanuts, have been demonstrated in this section on consumption of nuts in the United States.

Prices of salted nuts at the retail level, and prices paid by salters for their supplies of shelled nuts (raw materials) rank as

follows, by kind of nut: peanuts are the least expensive (Spanish type lower than Virginia type), followed by cashews and filberts (in an erratic pattern as to which is higher), then almonds, and pecans.

Because no long-time series of data are available on retail nut prices (salted or otherwise), or on prices paid by retailers to wholesalers for nuts, or on prices paid by wholesalers to salters, time-series analyses of demand and price relationships for salted nuts must depend on prices paid by salters for their nut supplies.

Table 26. Prices Received by Growers for Peanuts and Tree Nuts; United States, 1929-1960  
(Cents per Pound<sup>1/</sup>)

Crop Year <sup>2/</sup>	Southeastern					Southwestern				
	All Peanuts	Virginia Type Peanuts	Type Spanish Peanuts	Spanish Peanuts	Runner Peanuts	Almonds	Filberts	Pecans	Walnuts	
1929	3.7	3.3	3.0	2.5	2.1	24.0	15.0	14.7	16.1	
1930	3.5	3.5	3.3	3.3	2.3	10.0	17.0	14.9	20.5	
1931	1.6	1.5	1.2	1.4	0.9	8.8	12.5	7.8	11.2	
1932	1.6	1.8	1.8	1.5	1.3	8.3	10.0	6.0	9.0	
1933	2.9	3.2	2.8	2.8	2.6	9.3	14.9	8.0	11.2	
1934	3.3	3.7	4.1	3.5	3.5	9.0	10.1	12.6	9.6	
1935	3.1	3.5	3.2	2.8	2.8	14.0	13.2	6.8	10.2	
1936	3.7	4.2	3.9	3.6	3.3	20.1	13.5	12.4	10.9	
1937	3.3	3.4	3.2	3.0	2.8	13.8	10.9	7.7	9.1	
1938	3.3	3.6	3.2	2.9	2.7	12.9	11.3	9.4	11.1	
1939	3.4	3.5	3.3	3.2	2.7	10.5	11.3	9.7	8.4	
1940	3.3	4.1	3.6	3.1	3.1	16.2	12.5	8.9	11.5	
1941	4.7	6.4	6.2	4.5	5.3	35.2	15.3	10.3	12.6	
1942	6.1	8.1	8.0	7.4	7.2	22.1	17.6	17.1	15.4	
1943	7.1	7.7	7.4	6.6	6.8	36.6	25.0	23.0	23.9	
1944	8.0	8.8	8.3	8.2	7.6	37.2	27.0	21.6	22.3	
1945	8.3	8.3	8.6	8.3	7.8	36.0	27.6	23.9	25.5	
1946	9.1	10.2	9.4	8.4	8.4	24.3	19.2	33.8	27.7	
1947	10.1	10.9	10.5	9.9	9.6	27.9	12.6	22.6	19.1	
1948	10.5	10.8	10.9	10.6	10.3	21.1	12.9	12.3	20.9	
1949	10.4	12.0	10.8	10.2	10.0	16.5	11.0	18.8	17.6	
1950	10.9	12.0	11.1	10.5	10.0	27.3	17.5	28.7	19.3	
1951	10.4	12.7	10.8	10.7	9.8	23.6	17.6	19.7	21.4	
1952	10.9	11.9	10.7	12.0	10.2	23.2	15.0	22.0	19.8	
1953	11.1	11.8	11.3	11.1	10.1	23.8	17.2	16.1	20.6	
1954	12.2	13.2	12.4	14.0	11.4	24.9	18.0	28.2	17.5	
1955	11.8	14.2	11.6	11.4	10.6	40.0	22.5	31.4	27.0	
1956	11.2	12.6	11.9	12.3	10.5	40.2	25.5	18.5	22.0	
1957	10.4	11.4	11.4	11.4	10.1	25.3	15.0	23.9	21.3	

Table 26 (cont'd.) Prices Received by Growers for Peanuts and Tree Nuts, United States, 1929-1960  
(Cents per Pound<sup>1/</sup>)

Crop Year <sup>2/</sup>	Southeastern Southwestern					Almonds	Filberts	Pecans	Walnuts
	All Peanuts	Virginia Type Peanuts	Spanish Peanuts	Spanish Peanuts	Runner Peanuts				
1958	10.6	11.0	10.8	11.0	9.8	38.6	19.0	28.1	18.9
1959	9.6	10.6	9.5	9.4	8.5	23.3	18.8	32.4	24.1
1960 <sup>3/</sup>	10.0	11.1	9.8	10.0	9.0	24.4	21.0	30.9	26.6

<sup>1/</sup> Weight basis is farmers' stock for peanuts, in-shell for tree nuts.

<sup>2/</sup> Years beginning as follows: All peanuts, September 1; Virginia peanuts, November 1; Southeastern Spanish and Runner peanuts, September 1; Southwestern Spanish peanuts, August 1; all tree nuts, crop years.

<sup>3/</sup> Preliminary.

Source: Agricultural Marketing Service, U. S. Department of Agriculture (18; 19).



Table 27. Prices Paid by Nut Salters for Shelled Peanuts and Tree Nuts,  
United States, 1933-1959.  
(Cents per Pound)

Year <sup>1/</sup>	Peanuts <sup>2/</sup> (Va. Type) (Extra Large)	Cashews <sup>3/</sup> (320-Count Wholes)	Almonds <sup>4/</sup>	Filberts <sup>4/</sup>	Pecans <sup>4/</sup>
1933	4.3	23.7	5/	5/	5/
1934	7.3	28.1	5/	5/	5/
1935	9.0	27.0	39.0	31.0	54.0
1936	8.0	26.5	45.0	32.0	35.0
1937	8.1	23.7	57.0	33.0	44.0
1938	7.4	24.2	43.0	28.0	40.0
1939	8.0	23.1	36.0	36.0	43.0
1940	7.9	22.0	34.0	25.0	46.0
1941	9.5	29.4	54.0	43.0	40.0
1942	13.9	53.5	84.0	66.0	41.0
1943	16.4	99.6	89.0	70.0	85.0
1944	16.3	94.4	90.0	77.0	89.0
1945	16.3	96.3	91.0	65.0	88.0
1946	17.6	72.7	85.0	60.0	93.0
1947	22.1	53.9	71.0	48.0	125.0
1948	21.1	54.9	70.0	43.0	75.0
1949	22.2	54.9	52.0	34.0	67.0
1950	28.2	46.3	51.0	40.0	89.0
1951	23.5	54.8	70.0	64.0	109.0
1952	23.5	63.2	64.0	46.0	80.0
1953	28.2	53.3	62.0	48.0	85.0
1954	25.6	44.3	62.0	56.0	76.0
1955	29.2	52.9	75.0	57.0	140.0
1956	32.6	55.6	6/	6/	6/
1957	22.0	57.7	6/	6/	6/
1958	24.0	52.0	6/	6/	6/
1959	22.6	51.9	6/	6/	6/

<sup>1/</sup> Year is calendar year for cashews and extra-large Virginia peanuts; year is crop year for other nuts shown: begins preceding October 1 for almonds, pecans, and filberts; begins preceding November 1 for No. 1 Virginia peanuts.

<sup>2/</sup> Average prices for shelled, raw peanuts, F.O.B. important shell-ing and shipping points.

<sup>3/</sup> Cashew price quotations made by importers to nut salters for shell-ed, blanched kernels, F.O.B. New York.

<sup>4/</sup> Price quotations for shelled almonds, filberts, and pecans by primary distributors, F.O.B. New York.

<sup>5/</sup> Not available.

<sup>6/</sup> Not available.

Source: Peanut data computed from "Peanut Market News-Peanut Price Summary", Agricultural Marketing Service, U. S. Department of Agriculture. Cashew data from Table 13. Data on almonds, filberts, and pecans from "Marketing Tree Nuts--Trends and Prospects", Marketing Research Report No. 139, Agricultural Marketing Service, U. S. Department of Agriculture, 1956.

Table 28. Retail Prices of Salted Nuts and Other Nuts in Selected Chain Food Stores and "Dime Stores", Eastern United States, 1956-1961.

Type and Size of: Package	Salted Peanuts		Salted Cashews		Salted Mixed Nuts	
	Price per Package	Equiv. Price per lb.	Price per Package	Equiv. Price per lb.	Price per Package	Equiv. Price per lb.
In Chain Food	:	:	:	:	:	:
Stores--Pre-	:	:	:	:	:	:
packaged:	:	:	:	:	:	:
Bag--3 1/8 oz.	:	:	29¢	1.48:	:	:
Bag--3 3/4 oz.	:	:	:	:	29¢ w/peanuts	1.24
:	:	:	:	:	39¢ wo/peanuts	1.66
Can--4 oz.	:	:	:	:	:	:
Bag--4 1/2 oz. :19¢ Spanish	:	68¢:	:	:	:	:
Can--4 3/4 oz. :	:	:	39¢	1.31:	39¢ wo/peanuts	1.31
Can--5 oz. :	:	:	:	:	:	:
Bag--5 1/2 oz. :	:	:	49¢	1.43:	:	:
Can--5 1/2 oz. :	:	:	45¢	1.31:	:	:
Bag--6 oz. :29¢ Va. type	:	77¢:	:	:	:	:
Can--6 oz. :33¢ Va. type	:	88¢:	:	:	:	:
Can--6 1/2 oz. :35¢ Redskin	:	86¢:	:	:	49¢ w/peanuts	1.21
Can--6 3/4 oz. :	:	:	45¢ & 49¢	1.07 & 1.16:	59¢ wo/peanuts	1.40
Bag--7 oz. :	:	:	49¢	1.12:	49¢ w/peanuts	1.12
Can--7 oz. :29¢ Spanish	:	66¢:	:	:	:	:
Can--7 1/4 oz. :35¢ & 39¢ Vas. 77¢ & 86¢:	:	:	:	:	:	:
Bag--8 oz. :29¢ Spanish	:	58¢:	:	:	:	:
Bag--9 oz. :	:	:	69¢	1.23:	:	:
Can--9 oz. :35¢ Spanish	:	62¢:	:	:	:	:
Bag--9 1/2 oz. :39¢ Vas.	:	66¢:	:	:	:	:
Bag--12 oz. :39¢/49¢ <u>Span.</u>	:	52¢/65¢:	:	:	:	:
:	:	<u>Vas.</u>	:	:	:	:
Can--13 oz. :	:	:	89¢	1.10:	:	:
Can--14 oz. :69¢ Vas.	:	79¢:66¢ & 89¢	75¢ & 1.02:	89¢ w/peanuts	1.02	
Loose in Bulk	:	39¢:	:	:	:	:
per lb. : Roasted in	:	:	:	:	:	:
: Shell	:	:	:	:	:	:
In Chain "Dime	:	:	:	:	:	:
Stores"--	:	:	:	:	:	:
Salted on Pre-	:	:	:	:	:	:
mises, Held and:	:	:	:	:	:	:
Displayed in	:	:	:	:	:	:
Bulk, and Sold	:	:	:	:	:	:
in Bag or Box	:	:	:	:	:	:
Bag--4 oz. :	:	:	:	:	25¢ w/peanuts	1.00
Bag-- 4 1/2 oz.:	:	39¢	:	1.39:	:	:
Bag--5 1/2 oz. :25¢ Vas.	:	73¢:	:	:	:	:
Box--8 oz. :20¢ Spanish	:	40¢:69¢	:	1.38:	49¢ w/peanuts	.98
:35¢ Vas.	:	70¢:	:	:	:	:
Box--1 lb. :39¢ Spanish	:	39¢:	:	:	:	:

Table 28 (cont'd). Approximate Overall Average Retail Prices per Pound for:

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Salted Peanuts (Virginias)	\$0.76
Salted Peanuts (Spanish)	.55
Salted Peanuts (Redskin)	.86
Salted Cashews	1.21
Salted Pistachios	1.41
Salted Mixed Nuts with Peanuts	1.10
Salted Mixed Nuts without Peanuts	1.46
Shelled Almonds	2.19
Shelled Walnuts	2.21
Shelled Pecans	3.02
Roasted (In-Shell) Peanuts	.39
In-Shell Almonds	.49
In-Shell Walnuts	.53
In-Shell Mixed Nuts (without peanuts)	.55
In-Shell Brazil Nuts	.55

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Source: Random observations in various stores in Maryland and Virginia, by the author, from Spring 1956 to Winter 1961. These observations, which cover salted peanuts and cashews most closely, indicate that retail prices of salted cashews and peanuts have remained relatively stable during the period of the observations. Prices other than for salted peanuts and cashews were observed only in Winter 1961.

ANALYSIS OF DEMAND AND PRICE RELATIONSHIPS FOR PEANUTS AND CASHEWS IN  
THE UNITED STATES, WITH EMPHASIS ON THE SALTED NUT TRADE

Factors Believed to Affect Demand for Peanuts and Cashews

In view of the demand relationships suggested by economic theory<sup>3/</sup> and knowledge of the nut industry, and taking into account the statistical data available, it was decided to perform a time series statistical analysis of the following factors believed to determine primarily the demand for salted peanuts (quantity demanded represented by data on apparent consumption): (1) their price; (2) the price of cashew kernels (to determine whether a competitive or complementary relationship exists between peanuts and cashew nuts); and (3) disposable personal income. Other associated factors to be tested included: (1) a price index (to take account of the effects of changing value of money on the demand relationship); (2) effects of rising United States population; (3) and a linear time trend, in order to account for changes in the demand relationship over time which are not separately indentified. The objective was to determine the effect of changes in each of the foregoing supposed associated factors upon the demand for peanuts as salted nuts. Quantity demanded was measured by data on apparent consumption of salted peanuts.

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<sup>3/</sup> Marshall, Alfred, Principles of Economics, Macmillan and Company, Ltd., London, England, 8th edition, 1920, pp. 83-137.

In addition to the peanut demand analyses, similar analyses of demand for salted cashews, and for cashews in all uses (forms in which sold to consumers), were formulated. The demand for cashews (quantity measured by data on apparent consumption) was believed to be determined primarily by the following factors: (1) price of cashews; (2) price of peanuts (determining the nature of competitive or complementary relationships between cashews and peanuts); and (3) disposable personal income. Other associated factors to be tested included: (1) a price index; (2) United States population; (3) and a linear time trend.

The foregoing time series analyses of demand for peanuts and cashews were expected to yield the following estimates of demand: (1) "price elasticity of demand" for each nut with respect to its own price (other things being unchanged), which was expected to provide a measure of the effect of price on consumption, and therefore the utility of each nut to consumers; (2) "cross-elasticity of demand" for each nut with respect to price of the other (that is, the cross-elasticity of demand for peanuts with respect to the price of cashews, and the cross-elasticity of demand for cashews with respect to the price of peanuts), which was expected to indicate the existence of competitive or complementary relationships between peanuts and cashews; and (3) "income elasticity of demand" for each nut with respect to consumer income, which would reflect the relative importance of cashews and peanuts on consumers' necessity-luxury scales (and how rising levels of consumer income affect increased consumption of peanuts and cashews).

It was believed that, with this information from the aggregate time series demand analysis, the basic question which gave rise to this research would be answered.

#### Economic Variables Used to Measure Demand for Peanuts and Cashews

Measures of Quantity Demanded. Quantities of peanuts and cashews demanded in the United States were measured in two ways: total processor consumption, and average processor consumption on a per capita basis. Data on the total quantity of peanuts and cashews processed into salted nuts in the United States (as reported for peanuts in the United States Department of Agriculture's Peanut Stocks and Processing report, and as reported for cashews in the detailed discussion of the cashew industry) were used as the indicators of apparent total consumption of salted cashews and peanuts in the United States. These data were divided by population to obtain average per capita estimates of consumption of salted peanuts and cashews.

Similarly, data from the same reports, on the total quantity of cashews processed for all end-uses in the United States, were taken as the measures of apparent total consumption of cashews in all forms. These data were also divided by population to indicate average per capita consumption of cashews, in all forms, in the United States.

Measures of Factors Believed to Primarily Influence Demand. Because no long time series of data are available on retail peanut and cashew prices (salted or otherwise), or on prices paid by retailers to wholesalers for nuts, or on prices paid by wholesalers to salters and other processors, these analyses of demand and price relationships for peanuts and cashews

were based on wholesale prices paid by salters and other processors for their peanut and cashew supplies. These prices are the closest to the retail level that can be obtained with any degree of statistical accuracy.

Thus, demand for salted peanuts, salted cashews, and total cashews, had to be measured at the processor level, where salters and other nut processors purchase their supplies of peanuts and cashews to be used in producing salted nuts and other nut products for consumers. Demand for peanuts and cashews at the retail level cannot be accurately measured because of this lack of information on retail prices. Additional variables, relating to the behavior of firms in the marketing chain between the final consumer and the level of the market to which the available price series refers, should be included in the demand equation, if prices at another level are to be substituted for retail prices in making a determination of demand and price relationships at the retail level<sup>4/</sup>. In this case, information (time series data) describing the behavior of retailers, wholesalers, and salters after transactions between the salters and their suppliers of peanuts and cashews have been completed, should be included in the demand analysis. However, such information is not available in a statistically measurable form. Since this information was not included in this set of analyses, the demand relationships obtained in this study describe demand at the processor level only.

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<sup>4/</sup> Foote, Richard J., Analytical Tools for Studying Demand and Price Structures (U. S. Department of Agriculture Handbook No. 146), U. S. Government Printing Office, Washington, 1958, p. 103.

In a recent study at Oklahoma State University<sup>5/</sup>, an estimate of demand relationships for all peanuts at the processor (wholesale) level was made, which did include an index of marketing charges. This index was calculated in an attempt to estimate behavior in the marketing chain from the processor level to the retail level. In what the investigators considered to be their best measure of demand for peanuts, however, the effects of the index of marketing charges on per capita demand for peanuts in the United States could not be established in a statistically meaningful way.

The measure of consumer income as a demand factor, used in this study, was "disposable personal income," as computed by the United States Department of Commerce.

Measures of Other Factors Believed to be Associated With Demand. To take into consideration those possible changes over time in demand schedules for peanuts and cashews, which were not measured by separate statistical series, a linear time trend was included in each estimating equation.

In models based upon deflated prices and income (effects of changing value of money removed), with per capita consumption and income (annual basis for all data), only the foregoing variables were used.

In the "raw" annual models (based on undeflated prices and total consumption and income), however, extra data series were included to account for demand effects of population changes (United States total

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<sup>5/</sup> Badger, Daniel D. and Plaxico, James S., Selected Supply and Demand Relationships in the Peanut Industry, (Oklahoma Agricultural Experiment Station Processed Series P-338), Stillwater, Oklahoma, 1959, pp. 25-27.



population data) and changes in the value of money (Wholesale Price Index for Processed Foods).

Time Periods Analyzed. Peanut demand data were analyzed only for the postwar years, 1947 through 1959, because detailed data on use of peanuts for salting were not available for the years prior to 1944.

Cashew demand data were analyzed for the entire period 1932 through 1959. The first year for which cashew price data on the New York wholesale basis are available was 1932. All analyses were based on calendar year data. The latest year for which data were available at the time the statistical calculations were made was 1959. Models for cashews were run for the whole period 1932-1959, including the war years, for the prewar years 1932-1941 only, and for the postwar years 1947-1959 only.

Peanut Demand Analysis. In view of the foregoing considerations, the price series used for peanuts was that for Extra Large Virginia type peanuts, F.O.B. important shelling and shipping points in the Virginia-Carolina area. This price is indicative of prices paid by nut salters for peanuts. Extra Large Virginias are the grade and type of peanuts most highly desired by salters. Prices of Extra Large and Medium Virginias (the main grades of Virginias which are salted) tend to move together in about the same pattern over time, and to maintain a very small spread between grades (23).

The market effect of cashews on the demand for salted peanuts (competitive or complementary, if either) was investigated in terms of association of the price of cashews with quantity of peanuts consumed ("cross-elasticity of demand" for peanuts). For reasons explained previously, the prices of cashews used for demand analysis were those at

the level where nut salters and other processors obtain their supplies of nuts. In the case of cashews, this level means the transactions between nut salters and cashew importers in the United States who are based primarily in New York. The association of price of cashews with demand for peanuts was measured in terms of two price series (by grades) for cashews at this New York wholesale level. These two grades are 320-Count Wholes and Fancy Pieces, and are the most common grades of cashews which are imported by the United States.

The association of consumer income with demand for salted peanuts ("income elasticity of demand") was measured in terms of the association of United States disposable personal income with peanut consumption.

Cashew Demand Analysis. In analyzing the demand for cashews (both for salted nuts and for total uses of cashews), the analyses of demand were run on a basis similar to that described for peanuts, and for similar reasons. Three price series on cashews were used: the two series on New York wholesale prices discussed previously, and a series in which prices of all grades of cashews are combined on basis F.O.B. exporting countries (primarily the port of Cochin in India). The market effect of peanuts on demand for cashews was analyzed in terms of the extra large Virginia type peanut price series previously discussed. The effect of disposable personal income on cashew demand was also studied. From this analysis, there were obtained the following demand estimates (each obtained for both salted cashews and total cashews): (1) "price elasticity of demand" (indicating "demand schedule" or quantity-price relationship, other things being held constant); (2) "cross-elasticity of demand" with respect to price of peanuts (competition or complementarity of peanuts

with cashews); and (3) "income elasticity of demand" (association of income with consumption of cashews).

#### Statistical Method and Terminology for This Demand Analysis

The statistical method used in the measurement of demand in this study was the construction of multiple regression (least squares) equations (or "models"). These equations consist of one dependent variable and several independent variables, which are believed to influence variation in the dependent variable<sup>6/</sup>.

The equations of this study were formulated by using measures of consumption of peanuts and cashews as dependent variables. The independent variables included in these equations were those supposed associated factors listed previously believed to have important effects upon influencing the demand for peanuts and cashews. Data measuring the dependent and independent variables used in these equations are shown in Appendix A, Part 2.

The objective of this type of statistical analysis is to derive an equation containing a coefficient for each independent variable in the equation which will indicate the net effect of each independent variable (considering the effects of each other independent variable in the equation) on the variation of the dependent variable. For example, in a

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<sup>6/</sup> Ostle, Bernard, Statistics in Research, Iowa State College Press, Ames, Iowa, 1954, pp. 117-227.

demand equation for peanuts, using as the dependent variable a measure of consumption of peanuts and using as independent variables each of the following: price of peanuts, price of cashews, disposable personal income, and time trend, the analysis leads to a net regression coefficient for each of the independent variables. The coefficient obtained for price of peanuts in such an equation indicates the net influence of peanut price (independent variable) upon peanut consumption (dependent variable). Similarly, the influence of each independent variable upon the dependent variable is indicated.

Details of all of the multiple regression equations derived in this demand analysis are shown, equation by equation, in Appendix B. These details include: identification of dependent and independent variables, the coefficients (or "b-values") for each independent variable, the "standard error" of each regression coefficient, and a test of significance for each regression coefficient.

The significance test ( $t^2$ ), used for each regression coefficient, is the square of the ratio between the particular regression coefficient and its standard error. When this ratio for any regression coefficient is found to have a value which exceeds the comparable "critical value" of such ratio as tabulated by theoretical statisticians, the regression coefficient is regarded as "statistically significant." This means that the regression coefficient in question differs significantly from zero, and therefore plays an important part in explaining the variation of the dependent variable. In the tables in Appendix B, a regression coefficient is significant if one or two asterisks are placed beside the

calculated value of its significance ( $t^2$ ) test. Thus, the regression coefficients which are significant may be clearly observed in the tables of Appendix B.

In order to determine the elasticity of demand for salted peanuts, salted cashews, or total shelled edible cashews, from a given regression equation, the coefficient of each independent variable with respect to which the elasticity of demand is to be measured must be converted to a proportional value. This is done in an equation measuring demand for salted peanuts, for example, by making the conversion on the coefficient obtained for the price of peanuts variable, in order to estimate "price elasticity of demand" for salted peanuts from such an equation. Conversion is accomplished by multiplying the coefficient by the ratio between the observed mean values of the independent and dependent variables, respectively. As an example of such conversion, consider "Model B" of the demand analysis for salted peanuts (equation number 7b in Appendix B). This equation is based on per capita consumption of salted peanuts, as associated with shelling point price of Extra Large Virginia type peanuts, wholesale price of cashew Fancy Pieces, per capita disposable personal income, and time trend. (Prices were deflated by the wholesale price index for processed foods, and per capita income was deflated by the consumer price index, to eliminate variation due to changing value of money.) The mathematical model is as follows:

$Y_5$  (salted peanut consumption) = a function of  
 $X_7$  (peanut price),  $X_2$  (cashew price),  $X_9$  (income)  
 and  $X_{13}$  (time trend).

After the regression calculations were performed, the following regression coefficients were obtained:

peanut price	-.0121***
cashew price	.00468*
income	.00053
time trend	.0299

Regression coefficients were converted to elasticity values by the following formula:

$$\text{Elasticity} = \text{Regression Coefficient times } \left( \frac{\bar{X}}{\bar{Y}} \right),$$

where  $\bar{X}$  is the mean value of the independent variable (such as price) and  $\bar{Y}$  is the mean value of the dependent variable (such as consumption).

For equation 7b the conversion calculation is as follows, for the "price elasticity of demand" for salted peanuts:

$$\begin{aligned} \text{"Price Elasticity of Demand"} &= -.0121 \text{ times } \left( \frac{\bar{X}_7}{\bar{Y}_5} \right) \\ &= -.0121 \text{ times } (23,71/.90) \\ &= -.0121 (26.34) \\ \text{"Price Elasticity of Demand"} &= -0.32 \end{aligned}$$

Similar calculations were made to obtain "cross-elasticity of demand" with respect to cashew price, and "income elasticity of demand". When the regression coefficients were converted, the following elasticity values were obtained ("point" elasticity at the means of the observations):

peanut "price elasticity"	-0.32
"cross-elasticity" with respect to cashew price	0.19
"income elasticity"	0.81

The elasticity values thus obtained indicate the net effect of a one percent change in the value of each associated factor, such as price or income, on percentage change in the value of the dependent variable, consumption, and thus provide estimates of demand and price relationships for salted peanuts, salted cashews, and all shelled edible cashews.

In summary, this procedure was followed to determine from each equation an estimate of: (1) the elasticity of demand with respect to price of the nut being analyzed; (2) cross-elasticity of demand with respect to price of the competing or complementary nut; and (3) the elasticity of demand with respect to disposable personal income.

From each peanut equation, there were obtained net values of the elasticity of demand for peanuts with respect to peanut price, cross-elasticity of demand with respect to cashew price, and elasticity of demand with respect to disposable personal income.

From each cashew equation, there were obtained net estimates of the elasticity of demand for cashews with respect to cashew price, cross-elasticity of demand with respect to price of peanuts, and elasticity of demand with respect to disposable personal income.

Details of each equation derived in this analysis are provided in Appendices A and B, and are summarized in the following paragraphs for each model.

## Results of Demand Analysis for Salted Peanuts

Identification of Economic Variables in Demand Models:

Y <sub>5</sub> ...	Per Capita Consumption of Salted Peanuts
X <sub>7</sub> ...	Price of Peanuts (Extra Large Virginia type), Deflated by Wholesale Price Index for Processed Foods
X <sub>1</sub> ...	Deflated Price of Cashews (320-Count Wholes)
X <sub>2</sub> ...	Deflated Price of Cashews (Fancy Pieces)
X <sub>9</sub> ...	Per Capita Disposable Personal Income, Deflated by Consumer Price Index
Y <sub>6</sub> ...	Total Consumption of Salted Peanuts
X <sub>8</sub> ...	Price of Peanuts (Extra Large Virginia type)
X <sub>4</sub> ...	Price of Cashews (320-Count Wholes)
X <sub>5</sub> ...	Price of Cashews (Fancy Pieces)
X <sub>10</sub> ...	Disposable Personal Income
X <sub>13</sub> ...	Time Trend
X <sub>11</sub> ...	Wholesale Price Index for Processed Food
X <sub>12</sub> ...	U. S. Population

Models Considered	Equation Number	in	Time Period	Demand Elasticity with Respect to:		
				Price of Peanuts	Price of Cashews	Price of Income
A. $Y_5 = F(X_7, X_1, X_9, X_{13})$	7a		1947-1959	<u>-0.27</u>	0.002	0.50
B. $Y_5 = F(X_7, X_2, X_9, X_{13})$	7b		do.	<u>-0.32</u>	<u>0.19</u>	0.81
C. $Y_6 = F(X_8, X_4, X_{10}, X_{11}, X_{12}, X_{13})$	8a		do.	-0.27	-0.06	0.91
D. $Y_6 = F(X_8, X_5, X_{10}, X_{11}, X_{12}, X_{13})$	8b		do.	<u>-0.43</u>	0.21	-0.82

(Note: The related coefficient for the price elasticities which are underlined is statistically significant. For all elasticities not underlined, the related coefficient is not significant.)

Four annual models are considered in analyzing demand for salted peanuts for 1947 through 1959. Model A is based on per capita salted peanut consumption, as associated with shelling point price of Extra Large Virginia type peanuts, wholesale price of 320-Count Whole cashews,



per capita disposable personal income, and time trend. Prices were deflated by the wholesale price index for processed foods. Per capita income was deflated by the consumer price index. Model B is similar to Model A, except that a different set of cashew prices is used: the deflated wholesale price of Fancy Pieces.

Model C is based on total consumption of salted peanuts, as associated with undeflated shelling point price of Extra Large Virginia type peanuts, undeflated wholesale price at 320-Count Whole cashews, undeflated total disposable personal income, and time trend, with the addition, as extra factors, of wholesale price index for processed foods (to account for general price level changes, i.e. changes in value of money), and population data (to reduce total quantity consumed to a per capita basis). In effect, Model C describes a relationship similar to that of Model A.

Model D describes a similar relationship to that of Model B. It contains the same factors as Model C, except that the cashew price series used is changed to undeflated wholesale price of Fancy Pieces.

In addition to these models, certain equations based on quarterly and monthly data for 1947 through 1959 were run. These were set up on the same basis as Models C and D, except that extra variables were added to some of them to remove seasonal variation effects. These equations did not reveal any demand and price relationships not already suggested by the annual equations. No analysis was made for the years before 1947 because of lack of meaningful data.

Model B is the best of the annual salted peanut demand equations, in terms of statistical significance. It is consistent with Model A insofar as peanut price coefficients are concerned. Lack of consistency between

these two models as to cashew price coefficients is not readily explainable. Reference to the cashew price series for 320-Count Wholes ( $X_1$ ) and Fancy Pieces ( $X_2$ ) suggests that these two series are not highly correlated with each other, in that the year to year change in the price of one grade is frequently in the opposite direction to the corresponding change in price of the other grade. The reason for this difference might be explained by quantity data for each of the grades, but data of this nature are not available.

In general, the elasticity values for demand for salted peanuts with respect to the price of Extra Large Virginia peanuts were derived from statistically significant coefficients, and were inelastic (less than one). This means that a one percent change in the price of Extra Large Virginia type peanuts is associated with about a 0.32 percent change in demand of nut salters for peanuts, such change being in the opposite direction to that of the change in price. This is consistent with the inverse relationship between quantity demanded and price suggested by economic theory.

The cross elasticity of demand values for salted peanuts with respect to prices of cashews paid by nut salters are not, in general, meaningful. Only one of the four such values obtained was based on a statistically significant coefficient, and the values obtained are so small that they indicate that the price of cashews paid by nut salters has little influence on nut salters' demand for peanuts. These elasticity values do, in general, suggest that such little association as price of cashews had with demand of nut salters for peanuts points to a slightly competitive relationship between peanuts and cashews, rather than a complementary relationship.

No meaningful effects of changes in disposable personal income upon salters' demand for peanuts could be ascertained from this analysis.

## Results of Demand Analysis for Salted Cashews

Identification of Economic Variables in Demand Models:

$Y_1$	...	Per Capita Consumption of Salted Cashews
$X_1$	...	Deflated Price of Cashews (320-Count Wholes)
$X_2$	...	Deflated Price of Cashews (Fancy Pieces)
$X_3$	...	Deflated Price of Cashews (All Grades Combined, F.O.B. Exporting Countries)
$X_7$	...	Deflated Price of Peanuts (Extra Large Virginia type)
$X_9$	...	Per Capita Disposable Personal Income, Deflated by Consumer Price Index
$Y_3$	...	Total Consumption of Salted Cashews
$X_4$	...	Price of Cashews (320-Count Wholes)
$X_5$	...	Price of Cashews (Fancy Pieces)
$X_6$	...	Price of Cashews (All Grades Combined, F.O.B. Exporting Countries)
$X_8$	...	Price of Peanuts (Extra Large Virginias)
$X_{10}$	...	Disposable Personal Income
$X_{13}$	...	Time Trend
$X_{11}$	...	Wholesale Price Index for Processed Foods
$X_{12}$	...	U. S. Population

Models Considered	Equation Number	Time Period	Demand Elasticities with Respect to:		
			Price of Cashews	Price of Peanuts	Income
A. $Y_1 = F(X_1, X_7, X_9, X_{13})$	1a	1932-1959	-0.50	0.19	0.48
B. $Y_1 = F(X_3, X_7, X_9, X_{13})$	1c	do.	-0.08	0.16	-1.44
C. $Y_1 = F(X_2, X_7, X_9, X_{13})$	1e	do.	-0.43	0.30	0.05
D. $Y_3 = F(X_4, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	4a	1932-1959	0.51	0.16	0.05
E. $Y_3 = F(X_6, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	4c	do.	0.11	0.04	-3.90
F. $Y_3 = F(X_5, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	4e	do.	-0.39	0.25	-0.90
G. $Y_1 = F(X_1, X_7, X_9, X_{13})$	2a	1932-1941	-0.28	0.43	1.16
H. $Y_1 = F(X_3, X_7, X_9, X_{13})$	2c	do.	-0.35	0.52	1.18

Continued

Models Considered	Equation Number	in	Time Period	Demand Elasticities with Respect to:		
				Price of Cashews	Price of Peanuts	Income
I. $Y_1 = F(X_2, X_7, X_9, X_{13})$	2e		do.	-0.09	0.57	1.16
J. $Y_3 = F(X_4, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	5a		1932-1941	-0.77	0.43	0.65
K. $Y_3 = F(X_6, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	5c		do.	-0.52	0.68	0.49
L. $Y_3 = F(X_5, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	5e		do.	0.01	0.40	-0.16
M. $Y_1 = F(X_1, X_7, X_9, X_{13})$	3a		1947-1959	-0.68	0.28	0.23
N. $Y_1 = F(X_3, X_7, X_9, X_{13})$	3c		do.	<u>-0.79</u>	0.26	0.61
O. $Y_1 = F(X_2, X_7, X_9, X_{13})$	3e		do.	-0.50	0.44	2.70
P. $Y_3 = F(X_4, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	6a		1947-1959	-0.50	0.29	-1.44
Q. $Y_3 = F(X_6, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	6c		do.	<u>-0.78</u>	0.26	0.25
R. $Y_3 = F(X_5, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	6e		do.	-0.44	0.63	0.89

(Note: The related coefficient for the price elasticities which are underlined is statistically significant. For all elasticities not underlined, the related coefficient is not significant.)

Eighteen annual models are considered in analyzing demand for salted cashews. Models A, B, C, D, E, and F cover the period 1932 through 1959 (the entire period for which data were available when the analysis was run). Models G, H, I, J, K, and L cover the prewar years 1932 through 1941, and models M, N, O, P, Q, and R cover the postwar years 1947 through 1959. These analyses, omitting the wartime years 1942 through 1946, are considered to avoid spurious results which might be produced by the peculiar institutional factors which prevailed during those years (such as rationing, price ceilings, and shipping space restrictions).

Model A is based on per capita salted cashew consumption, as associated with wholesale price of 320-count whole cashews, shelling point of Extra Large Virginia type peanuts, per capita disposable personal income, and time trend. Prices were deflated by the wholesale price index for processed foods, and per capita income was deflated by the consumer price index. Models B and C are similar to Model A, except that different cashew price series were used. In Model B, the deflated price of all grades of cashews combined, F.O.B. exporting countries, is used. In Model C, the deflated wholesale price of cashew Fancy Pieces is used.

Model D is based on total consumption of salted cashews, as associated with undeflated wholesale price of 320-Count Whole cashews, undeflated shelling point price of Extra Large Virginia type peanuts, undeflated total disposable personal income, and time trend, with the addition, as extra factors, of wholesale price index for processed foods (to account for general price level changes, i.e. changes in value of money), and population data (to reduce total quantity consumed to a per capita basis). In effect, Model D describes a relationship similar to that of Model A. In like manner, Models E and F describe relationships similar to those of Models B and C, respectively.

The models for the prewar and the postwar years contain the same sets of variables as the models for all years 1932 through 1959. The following likenesses exist in the models' relationships:

Equivalent Models				
1932-1941	:	1947-1959	:	1932-1959
Prewar Models	:	Postwar Models	:	All Years' Models
G	:	M	:	A
H	:	N	:	B
I	:	O	:	C
J	:	P	:	D
K	:	Q	:	E
L	:	R	:	F

In addition to these models, certain equations based on quarterly and monthly data for 1947 through 1959 were run. These were set up on the same basis as Models M, N, O, P, Q, and R, except that extra variables were added to some of them to remove seasonal variation effects. These equations, however, did not reveal any demand and price relationships not already suggested by the annual equations for the postwar years.

Models A and C are the best of the salted cashew demand equations for 1932 through 1959, in terms of statistical significance. They appear to be equally valid. For the prewar years, no equations were derived which had any statistically significant coefficients.

For the postwar years, Model N is statistically the best. This outcome is probably a mathematical coincidence without economic validity, however. The cashew price used in this model is the average price of all grades, F.O.B. exporting countries (primarily India) at the time of shipment. Being so far removed from the processor and retail market levels, in terms of transactions in the marketing channel, time (due to orders being placed far in advance of shipment) and distance, this price series probably does not have the economic validity that wholesale cashew prices have. The only other postwar model having any statistical significance is Model Q, which has the same basis of cashew prices as Model N. Thus, there is no postwar model which is economically meaningful.

Coefficients of demand elasticity for cashews for salting, with respect to cashew prices, generally reflect the expected inverse relationship between quantity demanded and price. Few price coefficients were statistically significant, however. In general, the coefficients obtained suggested an inelastic relationship. In other words, the net effect of a

one percent change in cashew price on quantity of cashews demanded by nut salters is an inverse change of about 0.46 percent in quantity demanded.

Cross-elasticity of demand for cashews for salting, with respect to the price of Extra Large Virginia peanuts, was indeterminate. Coefficients were not significant, thus, no competitive relationship between salted peanuts and cashews was indicated.

Disposable personal income had no discernible effect on demand for cashews for salting.

## Results of Demand Analysis for All Cashews

Identification of Economic Variables in Demand Models:

Y <sub>2</sub>	...	Per Capita Consumption of All Cashews
X <sub>1</sub>	...	Deflated Price of Cashews (320-Count Wholes)
X <sub>2</sub>	...	Deflated Price of Cashews (Fancy Pieces)
X <sub>3</sub>	...	Deflated Price of Cashews (All Grades Combined, F.O.B. Exporting Countries)
X <sub>7</sub>	...	Deflated Price of Peanuts (Extra Large Virginia Type)
X <sub>9</sub>	...	Per Capita Disposable Personal Income, Deflated by Consumer Price Index
Y <sub>4</sub>	...	Total Consumption of All Cashews
X <sub>4</sub>	...	Price of Cashews (320-Count Wholes)
X <sub>5</sub>	...	Price of Cashews (Fancy Pieces)
X <sub>6</sub>	...	Price of Cashews (All Grades Combined, F.O.B. Exporting Countries)
X <sub>8</sub>	...	Price of Peanuts (Extra Large Virginias)
X <sub>10</sub>	...	Disposable Personal Income
X <sub>13</sub>	...	Time Trend
X <sub>11</sub>	...	Wholesale Price Index for Processed Foods
X <sub>12</sub>	...	U. S. Population

Models Considered	Equation Number	Appendix B: in	Time Period	Demand Elasticities with Respect to:		
				Price of Cashews	Price of Peanuts	Price of Income
A. $Y_2 = F(X_1, X_7, X_9, X_{13})$	1b		1932-1959	-0.50	0.17	0.44
B. $Y_2 = F(X_3, X_7, X_9, X_{13})$	1d		do.	-0.09	0.14	-1.43
C. $Y_2 = F(X_2, X_7, X_9, X_{13})$	1f		do.	-0.40	0.28	-0.10
D. $Y_4 = F(X_4, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	4b		1932-1959	-0.51	0.15	-0.14
E. $Y_4 = F(X_6, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	4d		do.	0.10	0.01	-4.03
F. $Y_4 = F(X_5, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	4f		do.	-0.36	0.22	-1.35
G. $Y_2 = F(X_1, X_7, X_9, X_{13})$	2b		1932-1941	-0.26	0.44	1.09
H. $Y_2 = F(X_3, X_7, X_9, X_{13})$	2d		do.	-0.34	0.52	1.11
I. $Y_2 = F(X_2, X_7, X_9, X_{13})$	2f		do.	-0.09	0.56	1.08



Continued

Models Considered	Equation Number	in	Time Period	Demand Elasticities with Respect to:		
				Price of	Price of	Income
	Appendix B:			Cashews:	Peanuts:	Income
J. $Y_4 = F(X_4, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	5b		1932-1941:	-0.77	0.38	0.63
K. $Y_4 = F(X_6, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	5d		do.	-0.53	0.60	0.48
L. $Y_4 = F(X_5, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	5f		do.	-0.01	0.35	-0.16
M. $Y_2 = F(X_1, X_7, X_9, X_{13})$	3b		1947-1959:	-0.67	0.28	0.13
N. $Y_2 = F(X_3, X_7, X_9, X_{13})$	3d		do.	<u>-0.78</u>	0.26	0.50
O. $Y_2 = F(X_2, X_7, X_9, X_{13})$	3f		do.	-0.46	0.43	2.32
P. $Y_4 = F(X_4, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	6b		1947-1959:	-0.49	0.32	-1.50
Q. $Y_4 = F(X_6, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	6d		do.	<u>-0.74</u>	0.29	0.12
R. $Y_4 = F(X_5, X_8, X_{10}, X_{11}, X_{12}, X_{13})$	6f		do.	-0.44	0.67	0.53

(Note: The related coefficient for the price elasticities which are underlined is statistically significant. For all elasticities not underlined, the related coefficient is not significant.)

Eighteen annual models are considered in analyzing demand for all cashews. These models are similar to their opposite numbers in the salted cashew demand analysis.

In addition to these, certain equations based on quarterly and monthly data for 1947 through 1959 were run. These were set up on the same basis as models M, N, O, P, Q, and R, except that extra variables were added to some of them to remove seasonal variation effects. These equations did not reveal any demand and price relationships not already suggested by the annual equations for the postwar years.

Models A and C are the best equations on demand for all cashews for 1932 through 1959, in terms of statistical significance. They appear to be equally valid. For the prewar years, no equations were derived which had any statistically significant coefficients. Among postwar equations, only Models N and Q had any statistical significance. These models, however, are based on a cashew price series (all grades, F.O.B. exporting countries) which is of doubtful economic validity. Thus, there is no postwar model which is economically and statistically meaningful.

The relationships between quantities of cashews demanded by processors for all end uses, and price of cashews, price of peanuts, and disposable personal income, were observed to be about the same as comparable demand relationships for salted cashews. This is to be expected, in view of the fact that about 90 percent of the entire supply of cashew kernels is consumed as salted nuts, with the remaining 10 percent being divided between candy and baked goods. Demand and price relationships for all cashews are suggested as follows by this analysis: (1) inelastic demand with respect to cashew prices; (2) not significantly competitive with peanuts, in terms of cross-elasticity of demand with respect to peanut prices; and (3) no discernible relationship between cashew demand and consumer incomes.

#### **Tentative Conclusions Drawn From Demand Analysis for Peanuts and Cashews**

Conclusions from this demand analysis are suggested with reservations, since the association of some factors believed to have an influence on demand by processors for peanuts for salting, cashews for salting, and cashews for all uses, could not be reliably demonstrated. Taking this

into consideration, the following tentative conclusions are drawn from this study: (1) demand for peanuts to be processed into salted nuts is inelastic in that, on the average, a one percent change in price is associated with a change of 0.27 to 0.32 percent, in the opposite direction, in quantity of peanuts demanded by salters; (2) demand for cashews appears to be similarly inelastic with respect to cashew price, in that a one percent change in price is associated, on the average, with a change of 0.40 to 0.50 percent, in the opposite direction, in quantity of cashews demanded for salting and other uses; (3) the cross-elasticity of demand for peanuts for salting, with respect to the price of cashews, appears to be largely indeterminate, because of inconsistent results obtained for the two major grades of cashews; no significant coefficients were obtained for cross-elasticity of demand for cashews with respect to the price of peanuts; (4) demand for peanuts for salting appears to be somewhat more inelastic than demand for cashews for salting and for all uses; and (5) disposable personal income coefficients failed to demonstrate any significant effect upon demand for either cashews or peanuts, for salting, at the processor level.

The most reasonable estimates of demand elasticity relationships for peanuts and cashews, obtained in this study are as follows:

Time Period:	Kind of Nut and Form in Which Used	Demand Elasticity with Respect to:		
		Own Price	Price of Other Nut	Income
1947- 1959	Salted Peanuts	-0.32	0.19	None
1932- 1959	Salted Cashews	-0.43 to -0.50	None	None
1932- 1959	All Cashews	-0.40 to -0.50	None	None

(Note: "None" indicates that the related coefficient obtained is not statistically significant.)

These conclusions are drawn about demand for peanuts by nut salters and demand for cashews by processors of salted nuts and other nut products made from cashews. Although no statistical analysis of this nature was conducted, it is possible to speculate that similar conclusions might apply to the demand for salted peanuts and cashews by consumers at the retail level, in view of the insignificant effect of marketing margins between the processor and retail levels (indicated in the Oklahoma research referred to previously), in view of the stability of prices of salted peanuts and salted cashews at retail levels (noted by the author in his random observations in retail stores from 1956 to 1961), and in view of the small concern of consumers about whether peanuts and their products are priced too expensively (indicated in the 1955 consumer survey, conducted by the United States Department of Agriculture and referred to previously herein).

In terms of the original hypotheses for this research, the tentative conclusions are stated as follows: (1) per capita consumer incomes have no statistically demonstrable effect on demand for salted peanuts, or for cashews either as salted nuts or in all edible forms; (2) the effect of changes in price differential between salted peanuts and salted cashews could not be successfully determined; thus, the existence of a competitive or complementary relationship between peanuts and cashews in the salted nut trade could not be established; and (3) people tend to reduce their per capita consumption of salted peanuts as price of peanuts rises, but consumption is reduced at a rate much smaller than the rate of price increase, so that rising price more than offsets falling consumption, and total salted peanut receipts to the industry are increased, rather than

decreased; further, a similar set of statements may be made about demand and price relationships for salted cashews, and cashews in all forms. It is tentatively concluded that the foregoing statements apply within moderate ranges of variation in prices and quantities demanded. They may not apply at more extreme ranges of variation, outside the limits of observed data on which this research is based. Further, they may not apply in the event of extreme changes in factors associated with demand.

The results of this analysis (bearing in mind their limitations) do not suggest that the peanut industry is likely to be adversely affected by moderate price increases, or by competition from cashews in the salted nut trade, as a result of the peanut price support and production control program.

#### Evaluation of Statistical Results

Before the tentative conclusions stated above can be accepted as fully warranted, some additional analyses, which were not within the scope of this study, should be conducted. These areas of investigation include:

(1) The extent to which Virginia-type Extra Large peanut prices and Spanish peanut prices are correlated. The demand model included salted quantities of both Spanish and Virginia type peanuts, but only prices of Extra Large Virginia type. If these two price series are not highly correlated, the models should be reconsidered.

(2) The analyses of cashew demand relationships included the war years in the period 1932-1959. This doubtless brings into play exogenous forces not included in the model. An analysis omitting the war years should be considered.

(3) The form of the relationships should be explored graphically, for each model considered useful, in order to observe the residual data, and the dispersion of the data about the partial regression lines of relationship. These procedures would be helpful in determining the relative validity of the coefficients, and perhaps point the way toward improved regression models in cases where no significant results were obtained. For example, postwar peanut price-quantity relationships were assumed to be linear, but consideration of government policy changes affecting peanut price suggests that the assumption may not be warranted.

(4) The degree of correlation between the two cashew price series should be ascertained. The inconsistent results obtained from the "320-Count Wholes" price series and the "Fancy Pieces" series needs further study.

(5) Some additional attention should be given to the degree to which the assumptions under least squares procedures have been met, as specified by the Markoff Theorem. The additional analyses indicated above should be helpful in this regard.

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APPENDICES ON DEMAND ANALYSIS

Appendix A - Economic Variables  
and Statistical Data Used in  
Demand Analysis.

Appendix B - Details of Multiple  
Regression (Least Squares)  
Demand Equations Derived in  
the Analysis.

APPENDIX A - PART 1

Identification of Economic Variables  
in Demand Equations

APPENDIX A - PART 1Identification of Economic Variables in  
Demand Equations**A. Dependent Variables (Quantities Demanded):**

- $Y_1$  - Apparent Annual Per Capita Consumption of Salted Cashews, U. S.  
(Quantity of Cashews Salted in U. S.).
- $Y_2$  - Apparent Annual Per Capita Consumption of All Cashews, U. S.  
(Quantity of Cashews Imported to U. S.).
- $Y_3$  - Apparent Annual Total Consumption of Salted Cashews, U. S.  
(Quantity of Cashews Salted in U. S.).
- $Y_4$  - Apparent Annual Total Consumption of All Cashews, U. S.  
(Quantity of Cashews Imported to U. S.).
- $Y_5$  - Apparent Annual Per Capita Consumption of Salted Peanuts, U. S.  
(Quantity of Peanuts Salted in U. S.).
- $Y_6$  - Apparent Annual Total Consumption of Salted Peanuts, U. S.  
(Quantity of Peanuts Salted in U. S.).

**B. Independent Variables (Factors Influencing Quantities Demanded):**

- $X_1$  - Calendar Year Average Price of Cashews (320-Count Whole Kernels,  
at Wholesale, New York) Deflated by Wholesale Price Index for  
Processed Foods (1947-1949 = 100).
- $X_2$  - Calendar Year Average Price of Cashews (Fancy Pieces at Whole-  
sale, New York) Deflated by Wholesale Price Index for Processed  
Foods (1947-1949 = 100).
- $X_3$  - Calendar Year Average Price of Cashews (All Grades Combined,  
F.O.B. Exporting Countries) Deflated by Wholesale Price Index  
for Processed Foods (1947-1949 = 100).
- $X_4$  - Calendar Year Average Price of Cashews (320-Count Whole Kernels,  
at Wholesale, New York).
- $X_5$  - Calendar Year Average Price of Cashews (Fancy Pieces at Whole-  
sale, New York).
- $X_6$  - Calendar Year Average Price of Cashews (All Grades Combined,  
F.O.B. Exporting Countries).

- X<sub>7</sub> - Calendar Year Average Price of Peanuts (Virginia-type, Extra Large Kernels, F.O.B. U. S. Shelling Points) Deflated by Wholesale Price Index for Processed Foods (1947-1949 = 100).
- X<sub>8</sub> - Calendar Year Average Price of Peanuts (Virginia-type, Extra Large Kernels, F.O.B. U. S. Shelling Points).
- X<sub>9</sub> - Per Capita Disposable Personal Income, U. S., Deflated by Consumer Price Index (1947-1949 = 100).
- X<sub>10</sub> - Total Disposable Personal Income, U. S. (Annual Rate).
- X<sub>11</sub> - Wholesale Price Index for Processed Foods, U. S. (1947-1949 = 100).
- X<sub>12</sub> - U. S. Population.
- X<sub>13</sub> - Time Trend.

## APPENDIX A - PART 2

Statistical Data Used in  
Demand Analysis

Table A - Deflated Annual Per Capita Data, 1932-1959 (basis of equations 1a-3f and 7a-7b).

Table B - Raw Annual Data, 1932-1959 (basis of equations 4a-6f and 8a-8b).

Note 1. See Part 1 of this Appendix A for complete identification of variables in these tables, in accordance with "Y" and "X" designations at the heads of the data columns.



Table A. Per Capita Consumption of Salted Cashews ( $y_1$ ), All Cashews ( $y_2$ ), and Salted Peanuts ( $y_5$ ); Deflated Prices of Cashews ( $x_1$ ), ( $x_2$ ), and ( $x_3$ ); Deflated Price of Peanuts ( $x_7$ ); Deflated Disposable Personal Income ( $x_9$ ); and Time Trend ( $x_{13}$ ). United States. Annual Data, 1932-1959.

	$y_1$	$y_2$	$y_5$	$x_1$	$x_2$	$x_3$	$x_7$	$x_9$	$x_{13}$
Year	(lbs.)	(lbs.)	(lbs.)	(¢/lb.)	(¢/lb.)	(¢/lb.)	(¢/lb.)	\$	(years)
1932	0.059	0.069	7/	78.90	38.33	44.4	10.88	667.73	1
1933	0.085	0.100	7/	65.29	44.10	35.3	11.96	657.12	2
1934	0.100	0.118	7/	61.22	39.51	37.1	17.23	718.58	3
1935	0.149	0.176	7/	51.73	33.30	31.5	17.18	779.43	4
1936	0.147	0.172	7/	52.79	39.00	33.5	15.95	870.51	5
1937	0.151	0.177	7/	52.92	36.66	29.2	15.38	896.12	6
1938	0.144	0.170	7/	53.05	32.65	29.6	16.12	838.46	7
1939	0.191	0.225	7/	53.35	35.45	31.6	18.38	904.58	8
1940	0.186	0.219	7/	50.48	43.46	32.3	18.17	961.39	9
1941	0.227	0.267	7/	58.14	50.97	31.9	18.75	1,108.70	10
1942	0.120	0.131	7/	90.58	56.60	37.2	23.47	1,249.81	11
1943	0.024	0.026	7/	161.75	116.85	51.1	26.67	1,319.68	12
1944	0.105	0.114	1.608	155.96	114.19	95.4	26.90	1,410.40	13
1945	0.161	0.175	1.652	158.36	98.68	110.2	26.73	1,398.14	14
1946	0.194	0.211	1.199	93.67	56.88	71.4	22.62	1,350.07	15
1947	0.190	0.208	0.850	54.89	38.11	40.3	22.53	1,228.31	16
1948	0.217	0.237	0.832	51.71	30.49	35.7	19.85	1,244.88	17
1949	0.225	0.246	0.798	57.36	28.21	39.8	23.24	1,239.28	18
1950	0.293	0.320	0.779	46.41	35.65	32.3	28.29	1,321.69	19
1951	0.293	0.327	0.899	49.17	37.55	35.5	21.08	1,319.30	20
1952	0.240	0.268	0.905	58.13	38.40	42.2	21.56	1,333.12	21
1953	0.268	0.299	0.940	50.98	39.93	40.3	23.12	1,370.30	22
1954	0.312	0.348	0.917	42.08	31.30	31.0	24.32	1,365.15	23

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Table A. (Continued)

Year	y <sup>1/</sup> <sub>1</sub> (lbs.)	y <sup>2/</sup> <sub>2</sub> (lbs.)	y <sup>3/</sup> <sub>5</sub> (lbs.)	x <sup>4/</sup> <sub>1</sub> (\$/lb.)	x <sup>4/</sup> <sub>2</sub> (\$/lb.)	x <sup>2/</sup> <sub>3</sub> (\$/lb.)	x <sup>5/</sup> <sub>7</sub> (\$/lb.)	x <sup>6/</sup> <sub>9</sub> \$	x <sub>13</sub> (years)
1955	0.360	0.402	0.867	52.06	38.01	34.6	28.72	1,427.71	24
1956	0.300	0.335	0.901	54.82	49.76	42.0	32.03	1,469.68	25
1957	0.306	0.341	0.988	54.64	41.39	39.5	20.82	1,496.50	26
1958	0.344	0.384	0.994	46.85	30.02	34.3	21.61	1,472.14	27
1959	0.320	0.358	1.054	48.48	33.95	36.4	21.09	1,516.09	28

- 1/ Source: Estimated quantities of cashews salted in United States are based on percentages of quantities of cashews imported to United States. These percentages are based on percentages determined in surveys of nut industry sources by the United States Tariff Commission for periods as follows: 1935-1937, 85% of all cashews estimated to be salted; 1946-1949 (average of years beginning October 1), 91.67% of all cashews estimated to be salted; 1950-1952 (average of years beginning October 1), 89.583% of all cashews estimated to be salted. As of June 1960, no further such information on cashews had been collected by the Tariff Commission for periods since 1953. However, the Commission's staff stated in June 1960 that the average percentage of cashews being salted is believed to have undergone little change since 1953. Based upon the percentages found in surveys, the following percentages have been used in this study to estimate the number of cashews being salted: 1932-1941, 85%; 1942-1946, 90.625%; 1947-1950, 91.67%; 1951-1953, 89.583%; 1954-1959, 90.625%.
- 2/ Source: 1931-1946, "Foreign Commerce and Navigation of the U. S.," United States Bureau of the Census; 1947-1956, "Imports for Consumption of Merchandise," Report FT 110, United States Bureau of the Census; 1957-1959, "Foreign Agricultural Trade of the U. S.," United States Department of Agriculture. These quantities of cashews imported to the United States are "General Imports" data for 1932, 1933, and 1947, and "Imports for Consumption" data for all other years. Price data represent unit value F.O.B. exporting country.
- 3/ Source: Crop Reporting Board, United States Department of Agriculture.

Table A (Continued)

- 4/ Source: Wholesale Price Quotations in "Journal of Commerce," New York, N. Y. Prices used for "320-count Whole" cashews were reported as such in the "Journal" beginning with June 1943. Prior to that time, only a price on "Whole" cashews was reported. Prices used for "Fancy Pieces" were reported as such starting with March 1939. Before that time, only a series on "Standard Pieces" was reported. These prices are market quotations, and not actual sales prices. Such quotations often remain unchanged for several months at a time, and do not necessarily reflect short-time changes in the cashew market. The price quotations are F.O.B. New York, at importers' warehouses, with all import duties and shipping charges paid. They are made by importers to nut salters.
- 5/ Source: "Peanut Market News," United States Department of Agriculture. Prices used for Virginia-type Extra Large Shelled Peanuts are simple averages of high, low, and "mostly" prices reported by shellers, cleaners, and brokers. Basis is F.O.B. important shipping sections (shelling points) for Virginia-type peanuts. These are prices charged to nut salters.
- 6/ Source: "Business Statistics" and "Survey of Current Business," United States Department of Commerce.
- 7/ Data not available prior to 1944.

Table B. Total Consumption of Salted Cashews ( $y_3$ ), All Cashews ( $y_4$ ), and Salted Peanuts ( $y_6$ ); Prices of Cashews ( $x_4$ ), ( $x_5$ ), and ( $x_6$ ); Price of Peanuts ( $x_8$ ); Disposable Personal Income ( $x_{10}$ ); Wholesale Price Index for Processed Foods ( $x_{11}$ ); Population ( $x_{12}$ ); and Time Trend ( $x_{13}$ ). United States Annual Data, 1932-1959

Year	$y_3$ (1000 lbs.)	$y_4$ (1000 lbs.)	$y_6$ (1000 lbs.)	$x_4$ (c/lb.)
1932	7,330	8,623	7/	28.80
1933	10,647	12,526	7/	23.70
1934	12,664	14,899	7/	26.08
1935	19,020	22,376	7/	26.95
1936	18,787	22,102	7/	26.45
1937	19,421	26,848	7/	23.75
1938	18,759	26,069	7/	24.19
1939	25,046	29,466	7/	23.10
1940	24,599	28,940	7/	22.01
1941	30,253	35,592	7/	29.36
1942	16,244	17,721	7/	53.53
1943	3,247	3,542	7/	99.64
1944	14,467	15,779	222,562	94.20
1945	22,460	24,502	231,172	96.28
1946	27,407	29,898	169,554	72.69
1947	27,410	29,902	123,966	53.90
1948	31,819	34,712	121,937	54.86
1949	33,596	36,650	119,073	54.89
1950	44,442	48,482	118,160	46.32
1951	45,243	50,504	138,806	54.78
1952	37,688	42,071	142,034	63.24
1953	42,739	47,709	150,101	53.32
1954	50,660	56,551	148,986	44.31
1955	59,480	66,396	143,255	52.94
1956	50,416	56,279	151,493	55.57
1957	52,313	58,396	169,122	57.70
1958	59,815	66,771	173,121	52.00
1959	56,752	63,351	186,652	51.87

Table B. (Continued)

Year:	x <sub>5</sub> <sup>4</sup> / (\$/lb.)	x <sub>6</sub> <sup>2</sup> / (\$/lb.)	x <sub>8</sub> <sup>5</sup> / (\$/lb.)	x <sub>10</sub> <sup>6</sup> / (\$ bil.)	x <sub>11</sub> <sup>6</sup> / (1947-49=100)	x <sub>12</sub> <sup>6</sup> / (mil. persons)	x <sub>13</sub> (years)
1932	13.99	16.2	3.97	48.7	36.5	124.9	1
1933	16.01	12.8	4.34	45.7	36.3	125.7	2
1934	16.85	15.8	7.34	52.0	42.6	126.5	3
1935	17.35	16.4	8.95	58.3	52.1	127.4	4
1936	19.54	16.8	7.99	66.2	50.1	128.2	5
1937	19.21	15.3	8.06	71.0	52.4	129.0	6
1938	14.89	13.5	7.35	65.7	45.6	130.0	7
1939	15.35	13.7	7.96	70.4	43.3	131.0	8
1940	18.95	14.1	7.92	76.1	43.6	132.1	9
1941	25.74	16.5	9.47	93.0	50.5	133.4	10
1942	33.45	22.0	13.87	117.5	59.1	134.9	11
1943	71.98	31.5	16.43	133.5	61.6	136.7	12
1944	68.97	57.6	16.25	146.8	60.4	138.4	13
1945	60.00	67.0	16.25	150.4	60.8	139.9	14
1946	44.14	55.4	17.55	159.2	77.6	141.4	15
1947	37.42	39.6	22.12	169.0	98.2	144.1	16
1948	32.35	37.9	21.06	187.6	106.1	146.6	17
1949	27.00	38.1	22.24	188.2	95.7	149.2	18
1950	35.58	32.2	28.23	206.1	99.8	151.7	19
1951	41.83	39.6	23.48	226.1	111.4	154.4	20
1952	41.78	45.9	23.46	237.4	108.8	157.0	21
1953	41.77	42.2	28.18	250.2	104.6	159.6	22
1954	32.96	32.6	25.61	254.5	105.3	162.4	23
1955	38.66	35.2	29.21	270.2	101.7	165.3	24
1956	50.61	42.7	32.57	287.2	101.7	168.2	25
1957	43.71	41.7	21.99	307.9	105.6	171.2	26
1958	33.32	38.1	23.99	316.5	111.0	174.1	27
1959	36.33	38.9	22.57	334.6	107.0	177.1	28

1/ Source: Estimated quantities of cashews salted in United States are based on percentages of quantities of cashews imported to United States. These percentages are based on percentages determined in surveys of nut industry sources by the United States Tariff Commission for periods as follows: 1935-1937, 85% of all cashews estimated to be salted; 1946-1949 (average of years beginning October 1), 91.67% of all cashews estimated to be salted; 1950-1952 (average of years beginning October 1) 89.583% of all cashews estimated to be salted. As of June 1960, no further such information on cashews had been collected by the Tariff Commission for periods since 1953. However, the Commission's staff stated in June 1960 that the average percentage of cashews being salted is believed to have undergone little change since 1953. Based upon the percentages found in surveys, the following percentages have been used in this study to estimate the number of cashews being salted: 1932-1941, 85%; 1942-1946, 90.625%; 1947-1950, 91.67%; 1951-1953, 89.583%; 1954-1959, 90.625%.

## Table B (Continued)

- 2/ Source: 1931-1946, "Foreign Commerce and Navigation of the U. S.," United States Bureau of the Census; 1947-1956, "Imports for Consumption of Merchandise," Report FT 110, United States Bureau of the Census; 1957-1959, "Foreign Agricultural Trade of the U. S.," United States Department of Agriculture. These quantities of cashews imported to the United States are "General Imports" data for 1932, 1933, and 1947, and "Imports for Consumption" data for all other years. Price data represent unit value F.O.B. exporting country.
- 3/ Source: Crop Reporting Board, United States Department of Agriculture.
- 4/ Source: Wholesale Price Quotations in "Journal of Commerce," New York, N. Y. Prices used for "320-count Whole" cashews were reported as such in the "Journal" beginning with June 1943. Prior to that time, only a price on "whole" cashews was reported. Prices used for "Fancy Pieces" were reported as such starting with March 1939. Before that time, only a series on "Standard Pieces" was reported. These prices are market quotations, and not actual sales prices. Such quotations often remain unchanged for several months at a time, and do not necessarily reflect short-time changes in the cashew market. The price quotations are F.O.B. New York, at importers' warehouses, with all import duties and shipping charges paid. They are made by importers to nut salters.
- 5/ Source: "Peanut Market News," United States Department of Agriculture. Prices used for Virginia-type Extra Large Shelled Peanuts are simple averages of high, low, and "mostly" prices reported by shellers, cleaners, and brokers. Basis is F.O.B. important shipping sections (shelling points) for Virginia-type peanuts. These are prices charged to nut salters.
- 6/ Source: "Business Statistics" and "Survey of Current Business," United States Department of Commerce.
- 7/ Data not available prior to 1944.

**APPENDIX B**

**Details of Multiple Regression  
(Least Squares) Demand Equations  
Derived in the Analysis**

**Section 1. Cashews Equations**

- a. Tables 1-6 (Equations 1a through 6f.)

**Section 2. Peanuts Equations**

- a. Tables 7-8 (Equations 7a through 8b)

**SECTION 1 - CASHEWS EQUATIONS**



Table 1.-Per Capita Consumption of Salted Cashews ( $Y_1$ ) and All Cashews ( $Y_2$ ) as a Function of Deflated Prices of Cashews ( $X_1$ ), ( $X_2$ ), and ( $X_3$ ); Deflated Price of Peanuts ( $Z_1$ ); Per Capita Income ( $Z_2$ ); and Time ( $X_{13}$ ). 1932-1959.

Equation	Variables	Dep. Var.	Incl.	b-values	Standard Error	$r^2$	Other values	Demand elasticities with respect to:
1a	$Y_1$	$X_1$	$b_0$	0.09561594	--	--	$R^2$ .....	Price of cashews..
		$X_2$	$X_1$	-0.00146476	0.00034	18.16**	0.910	-0.50**
		$X_7$	$X_7$	0.00180317	0.00210	0.73	0.02947	Price of peanuts..
		$X_9$	$X_9$	0.00008843	0.00011	0.54	58.05**	Income.....
		$X_{13}$	$X_{13}$	0.00502016	0.00352	2.04		
1b	$Y_2$	$b_0$	$b_0$	0.12467288	--	--	$R^2$ .....	Price of cashews..
		$X_1$	$X_1$	-0.00168335	0.00041	17.19**	0.896	-0.50**
		$X_7$	$X_7$	0.00187065	0.00249	0.57	0.3482	Price of peanuts..
		$X_9$	$X_9$	0.00008583	0.00013	0.42	49.78**	Income.....
		$X_{13}$	$X_{13}$	0.00540749	0.00415	1.70		
1c	$Y_1$	$b_0$	$b_0$	0.23893765	--	--	$R^2$ .....	Price of cashews..
		$X_3$	$X_3$	-0.00037110	0.00061	0.37	0.841	-0.08
		$X_7$	$X_7$	0.00149256	0.00280	0.29	0.03911	Price of peanuts..
		$X_9$	$X_9$	-0.00084538	0.00012	3.98	30.47**	Income.....
		$X_{13}$	$X_{13}$	0.01639118	0.00341	23.06**		-1.44

Table 1. Continued.

Equation	Variables : Dep. : Ind. :	b-values	Standard error	t <sup>2</sup>	Other values	Demand elasticities with respect to:
1d	Y <sub>2</sub> : b <sub>0</sub> Y <sub>3</sub> : Y <sub>7</sub> : Y <sub>9</sub> : Y <sub>13</sub> :	0.28536094 -0.007962 0.001495 -0.000802 0.01816	--- 0.00071 0.00326 0.00014 0.00397	--- 0.51 0.21 3.83 20.80**	R <sup>2</sup> ..... 0.823 S ..... 0.04583 F ... 26.38**	Price of cashews.. -0.09 Price of peanuts.. 0.14 Income ..... -1.43
1e	Y <sub>1</sub> : b <sub>0</sub> Y <sub>2</sub> : Y <sub>7</sub> : Y <sub>9</sub> : Y <sub>13</sub> :	0.1104 -0.001819 0.008869 0.0000896 0.007395	--- 0.00056 0.00236 0.00012 0.00379	--- 10.60** 1.47 0.01 3.81	R <sup>2</sup> ..... 0.890 S ..... 9.03256 F ..... 46.51**	Price of cashews.. -0.43** Price of peanuts.. 0.30 Income ..... 0.05
1f	Y <sub>2</sub> : b <sub>0</sub> Y <sub>2</sub> : Y <sub>7</sub> : Y <sub>9</sub> : Y <sub>13</sub> :	0.1521 -0.001965 0.003005 -0.00001971 0.008864	--- 0.00067 0.00085 0.00015 0.00457	--- 8.50** 1.11 0.02 3.77	R <sup>2</sup> ..... 0.868 S ..... 0.03933 F ..... 37.79**	Price of cashews.. -0.40** Price of peanuts.. 0.28 Income ..... -0.10

Table 2.-Per Capita Consumption of Salted Cashews ( $Y_1$ ) and All Cashews ( $Y_2$ ) as a Function of Deflated Prices of Cashews ( $X_1$ ), ( $X_2$ ), and ( $X_3$ ); Deflated Price of Peanuts ( $X_7$ ); Per Capita Income ( $Y_9$ ); and Time ( $X_{13}$ ). 1932-1941.

Equation	Variables	Standard error	$t^2$	Other values	Demand elasticities with respect to:
	Dep. Ind.	b-values		$R^2$ S F	Price of cashews... Price of peanuts... Income .....
2a	$Y_1$	$b_0$	---	0.964	-0.28
		$X_1$	0.00083	0.01312	0.43
		$X_7$	0.00326	33.0244	1.16
		$X_9$	0.0001939		
		$X_{13}$	0.003651		
2b	$Y_2$	$b_0$	---	0.963	-0.26
		$X_1$	0.00096	0.01562	0.44
		$X_7$	0.00368	32.3044	1.09
		$X_9$	0.0002197		
		$X_{13}$	0.004601		
2c	$Y_1$	$b_0$	---	0.966	-0.35
		$X_1$	0.00139	0.01262	0.52
		$X_7$	0.00271	35.7944	1.18
		$X_9$	0.0001970		
		$X_{13}$	0.002749		

Table 2. Continued.

Equation	Variables : Dep. : Ind. :	b-values	Standard error	t <sup>2</sup>	Other values	Demand elasticities with respect to:
2d	Y <sub>2</sub> : X <sub>3</sub> X <sub>7</sub> X <sub>9</sub> X <sub>13</sub>	-0.06889 -0.00172 0.00554 0.000224 0.00351	-- 0.00165 0.00322 0.00011 0.00613	-- 1.09 2.96 3.87 0.33	R <sup>2</sup> ..... 0.966 S ..... 0.01497 F ..... 35.27**	Price of cashews.. -0.34 Price of peanuts.. 0.52 Income ..... 1.11
2e	Y <sub>1</sub> : X <sub>0</sub> X <sub>2</sub> X <sub>7</sub> X <sub>9</sub> X <sub>13</sub>	-0.1084 -0.000331 0.00496 0.000193 0.00437	-- 0.00100 0.00299 0.00012 0.00541	-- 0.11 2.76 2.76 0.65	R <sup>2</sup> ..... 0.960 S ..... 0.01382 F ..... 29.63**	Price of cashews.. -0.09 Price of peanuts.. 0.57 Income ..... 1.16
2f	Y <sub>2</sub> : X <sub>0</sub> X <sub>2</sub> X <sub>7</sub> X <sub>9</sub> X <sub>13</sub>	-0.1249 -0.000376 0.00799 0.000218 0.00542	-- 0.00119 0.00354 0.00014 0.00641	-- 0.10 2.86 2.52 0.71	R <sup>2</sup> ..... 0.979 S ..... 0.01637 F ..... 29.29**	Price of cashews.. -0.09 Price of peanuts.. 0.56 Income ..... 1.08

Table 3.-Per Capita Consumption of Salted Cashews ( $Y_1$ ) and All Cashews ( $Y_2$ ) as a Function of Deflated Prices of Cashews ( $X_1$ ), ( $X_2$ ), and ( $X_3$ ); Deflated Price of Peanuts ( $X_7$ ); Per Capita Income ( $X_9$ ) and Time ( $X_{13}$ ). 1947-1959.

Equation	Variables	Dep.	Ind.	b-values	Standard error	t <sup>2</sup>	Other values	Demand elasticities with respect to:
3a	$Y_1$	$b_0$		0.151	--	--	$R^2$ ..... 0.843	Price of cashews... -0.68
		$X_1$		-0.00370	0.00163	5.13		Price of peanuts... 0.28
		$X_7$		0.00334	0.00215	2.41		Income ..... 0.23
		$X_9$		0.0000465	0.00041	0.01		
		$X_{13}$		0.00808	0.01049	0.59		
3b	$Y_2$	$b_0$		0.170	--	--	$R^2$ ..... 0.848	Price of cashews... -0.67
		$X_1$		-0.00403	0.00184	4.80		Price of peanuts .. 0.28
		$X_7$		0.00369	0.00243	2.31		Income ..... 0.13
		$X_9$		0.0000292	0.00046	0.00		
		$X_{13}$		0.01101	0.01183	0.73		
3c	$Y_1$	$b_0$		0.111	--	--	$R^2$ ..... 0.916	Price of cashews... -0.79**
		$X_3$		-0.00397	0.00147	16.50**		Price of peanuts... 0.26
		$X_7$		0.00302	0.00158	3.66		Income ..... 0.61
		$X_9$		0.000125	0.00030	0.17		
		$X_{13}$		0.00681	0.00765	0.79		

Table 3. Continued.

Equation	Variables : Dep. : Ind.	b-values	Standard error	$\chi^2$	Other values	Demand elasticities with respect to:
34	$Y_2$ :	0.126	--	--	$R^2$ .....	Price of cashews..
	$X_3$ :	-0.00848	0.00172	24.84**	0.913	-0.78**
	$X_7$ :	0.00335	0.00185	3.29	S .....	Price of peanuts..
	$X_9$ :	0.000114	0.00035	0.11	F .....	Income .....
	$X_{13}$ :	0.00880	0.00893	0.97		0.50
36	$Y_1$ :	0.165	--	--	$R^2$ .....	Price of cashews..
	$X_2$ :	-0.00384	0.00221	3.03	0.813	-0.50
	$X_7$ :	0.00521	0.00248	4.40	S .....	Price of peanuts..
	$X_9$ :	0.000572	0.00060	0.86	F .....	Income .....
	$X_{13}$ :	-0.00236	0.01463	0.03		2.70
38	$Y_2$ :	0.399	--	--	$R^2$ .....	Price of cashews..
	$X_2$ :	-0.00389	0.00254	2.35	0.812	-0.46
	$X_7$ :	0.00542	0.00285	3.88	S .....	Price of peanuts..
	$X_9$ :	0.000725	0.00069	0.99	F .....	Income .....
	$X_{13}$ :	0.0000653	0.01622	0.00		2.32

Table 4.-Consumption of Salted Cashews ( $Y_3$ ) and All Cashews ( $Y_4$ ) as a Function of Prices of Cashews ( $X_4$ ), ( $X_5$ ), and ( $X_6$ ); Price of Peanuts ( $X_8$ ); Income ( $X_{10}$ ); Price Index ( $X_{11}$ ); Population ( $X_{12}$ ); and Time ( $X_{13}$ ). 1952-1959.

Equation	Variables	Standard error	$t^2$	Other values	Demand elasticities with respect to:
	Dep. : Ind. : b-values				
4a	$Y_3$ :			$R^2$ .....	Price of cashews..
	$X_4$ :	1960.35	---	0.953	-0.51*
	$X_5$ :	-320.04	115.69	7.65*	
	$X_6$ :	314.89	316.39	0.99	Price of peanuts..
	$X_{10}$ :	9.24	252.07	0.00	0.16
	$X_{11}$ :	-86.43	144.95	0.36	Income .....
	$X_{12}$ :	119.25	1269.00	0.01	0.05
	$X_{13}$ :	1858.42	711.20		
4b	$Y_4$ :			$R^2$ .....	Price of cashews..
	$X_4$ :	-18563.26	---	0.950	-0.51*
	$X_5$ :	-360.76	132.13	7.46*	
	$X_6$ :	292.97	361.34	0.66	Price of peanuts..
	$X_{10}$ :	-30.48	287.88	0.01	0.15
	$X_{11}$ :	-102.47	165.54	0.38	Income .....
	$X_{12}$ :	324.49	1449.30	0.05	-0.14
	$X_{13}$ :	2178.41	812.25		
4c	$Y_3$ :			$R^2$ .....	Price of cashews..
	$X_4$ :	-465,453.43	---	0.938	0.11
	$X_5$ :	109.72	136.60	0.65	
	$X_6$ :	77.37	352.85	0.05	Price of peanuts..
	$X_{10}$ :	-735.14	186.30	15.57**	0.04
	$X_{11}$ :	275.26	116.48	4.80	Income .....
	$X_{12}$ :	3963.88	903.01	19.27**	-3.90**
	$X_{13}$ :	1224.04	802.13		

Table 4. Continued.

Equation	Variables : Dep. : Ind. :	b-values	Standard error	t <sup>2</sup>	Other values	Demand elasticities with respect to:
4d	Y <sub>4</sub> : X <sub>6</sub> X <sub>8</sub> X <sub>10</sub> X <sub>11</sub> X <sub>12</sub> X <sub>13</sub>	-538,536.57	---	---	R <sup>2</sup> .... 0.933	Price of cashews... 0.10
		112.08	155.91	0.52	S .. 5355.24	Price of peanuts... 0.01
		26.28	402.71	0.00	F .... 48.97**	Income..... -4.03**
		-852.48	212.62	16.30**		
		279.20	132.94	4.41*		
		4600.97	1030.63	19.93**		
		1474.62	915.49	2.59		
4e	Y <sub>3</sub> : X <sub>5</sub> X <sub>6</sub> X <sub>10</sub> X <sub>11</sub> X <sub>12</sub> X <sub>13</sub>	-116,032.10	---	---	R <sup>2</sup> .... 0.948	Price of cashews... -0.39*
		-357.56	162.78	4.83*	S .. 4295.57	Price of peanuts... 0.25
		491.51	369.75	1.77	F .... 63.51**	Income..... -0.90
		-169.97	234.69	0.52		
		-20.38	168.48	0.23		
		1102.48	1149.06	0.92		
		1706.50	741.63	5.29*		
4f	Y <sub>4</sub> : X <sub>5</sub> X <sub>6</sub> X <sub>10</sub> X <sub>11</sub> X <sub>12</sub> X <sub>13</sub>	-125,007.53	---	---	R <sup>2</sup> .... 0.942	Price of cashews... -0.36
		-360.24	129.81	3.60	S .. 5008.96	Price of peanuts... 0.22
		444.47	431.15	1.06	F .... 56.47**	Income..... -1.35
		-226.69	273.67	1.10		
		-79.72	196.46	0.09		
		1705.78	1339.89	1.62		
		1963.15	864.79	5.15*		



Table 5.-Consumption of Salted Cashews ( $Y_3$ ) and All Cashews ( $Y_4$ ) as a Function of Prices of Cashews ( $X_1$ ), ( $X_2$ ), ( $X_3$ ), and ( $X_6$ ); Prices of Peanuts ( $X_4$ ); Income ( $X_5$ ); Income ( $X_{10}$ ); Price Index ( $X_{11}$ ); Population ( $X_{12}$ ); and Time ( $X_{13}$ ). 1932-1941.

Equation	Variables	Standard error	$t^2$	Other values	Demand elasticities with respect to:
5a	$Y_3$			$R^2$ .....	Price of cashews..
	$X_1$	-596.825.71	---	0.975	-0.77
	$X_2$	-547.63	760.72		
	$X_3$	1093.35	1411.18	0.52	
	$X_4$	185.61	441.13	0.59	Price of peanuts..
	$X_5$	130.50	401.62	0.18	0.43
	$X_6$	1042.51	6147.51	0.07	Income .....
5b	$Y_4$			$R^2$ .....	Price of cashews..
	$X_1$	-702,103.42	---	0.975	-0.77
	$X_2$	-644.33	894.98	0.52	
	$X_3$	1274.84	1660.24	0.59	
	$X_4$	212.43	512.99	0.18	Price of peanuts..
	$X_5$	153.43	566.63	0.07	0.38
	$X_6$	5703.79	7232.49	0.62	Income .....
5c	$Y_3$			$R^2$ .....	Price of cashews..
	$X_1$	-407,702.04	---	0.973	-0.52
	$X_2$	-647.17	1260.68	0.26	
	$X_3$	1707.28	2009.42	0.72	
	$X_4$	139.85	478.03	0.09	Price of peanuts..
	$X_5$	-21.76	988.19	0.00	0.68
	$X_6$	3392.42	6657.80	0.25	Income .....
5d	$Y_3$			$R^2$ .....	Price of cashews..
	$X_1$	-2253.39	4771.13	0.22	-0.52
	$X_2$				
	$X_3$				
	$X_4$				
	$X_5$				
	$X_6$				

Table 5. Continued.

Equation	Variables	Dep. Var.	b-values	Standard error	r <sup>2</sup>	Other values	Demand elasticities with respect to:
54	Y <sub>4</sub>	X <sub>0</sub>	-479,635.03	---	---	R <sup>2</sup> .....	Price of cashews...
		X <sub>6</sub>	-761.74	1483.15	0.86		-0.53
		X <sub>8</sub>	2009.25	2364.81	0.72	S ..	Price of peanuts...
		X <sub>10</sub>	164.66	562.38	0.69	F ...	Income .....
		X <sub>11</sub>	-25.77	656.69	0.00		0.48
		X <sub>12</sub>	3907.88	7832.65	0.25		
		X <sub>13</sub>	-2650.98	5613.06	0.22		
56	Y <sub>3</sub>	X <sub>0</sub>	-535,337.87	---	---	R <sup>2</sup> .....	Price of cashews...
		X <sub>6</sub>	7.65	541.45	0.00		0.01
		X <sub>8</sub>	995.97	1534.94	0.42	S ..	Price of peanuts...
		X <sub>10</sub>	-46.33	362.41	0.02	F ...	Income .....
		X <sub>11</sub>	105.83	524.03	0.04		-0.16
		X <sub>12</sub>	4319.21	7177.00	0.36		
		X <sub>13</sub>	-2117.90	5815.38	0.13		
58	Y <sub>4</sub>	X <sub>0</sub>	-629,708.02	---	---	R <sup>2</sup> .....	Price of cashews...
		X <sub>6</sub>	9.12	637.02	0.00		0.01
		X <sub>8</sub>	1171.95	1805.87	0.42	S ..	Price of peanuts...
		X <sub>10</sub>	-54.51	476.22	0.02	F ...	Income .....
		X <sub>11</sub>	124.40	616.52	0.04		-0.16
		X <sub>12</sub>	5080.62	8443.81	0.36		
		X <sub>13</sub>	-2490.90	6841.85	0.13		

Table 6. Consumption of Salted Cashews ( $Y_3$ ) and All Cashews ( $Y_4$ ) as a Function of Prices of Cashews ( $X_4$ ), ( $X_5$ ), and ( $X_6$ ); Prices of Peanuts ( $X_6$ ); Income ( $X_{10}$ ); Price Index ( $X_{11}$ ); Population ( $X_{12}$ ); and Time ( $X_{13}$ ). 1947-1959.

Equation	Variables	Dep. Var.	b-values	Standard Error	$\chi^2$	Other values	Demand elasticities with respect to:
6a	$Y_3$	$X_4$	-146.468.43	---	---	$R^2$ .....	Price of cashews... -0.50
		$X_5$	-417.49	307.71	1.84	S ..	Price of peanuts... 0.29
		$X_6$	573.65	515.43	1.24	F ...	Income .....
		$X_{10}$	-262.24	463.11	0.32		
		$X_{11}$	459.17	439.69	1.09		
		$X_{12}$	943.58	5279.24	0.03		
		$X_{13}$	3024.30	12542.37	0.06		
6b	$Y_4$	$X_4$	-135,971.68	---	---	$R^2$ ....	Price of cashews... -0.49
		$X_5$	-442.11	340.81	1.65	S ..	Price of peanuts... 0.32
		$X_6$	630.39	570.87	1.22	F ...	Income .....
		$X_{10}$	-307.14	512.93	0.35		
		$X_{11}$	542.43	486.99	1.24		
		$X_{12}$	709.50	5,847.11	0.02		
		$X_{13}$	4,505.67	13,891.52	0.11		
6c	$Y_3$	$X_4$	139,852.39	---	---	$R^2$ .....	Price of cashews... -0.78
		$X_5$	-863.88	284.08	9.25*	S ..	Price of peanuts... 0.26
		$X_6$	523.04	369.85	2.00	F ...	Income .....
		$X_{10}$	45.53	354.13	0.02		
		$X_{11}$	312.69	321.10	0.95		
		$X_{12}$	-1,547.60	3,927.16	0.16		
		$X_{13}$	5,913.50	9,070.44	0.43		

Table 6. Continued.

Equation	Variables	Dep. Var.	Ind.	b-values	Standard error	t <sup>2</sup>	Other values	Demand elasticities with respect to:
64	I <sub>4</sub>	b <sub>0</sub>		172,536.53	--	--	R <sup>2</sup> ..... 0.999	Price of cashews... -0.74*
		X <sub>6</sub>		-902.93	322.95	8.17*		Price of peanuts... 0.29
		X <sub>8</sub>		575.49	420.45	1.87		Income..... 0.12
		X <sub>10</sub>		25.09	402.58	0.00		
		X <sub>11</sub>		304.59	365.03	1.11		
		X <sub>12</sub>		-1,972.36	4,464.42	0.80		
		X <sub>13</sub>		7,682.90	10,311.34	0.56		
65	I <sub>3</sub>	b <sub>0</sub>		143,194.90	--	--	R <sup>2</sup> ..... 0.919	Price of cashews... -0.44
		X <sub>5</sub>		-545.94	411.52	1.76		Price of peanuts... 0.63
		X <sub>8</sub>		1,265.88	695.29	3.31		Income ..... 0.89
		X <sub>10</sub>		161.62	678.60	0.06		
		X <sub>11</sub>		336.57	469.47	0.51		
		X <sub>12</sub>		-1,861.32	6,193.44	0.09		
		X <sub>13</sub>		5,202.07	12,812.29	0.16		
66	I <sub>4</sub>	b <sub>0</sub>		146,268.00	--	--	R <sup>2</sup> ..... 0.922	Price of cashews... -0.44
		X <sub>5</sub>		-551.67	460.74	1.43:		Price of peanuts... 0.67
		X <sub>8</sub>		1,333.27	778.45	2.93		Income ..... 0.53
		X <sub>10</sub>		107.77	779.76	0.02		
		X <sub>11</sub>		423.93	925.62	0.65		
		X <sub>12</sub>		-2,042.61	6,974.13	0.09		
		X <sub>13</sub>		6,739.16	14,344.54	0.22		

**SECTION 2 - PEANUTS EQUATIONS**

Table 7. Per Capita Consumption of Salted Peanuts ( $Y_5$ ) as a Function of Deflated Price of Peanuts ( $X_7$ ); Deflated Prices of Cashews ( $X_1$ ) and ( $X_2$ ); Per Capita Income ( $X_9$ ); and Time ( $X_{13}$ ). 1947-1959.

Equation	Variables	Standard			Other values	Demand elasticities
	Dep. : Ind. :	b-values	error	$t^2$		with respect to:
7a	$Y_5$ :	$b_0$ 0.487	--	--	$R^2$ ..... 0.893	Price of peanuts.. -0.27 <sup>1</sup>
		$X_7$ -0.0104	0.00273	14.46**		
		$X_1$ 0.000039	0.00207	0.00	S ..... 0.03150	Price of cashews.. 0.002
		$X_9$ 0.000327	0.00052	0.40		
		$X_{13}$ 0.00965	0.01334	0.52	F .....16.73**	Income..... 0.50
7b	$Y_5$ :	$b_0$ 1.093	--	--	$R^2$ ..... 0.938	Price of peanuts.. -0.32 <sup>1</sup>
		$X_7$ -0.0121	0.00221	30.27**		
		$X_2$ 0.00468	0.00196	5.68*	S ..... 0.02408	Price of cashews.. 0.19 <sup>1</sup>
		$X_9$ 0.000533	0.00053	1.01		
		$X_{13}$ 0.0299	0.01304	5.28	F .....29.31**	Income..... 0.81

Table 8. Consumption of Salted Peanuts ( $Y_6$ ) as a Function of Price of Peanuts ( $X_8$ ); Prices of Cashews ( $X_4$ ) ( $X_5$ ); Income ( $X_{10}$ ); Price Index ( $X_{11}$ ); Population ( $X_{12}$ ); and Time ( $X_{13}$ ). 1947-1959.

Equation	Variables	b-values	Standard error	t <sup>2</sup>	Other values	Demand elasticities with respect to:			
	Dep. : Ind. :								
8a	$Y_6$	$b_0$	-50,646.00	--	--	$R^2$ ..... 0.569	Price of peanuts... -0.27		
		$X_8$	-1,354.55	658.38	4.23				
		$X_4$	-143.63	393.05	0.13			$S$ .. 5,419.43	Price of cashews... -0.06
		$X_{10}$	537.82	591.55	0.83				
		$X_{11}$	97.98	561.64	0.03			$F$ ..... 30.83**	Income..... 0.91
		$X_{12}$	1,333.17	6,743.36	0.04				
		$X_{13}$	-5,481.79	16,020.81	0.12				
8b	$Y_6$	$b_0$	-793,308.31	--	--	$R^2$ ..... 0.977	Price of peanuts... -0.43		
		$X_8$	-2,127.16	750.14	8.04*				
		$X_5$	703.22	443.99	2.51			$S$ .. 4,601.27	Price of cashews... 0.21
		$X_{10}$	-482.80	732.14	0.43				
		$X_{11}$	446.36	506.51	0.78-			$F$ ..... 43.15**	Income..... -0.82
		$X_{12}$	7,848.18	6,682.01	1.38				
		$X_{13}$	-9,929.48	13,823.00	0.52				

## ABSTRACT

This study concerns the competitive position of peanuts and cashews in the salted nut trade of the United States. The effect of the price support and production control program for peanuts is evaluated in regard to the demand and price relationships between salted peanuts and cashews. This research analyzes demand and price relationships for salted peanuts and cashews, compiles the available information on the world cashew nut industry, which has not heretofore been readily available to the public, and summarizes relevant information about the United States nut trade in terms of supplies, consumption, and prices of peanuts and tree nuts with emphasis on the salted nut trade.

The results of this research, in its present stage, do not suggest conclusively that salted peanut consumption is likely to be affected in a manner detrimental to the peanut industry, in the foreseeable future, by moderate price increases, or by competition from cashew nuts, as a result of the peanut price support and production control program. However, a substantial expansion of world cashew production has occurred in the recent past. Prospects for further expansion appear bright in view of the encouragement currently provided by India's plans for total economic growth. African production has also demonstrated capability of substantial expansion. Accordingly, a further increase in cashew imports by the United States might reasonably be expected.