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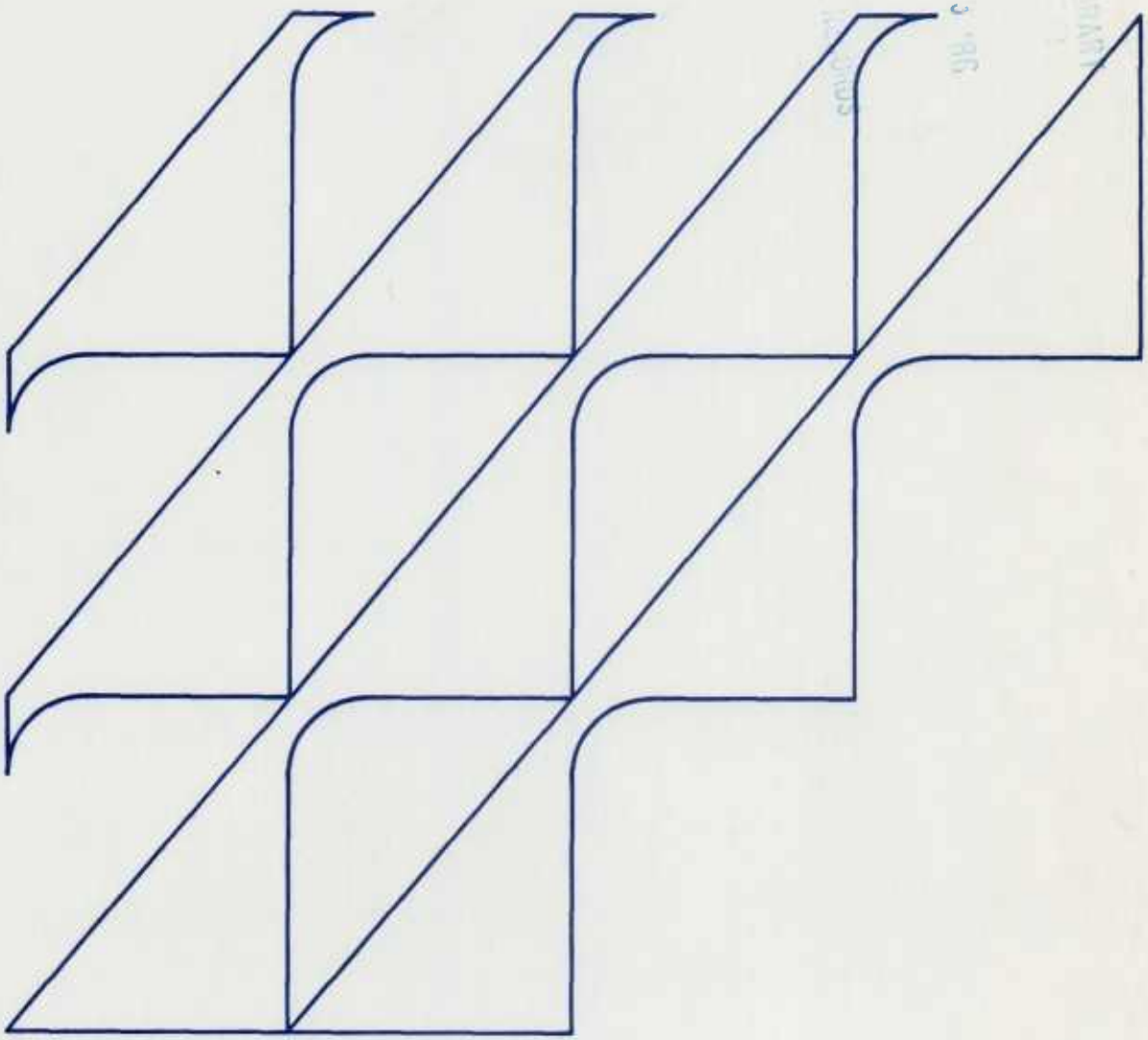
Assessment of a Marketing Order Prorate Suspension: A Study of California-Arizona Navel Oranges

Nicholas J. Powers
Glenn A. Zepp
Frederic L. Hoff



ASSESSMENT OF A MARKETING ORDER PRORATE SUSPENSION: A STUDY OF CALIFORNIA-ARIZONA NAVEL ORANGES, by Nicholas J. Powers, Glenn A. Zepp, and Frederic L. Hoff, National Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report Number 557.

ABSTRACT

The market for California-Arizona navel oranges performed in about the same way during the 1984/85 season after the handler prorate was suspended as during comparable prorated periods. The industry uses a handler prorate to regulate the weekly quantity of fresh navel oranges shipped to the domestic market by placing an upper limit on the quantity each handler can sell. The prorate was suspended when fresh navel orange prices exceeded parity level during the 1984/85 season. Only minor differences existed between the prorate suspension and prorated periods in the stability of shipments and prices. Higher prices in the 1984/85 season were due to relatively small U.S. fresh orange supplies during the winter. Handler marketing practices changed very little during the partial season with a prorate suspension. The shortrun effects of a full-season prorate suspension would be lower grower prices, greater fresh use, and less processing use of available supplies.

Keywords: Marketing orders, navel oranges, handler prorate, prorate suspension, economic effects.

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SUMMARY

The Federal marketing order for California-Arizona (C-A) navel oranges provides for coordinated marketing through use of handler prorates. The handler prorate, placing an upper limit on the quantity each handler can sell, enables the C-A industry to regulate the weekly shipments of navels supplied to the fresh domestic market. The C-A navel orange crop was relatively small during the 1984/85 season; prices for fresh navels exceeded the parity level. A freeze during late January in Florida and Texas further reduced supplies of fresh oranges. Consequently, the handler prorate provision of the Federal marketing order for California-Arizona navel oranges was suspended in the midst of the 1984/85 season after 52 percent of the crop had been marketed. During the 1982/83 and 1983/84 seasons, the prorate was terminated after 85 percent of the crop was marketed. Prior to the 1982/83 season, navel shipments had been prorated through nearly the entire season since the order's inception in 1953.

This report presents findings on two aspects of a handler prorate suspension. The first is a comparison of handler marketing practices and of the level and stability of prices and shipments during the prorate suspension of the 1984/85 season with those for two prorated periods. The second is an assessment of the potential effects of a season-long prorate suspension on grower prices, revenue, and product uses.

Average weekly shipments of fresh navel oranges to the domestic and export markets during the 1984/85 suspension were slightly greater than for comparable prorated periods (defined as February 7 to the end of the season) during other recent seasons. Fewer navels were used for processing during the suspension. Stability of weekly shipments to the fresh domestic, fresh export, and processing markets during the suspension did not differ from prorated periods.

Navel orange prices for both fresh and processed uses were higher during the suspension than during prorated periods. The higher prices were mostly attributable to relatively small U.S. fresh orange supplies during the 1984/85 winter. There was no consistent pattern of more or less stability in navel orange prices between the suspension and the prorate periods.

Cooperative-affiliated handlers may have been more price competitive relative to independent handlers during the suspension. The weighted average weekly f.o.b. shipper price received by cooperative-affiliated handlers was less than that for independent handlers during the 1984/85 suspension. During the prorated portion of the 1984/85 season, cooperative-affiliated handlers received a slightly higher price.

Independent handlers increased their share of the navel orange crop during the 1984/85 season. In the central California district, where most of the navel orange crop is produced, independent handlers accounted for 48 percent of the navel orange volume during the 1984/85 season, compared with 36 percent during the 1979/80-1983/84 seasons. The increase in market shares for independent handlers is probably due to an increase in the number of unaffiliated handlers.

No category of handlers seemed to benefit more than another from the suspension by shipping a larger share of their navels into the fresh market. There were no pronounced changes among the various handler categories in the share of their total volume processed during the 1984/85 season.

In the short run, a season-long suspension of the California-Arizona prorate would lead to lower grower prices for fresh navels, increased fresh navel orange use, little or no change in prices for processing navels, decreased processing navel use, and lower grower returns. The within-season effects of a suspension would be greater during large-supply seasons than during small-supply seasons. A suspension during 1982/83 (a record crop) would have generated an estimated $0.49 per box decline in grower-weighted average prices from the $2.97 actually received that season. Gross receipts would have fallen an estimated $20.2 million from the $122 million actual. During the normal-supply season (average of 1979/80-1983/84), a suspension would have caused an estimated $0.36 per box decline in grower-weighted average price and about a $16 million decline in grower revenue from the $119 million actual. During the small-supply season of 1981/82, a suspension would have resulted in an estimated $0.07 per box decline in grower-weighted average prices and a $1.9 million decline in grower revenue from the $151.5 million actual.

If changes in grower prices are transmitted through the marketing channel to the retail level, both consumer prices and total expenditures for navels would decrease with a suspension in the short term. Reductions in consumer expenditures from a suspension are greater during a large-supply season and less during a small-supply season. Per capita expenditures on navels would have declined by about 7 cents in the first year of a suspension in the large-supply season, 5 cents in the normal-supply season, and 1 cent in the small-supply season. Net economic social welfare (a summation of consumer economic gains and grower economic losses) would have been greater by 6 cents per capita in the large-supply season, 7 cents per capita in the normal-supply season, and 3 cents per capita in the small-supply season.

In the long run, a continuing suspension would lead to lower navel production than with a prorate. Fresh navel orange use would probably be no less with a continuing suspension than with a prorate and prices for fresh navels would probably be no greater. A continuing suspension would result in less processing use, but probably no change in the processing navel price.

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INTRODUCTION

Federal marketing orders for fruits, vegetables, and specialty crops allow growers to collectively market their products in interstate commerce. The Agricultural Marketing Agreement Act of 1937, the enabling legislation for Federal marketing orders, provides that provisions of the order may be used to improve the coordination of supply and demand, thus promoting stability and enhancing grower returns toward parity, but that provisions cannot be used to maintain prices above parity.1/

The Federal marketing order for California-Arizona (C-A) navel oranges provides for coordinated marketing through use of handler prorates. The handler prorate, placing an upper limit on the quantity each handler can sell, enables the C-A industry to regulate the weekly shipments of navels supplied to the fresh domestic market (the continental United States and Canada). Management of weekly shipment flows is intended to provide continuity and stability of intraseasonal shipments and prices. Each handler (shipper) is assigned a prorate each week (a fixed share of that handler's total volume of navel oranges), limiting the quantity of navels each handler can ship into the fresh domestic market.

The C-A navel orange crop was relatively small during the 1984/85 season; prices for fresh navels exceeded parity level. A freeze during late January in Florida and Texas further reduced supplies of fresh oranges. The Secretary of Agriculture suspended the handler prorate effective February 7 after the price of fresh navels continued to exceed parity level. Only 52 percent of the 1984/85 navel orange crop had been marketed when the prorate was suspended. During the 1982/83 and 1983/84 seasons, the prorate was terminated after 85 percent of the crop was marketed. Prior to the 1982/83 season, navel shipments had been prorated through nearly the entire season since the order's inception in 1953.

The suspension was controversial. Some industry members argued that weekly shipments and prices would become less stable without a prorate. Several consumer groups argued that a season-long prorate would effectively restrict the quantity of fresh navels entering the domestic market. Thus, more navels

1/ The parity price for navels is the base price (the average price in the last 10 years divided by the index of prices received by farmers for all commodities during the last 10 years, 1910-14 = 100) times the current index of prices paid by farmers, 1910-14 = 100.

would be shipped to the fresh market with a suspension, and the increased supplies would clear the fresh market at a lower price. Grower revenue would consequently decline. Handlers were not regulated during the suspension and, thus, handlers may have changed their marketing practices in an attempt to increase their market shares and increase their share of shipments to the higher priced fresh market.

The Secretary's action raised the following questions about the potential effects of suspension. Does a suspension affect: (1) The week-to-week stability of navel orange shipments and prices? (2) The levels of fresh domestic shipments and prices? (3) The level of grower revenue? (4) The market structure and marketing practices of handlers?

This report analyzes these four issues. Navel orange price and shipment data for the prorate suspension portion of the 1984/85 season are compared with data for comparable weeks of several prorated periods to determine differences in the level and stability of prices and shipments, and changes in handler marketing practices. Because of the unusually strong demand for fresh C-A navels and relatively small fresh orange supplies during the winter of 1984/85, it was not possible to estimate grower price and income effects caused by the suspension of 1984/85. The magnitude of within-season effects of a hypothetical suspension on grower prices and revenue and on product uses are estimated for several more typical historical seasons with small, normal, and large orange supplies. The longrun effects of a continuing suspension are described without estimates of their magnitudes.

BACKGROUND

C-A navels represented only about 14 percent of total U.S. orange production, but comprised nearly 70 percent all U.S. fresh oranges marketed during the 1979/80-1983/84 winter seasons. Annual value of the navel crop averaged $118.6 million for that period.

The C-A Navel Orange Industry

The marketing season for C-A navels extends from about early November to mid-June and coincides principally with the Florida early, mid-season, and navel orange season and with the Texas orange season. Fresh C-A navels are easy to peel, have a low sugar-acid ratio, low juice content, and no seeds. They are a preferred fresh eating orange, thus selling for a price premium over fresh Florida and Texas oranges. However, C-A navels are poor processing oranges; prices for navels entering processing are lower than prices for Florida and Texas processing oranges.

Harvested area of C-A navels increased from about 62,000 acres in 1957/58 to about 115,000 in 1971/72 and stabilized thereafter. Most of this expansion occurred in central California where harvested area increased steadily from about 28,500 acres in 1953/54 to 92,000 in 1971/72, then stabilized. The expansion in central California was partially encouraged and fostered by a tax investment policy (since discontinued) which provided financial incentives for planting certain tree crops including orange groves and by ample supplies of subsidized irrigation water.

Because of stiff urban competition for land and increased irrigation water rates, harvested navel area in southern California dwindled from about 42,000

acres in 1953/54 to 15,500 in 1979/80. Arizona harvests about 4,000 acres, while northern California harvests about 1,050 acres.

Navel production in California and Arizona fluctuated around 27,000 carloads (1 carload = 1,000 cartons containing 37 1/2 pounds per carton) from the 1950's through the mid-1960's. Then, production increased steadily to a record 84,000 carloads in 1982/83 (table 1). Navel production is concentrated in central California where acreage and yields are highest. During 1983/84, central California produced about 87 percent of the industry total and southern California about 12 percent.

There are three major uses for navel oranges: fresh domestic, fresh export, and processing. Since 1979/80, about 63 percent of the crop has entered fresh domestic use and 8 percent has been exported. An average of 29 percent of the crop has been processed (products and other uses). Exports, primarily from southern California, are shipped mainly to Japan, Hong Kong, and Singapore.

Navel oranges, typically ripening during November, can be stored under refrigeration for about 10 to 14 days, but they can be satisfactorily stored on the tree for about 5 to 6 months. The internal quality of "tree-stored" navel oranges can be partially controlled by applying giberic acid to the fruit, retarding ripening. The external as well as the internal quality is vulnerable to degradation and discoloration caused by weather. Tree-stored navels can grow up to one size larger during the season. Larger fruit generally sells at a premium price which may compensate for external damage discounts.

Navels entering the fresh market are graded, packed, and sold by size. The three commonly used grades are first, choice, and standard. First grade navels are of high internal (meets certain standards of sugar-acid ratio) and external (free of scars and blemishes) quality. Choice grade navels have high internal quality, but slightly lower external quality than first grade. Standard grade navels generally exceed the minimum quality mandated by California and Arizona standards. A State maturity requirement prohibits sales of navels not meeting minimum sugar-acid ratio levels.

Fresh domestic shipments of navels are typically light in early November, reach a seasonal peak prior to Christmas week, and remain heavy from January to April when the marketing season is nearly completed. Export shipments are light and erratic before December and after April, but heavy and uniform from December through April. Processing shipments follow a seasonal upward trend and peak near the end of the marketing season because a larger share of the shipments consist of smaller, lower quality fruit.

At the beginning of each season, growers contract with handlers to pick, transport, sort, grade, pack, and ship their navel oranges. Handlers usually schedule crews to pick three times during a season because of slight variations in fruit maturity and fruit size enlargement, and to spread out grower price risk. Growers receive an average return from the fresh market weighted by the quality and quantity of their navels marketed fresh. Industry personnel knowledgeable about pricing indicate that prices for comparable quality of fresh navels in domestic and export markets are about equal. Grower returns for processing navels are computed at season's end. Grower on-tree returns for processing oranges are less than for fresh and have been negative during most seasons since 1966/67 (table 2). Negative on-tree returns

Table 1--Use and production of C-A navel oranges, 1953/54-1984/85 seasons 1/

Season	Domestic		Export		Products		Other		Total
	Cars	Percent	Cars	Percent	Cars	Percent	Cars	Percent	Cars
1953/54	22,101	77	1,877	6	4,245	14	725	3	28,948
1954/55	23,861	78	1,981	6	4,245	14	721	2	30,808
1955/56	24,801	82	1,238	4	3,328	11	782	3	30,149
1956/57	24,737	81	1,817	6	3,519	11	641	2	30,714
1957/58	16,359	91	569	3	768	4	304	2	18,000
1958/59	27,033	82	1,419	4	4,270	13	276	1	32,998
1959/60	21,641	82	1,168	4	3,301	12	409	2	26,519
1960/61	15,890	89	677	4	1,035	6	313	1	17,915
1961/62	13,158	86	448	3	1,401	9	289	2	15,296
1962/63	17,330	69	606	3	6,615	26	484	2	25,035
1963/64	24,476	79	1,101	4	4,651	15	533	2	30,761
1964/65	26,486	87	785	2	2,623	9	635	2	30,529
1965/66	27,541	71	1,579	4	8,350	23	913	2	38,383
1966/67	28,476	81	1,115	3	4,818	14	847	2	35,256
1967/68	11,132	58	647	3	7,142	37	316	2	19,237
1968/69	28,107	70	1,461	4	8,846	22	1,437	4	39,851
1969/70	31,113	69	1,826	4	10,638	24	1,474	3	45,051
1970/71	27,945	76	1,353	4	6,458	18	917	2	36,673
1971/72	31,970	68	2,056	5	11,491	24	1,259	3	46,776
1972/73	24,507	61	1,340	3	12,792	32	1,606	4	40,245
1973/74	33,246	74	1,869	4	8,899	20	1,051	2	45,065
1974/75	37,797	65	3,739	6	15,508	26	1,478	3	58,522
1975/76	37,335	64	4,431	8	15,478	26	1,219	2	58,463
1976/77	35,562	66	3,942	8	12,899	24	1,222	2	53,625
1977/78	27,421	65	3,816	9	9,634	23	1,254	3	42,125
1978/79	26,121	60	3,267	8	13,138	30	970	2	43,496
1979/80	40,101	59	4,207	6	21,942	32	2,351	3	68,601
1980/81	43,610	56	6,201	8	26,993	34	1,649	2	78,453
1981/82	38,274	69	5,115	9	10,794	20	1,295	2	55,478
1982/83	49,018	58	6,851	8	26,155	31	2,151	3	84,175
1983/84	45,917	66	5,309	8	16,732	24	1,692	2	69,650
1984/85	41,316	76	5,337	10	6,210	12	1,316	2	54,179

1/ Domestic--Volume marketed in fresh form within the continental United States and Canada subject to volume and size regulation.
Export--Volume marketed in fresh form outside the continental United States and Canada exempt from volume and size regulation.
Products--Volume processed into products, including juice, exempt from volume and size regulation.
Other—Includes oranges donated for charitable purposes, shipped via railway express or parcel post, sold directly to consumers by producers, and disposed of otherwise as unfit for human consumption, exempt from volume and size regulation.

Source: Navel Orange Administrative Committee (NOAC).

Table 2--Grower prices for C-A navels

Season	Fresh	Products	Weighted average
	Dollars per box, on-tree equivalent		
1954/55	2.46	0.15	2.14
1955/56	2.96	.06	2.64
1956/57	2.88	.44	2.60
1957/58	4.53	.54	4.36
1958/59	3.06	1.10	2.81
1959/60	3.67	.42	3.26
1960/61	5.24	.48	4.96
1961/62	5.92	.74	5.43
1962/63	5.20	.88	4.05
1963/64	3.56	1.21	3.20
1964/65	3.44	.54	3.19
1965/66	2.80	.06	2.18
1966/67	2.90	-.38	2.44
1967/68	5.84	.10	3.60
1968/69	2.94	-.26	2.19
1969/70	2.84	-.24	2.09
1970/71	3.50	-.36	2.80
1971/72	2.92	-.34	2.09
1972/73	4.31	-.60	2.68
1973/74	3.85	-.87	2.88
1974/75	3.67	-1.06	2.37
1975/76	3.02	-.88	1.96
1976/77	3.54	-.98	2.42
1977/78	6.50	-.80	4.75
1978/79	8.02	-.29	5.42
1979/80	4.00	-.39	2.73
1980/81	4.90	-1.30	2.61
1981/82	7.24	-1.04	5.58
1982/83	4.58	-.46	2.95
1983/84	5.66	-1.24	3.95
1984/85	10.94	.96	9.77

Source: National Agricultural Statistics Service, U.S. Dept. of Agr.

mean that the processing plant price did not cover average picking, hauling, and handling costs.2/

The number of navel growers declined from about 7,500 in 1954/55 to 3,962 in 1983/84. Average operation size was 28 acres in 1983/84. Central California operations averaged 37 acres, while southern California operations averaged 12 acres.

Handlers market navels either independently or through a marketing cooperative. Handlers operating independently provide all necessary marketing services from the shipper to the wholesaler or retailer. Such a handler is called an independent or unaffiliated handler. A handler marketing through a cooperative is called a cooperative-affiliated handler. The cooperative provides various marketing services from the shipper to retailer. Marketing services include identifying prospective buyers for the handler, handling transportation arrangements, settling any buyer grievances, and promotional activities. Sunkist is the largest federated marketing cooperative for handlers of citrus fruits, followed by Pure Gold. Most handlers are members of marketing cooperatives. In 1984/85, cooperative-affiliated handlers marketed nearly 80 percent of southern California's production and slightly less than 50 percent of central California's production. There were 125 handlers in the industry in 1983/84.

Federal Marketing Order No. 907

A Federal marketing order for C-A navels has been in effect almost continuously since 1933. Federal Marketing Order No. 907, the present order for C-A navel oranges approved in 1953, authorizes a handler prorate, size standard, and marketing research. A size standard may place a minimum or maximum restriction, or both, on the sizes of the navel oranges that can be marketed. Size standards have been used infrequently. The handler prorate establishes a maximum quantity of navels that each handler can ship into the fresh domestic market (the continental United States and Canada) each week.3/ As a share of total production, the fresh export market for navels is relatively minor, less than 10 percent, and is not prorated. Navels not sold in the fresh market during a given week must be left on the tree for shipment in subsequent weeks or diverted to processing.

Administration of Handler Prorate

The industy established four geographic districts to administer the market order. District 1, or central California, is basically the San Joaquin Valley. District 2, or southern California, includes the region west of Palm Springs and south of Bakersfield. District 3, or Arizona-Desert Valley, includes Arizona and the eastern desert of southern California. District 4, or northern California, includes the Sacramento area and extends slightly north of Sacramento.

2/ Picking and shipping navels which enter processing is profitable for growers even though on-tree grower returns cover only part of the picking and hauling costs. Navels used in processing represent a part of the production base from which the prorate for the fresh domestic market is calculated. For a grower, a larger production base means a larger prorate.

3/ While the marketing order was approved by growers, the provisions of the order are administered through handlers.

At the onset of each marketing season, the Navel Orange Adminstrative Committee (NOAC) develops a marketing policy and submits it to the U.S. Department of Agriculture for review.4/ The policy contains information on early season crop estimates, fruit size and quality, a discussion of the intended use of the size restriction provisions, and a breakdown of the percentage and absolute levels of the crop to be marketed into the fresh domestic, export, and processing markets. The breakdown of the crop use is developed from the notion of best "economic utilization of the crop," say industry officials. In practice, this has meant that a larger share of the crop enters processing during seasons when there are relatively large supplies, while a smaller share of the crop enters processing during small-supply seasons.

As a first step toward providing equitable marketing opportunity among districts, the NOAC establishes an identical fresh domestic use percentage (called the equity factor) in each of the districts. A preliminary handler utilization schedule contains weekly prorate quantities developed from the equity factor. This schedule is revised periodically through the season by the NOAC in response to new information on size distribution and quality of the crop, supplies, availability of substitutes, and demand conditions.5/

NOAC usually begins to prorate in mid-November when fresh domestic shipments begin to increase. At a public meeting each Tuesday morning, it discusses and votes on whether to have or not have a prorate in each of the districts, the industry prorate quantity for the subsequent 2 weeks, early maturity or freeze allotment, and size regulations.6/ The following Tuesday morning, NOAC reviews the implications of any new market information and then votes to either maintain or increase the prorate established at the preceding Tuesday meeting. NOAC cannot decrease the prorate quantity established the previous Tuesday. The weekly prorate level voted on by NOAC is subject to review and approval by the Secretary of Agriculture.

Prorates are administered by the NOAC through handlers. The prorate legally binds each handler to an upper limit on weekly shipments to the fresh domestic market. The prorate for each handler equals the share of the district production contracted by the handler multiplied by the district's prorate quantity with an adjustment for any handler loan repayments and overshipments from preceding weeks. Several procedures--intra- and interdistrict prorate loans (through other handlers), early maturity and freeze allotments, up to 10-percent overshipments three times per season, and up to 20-percent overshipment one time per season--permit the level of navel orange shipments into the fresh domestic market to slightly exceed the prorated quantity during a given week.

PRICES, SHIPMENTS, AND MARKETING PRACTICES

Weekly shipments of fresh navel oranges to the domestic and export markets during the 1984/85 suspension were slightly greater than during comparable

4/ NOAC is composed of 11 voting members (5 growers, 5 handlers, and a nonindustry member).

5/ Individual handler prorates are not affected by the quality of the handler's contracted navel oranges nor the quantity of export shipments.

6/ Handlers with matured or freeze damaged navels can request NOAC for early maturity or freeze allotments allowing them to ship in excess of their weekly prorate.

weeks of the prorated periods. Fewer navel oranges were used for processing. Prices for both fresh and processed navels were higher during the suspension. Higher prices during the 1984/85 season were mostly attributable to a relatively small supply of fresh oranges during the winter. Navel prices were not consistently more, nor less, stable during the suspension than during the prorated periods. Independent handlers marketed a larger share of the total navel crop during the 1984/85 season than during the 1979/80-1983/84 seasons.

This section examines differences in prices and shipments between the weeks of the 1984/85 suspension and those for comparable weeks of earlier prorated periods. The 1984/85 suspension began on February 7, 1985, and extended through the remainder of the season. To better understand how the market performed from approximately the middle of the season to the end, we made price and shipment comparisons among seasons only for those weeks following February 7.7/

The two prorated periods used for comparison were the five seasons 1979/80 through 1983/84 and the 1981/82 season. Average U.S. winter season fresh orange supply during the 1979/80-1983/84 seasons was about 40 percent greater than during 1984/85 and the average navel supply was 35 percent greater (table 3).

The 1981/82 season was chosen as a second comparison prorated period because supplies were more similar to those for the 1984/85 season. While U.S. winter season fresh orange supplies in 1981/82 were 15 percent greater than in 1984/85, the navel supply was only 2 percent greater.

Since fresh orange supplies during the two prorated periods are different from the 1984/85 season, differences in level and stability of prices and shipments among prorated and the suspension periods cannot be attributed solely to the suspension. Differences in supply and demand conditions between the seasons contribute to the price and shipment outcomes, disguising the true effects of the suspension.

Reported prices were collected at five levels in the navel marketing channel. At the grower level, prices before and after picking were measured with the monthly California fresh and processing estimated-on-tree (e.o.t.) and packing-house-door (p.h.d.) navel prices. At the handler level, shipper f.o.b. prices from the major navel producing regions--southern and central California--were assembled. Midweek f.o.b. prices were further disaggregated into first and choice grades, the two major grades of fresh navels, and by the major fruit sizes 56 (large), 72, 88, and 113 (small). Midweek prices for first grade fresh navels of sizes 48 through 113 were from three major regional wholesale markets: New York City, Chicago, and Los Angeles. Monthly retail prices were for fresh navels sold in U.S. urban areas.

7/ The number of weeks from February 7 to the end of the 1984/85 season differed from the number for earlier prorated seasons. This is partially due to different crop sizes and to the prorate. Larger supplies of navels and the prorate each contribute to a longer season. Season length directly affects the average weekly shipment level. For a given supply, the longer the season, the smaller the average weekly shipment level. Thus, the level and stability of weekly shipments can be sensitive to the weeks selected for comparison.

Table 3--Average U.S. fresh orange supplies during the winter seasons of the 1979/80-1983/84 and 1981/82 prorated periods and the 1984/85 suspension

Period	Crop	Quantity
		100,000 lbs.
Prorated:		
1979/80 to 1983/84	C-A navels	26,726
	Florida early, navels, and midseason	5,075
	Texas	2,207
	Total, United States	34,008
1981/82	C-A navels	20,804
	Florida early, navels, and midseason	4,436
	Texas	2,822
	Total, United States	28,062
Prorate suspension:		
1984/85	C-A navels	20,317
	Florida early, navels, and midseason	3,976
	Texas	0
	Total, United States	24,293

Source: National Agricultural Statistics Service, U.S. Dept. of Agr.

Each price series was deflated to remove general price trends and price trends due to changes in the amount of marketing services embodied in fruit prices. Retail prices were deflated by the urban consumer price index for food. Wholesale prices were deflated by the wholesale price index for fresh fruits. Prices at the f.o.b., p.h.d., and e.o.t. levels were deflated by the index of prices received by farmers for all commodities.

Findings for prices and shipments are presented as differences in outcomes between the suspension portion of the 1984/85 season and the comparable weeks of the 1981/82 and the 1979/80-1983/84 prorated periods. Findings for handler marketing practices are presented as differences in outcomes between the 1984/85 season and the 1979/80-1983/84 seasons.

Shipment Stability

Stability of intraseasonal shipments and prices was measured with the coefficient of variation (c.v.).8/ A larger c.v. value indicates greater

8/ The c.v. is a measure of the relative dispersion of observations about their mean. The c.v. is the standard deviation (s.d.) of a variable such as shipments or prices divided by the absolute value of the mean of the variable.

relative variability about the mean and, thus, less stability than a smaller value. Stability of weekly shipments was essentially the same during the 1984/85 suspension as during the two prorated periods (table 4). Although the c.v. for fresh domestic shipments was slightly smaller during the 1984/85 period, magnitude of the difference was inconsequential.

Price Stability 9/

Prices were not consistently more, nor less, stable during the suspension than during the prorate periods. At some levels of the marketing channel, prices were more stable during the suspension. At other levels, prices were less stable during the suspension. The c.v.'s for grower e.o.t. returns for both fresh and processing navels during the suspension fell between those of the two prorated periods (table 5). Prices for both fresh and processing navels at the p.h.d. level were more stable during the suspension.

Table 4--Mean, s.d., and c.v. of weekly industry shipments of C-A navel oranges during the 1979/80-1983/84 and 1981/82 prorated periods, and the 1984/85 suspension 1/

Use and period	Observations	Mean	Standard deviation	Coefficient of variation
	Number	1,000 cartons		c.v.
Fresh domestic:				
1979/80-1983/84	102	1,230	730	0.59
1981/82	16	1,268	818	.65
1984/85	15	1,332	696	.52
Fresh export:				
1979/80-1983/84	83	156	121	.78
1981/82	13	144	110	.76
1984/85	14	126	98	.78
Processing:				
1979/80-1983/84	110	758	485	.64
1981/82	16	438	287	.66
1984/85	14	280	175	.63

1/ Weekly shipments for the weeks after February 7 (effective start of prorate suspension) to the end of the season.

Source: Weekly shipment data are from the NOAC.

9/ F-tests were calculated to examine whether variances of various prices during the suspension were significantly different from those during prorated periods. Results are shown in appendix tables 1 and 2.

Table 5--Mean, s.d., and c.v. of deflated estimated-on-tree and packing-house-door prices for C-A navels during the 1979/80-1983/84 and 1981/82 prorated periods, and the 1984/85 suspension

Deflated price series, use, and period 1/	Observations	Mean	Standard deviation	Coefficient of variation
	Number	Dollars per carton		c.v.
Estimated-on-tree:				
Fresh--				
1979/80-1983/84	27	3.26	1.37	0.42
1981/82	5	5.68	.33	.06
1984/85	4	8.48	2.32	.27
Processing--				
1979/80-1983/84	29	-.62	.27	.43
1981/82	5	-.77	.01	.02
1984/85	4	1.01	.32	.32
Packing-house-door:				
Fresh--				
1979/80-1983/84	27	4.39	1.41	.32
1984/85	4	9.64	2.38	.25
Processing--				
1979/80-1983/84	29	.51	.32	.63
1984/85	4	2.21	.28	.13

1/ Monthly prices from February 7 (effective start of prorate suspension) to the end of the season. Prices deflated by the index of prices received by farmers for all farm commodities, 1977 = 100.

Source: National Agricultural Statistics Service, U.S. Dept. of Agr.

Fresh navel prices at f.o.b. showed no consistent pattern of change in stability (table 6). F.o.b. prices were more stable during the prorated periods for some grades and sizes in some districts. In other cases, f.o.b. prices were less stable during the prorated periods. F.o.b. prices of all sizes of first grade fresh navels from central California were more stable during the suspension. However, f.o.b. prices for all sizes of choice grade fresh navels (except the smallest size) from central California were less stable during the suspension. The f.o.b. prices for all sizes of first and choice grade navels from southern California were more stable during the suspension than during the prorated period.

Wholesale prices were more stable for first grade navel oranges sold in New York City, Chicago, and Los Angeles during the suspension than during the prorated periods (table 7). Retail prices for fresh navels sold in urban areas were slightly less stable during the suspension (table 8).

Table 6--Mean, s.d., and c.v. of deflated f.o.b. prices for C-A navels during the 1979/80-1983/84 and 1981/82 prorated periods, and the 1984/85 suspension

Deflated price series, use, grade, and fruit size	Period 1/	Observations	Mean	Standard deviation	Coefficient of variation
		Number	Dollars per carton		c.v.
California, f.o.b., fresh	1979/80-1983/84	27	7.74	1.40	0.18
	1984/85	4	13.70	2.43	.18
Central California f.o.b., fresh, first:					
56	1979/80-1983/84	75	4.97	1.21	.24
	1981/82	12	5.26	.12	.02
	1984/85	12	7.16	1.00	.14
72	1979/80-1983/84	75	4.72	.70	.15
	1981/82	12	5.46	.15	.03
	1984/85	12	7.15	1.11	.16
88	1979/80-1983/84	75	4.44	.87	.20
	1981/82	12	5.68	.29	.05
	1984/85	12	7.05	1.40	.20
113	1979/80-1983/84	75	4.21	1.07	.25
	1981/82	12	5.60	.04	.01
	1984/85	12	6.91	1.48	.21
138	1979/80-1983/84	75	3.94	1.23	.31
	1981/82	12	5.60	.04	.01
	1984/85	12	6.38	1.00	.16
Southern California, f.o.b., fresh, first:					
56	1979/80-1983/84	38	5.56	1.40	.25
	1984/85	8	7.64	.64	.08
72	1979/80-1983/84	38	5.26	.77	.15
	1984/85	8	7.51	.35	.05
88	1979/80-1983/84	38	5.28	1.00	.19
	1984/85	8	6.95	.13	.02
113	1979/80-1983/84	38	4.84	1.04	.22
	1984/85	8	6.30	.38	.06
138	1979/80-1983/84	38	6.48	.49	.08
	1984/85				
Central California, f.o.b., fresh, choice:					
56	1979/80-1983/84	83	4.38	.89	.20
	1984/85	13	5.78	1.20	.21
72	1979/80-1983/84	83	4.33	.68	.16
	1984/85	12	5.64	1.18	.21
88	1979/80-1983/84	83	4.26	.77	.18
	1984/85	13	5.91	1.44	.24
113	1979/80-1983/84	81	4.18	.85	.20
	1984/85	13	5.86	1.47	.25
138	1979/80-1983/84	75	4.05	.82	.20
	1984/85	13	5.36	.91	.17
Southern California, f.o.b., fresh, choice:					
56	1979/80-1983/84	26	4.76	1.39	.29
	1984/85	8	5.14	.18	.04
72	1979/80-1983/84	26	4.67	0.56	.12
	1984/85	8	5.16	0.36	.07
88	1979/80-1983/84	26	5.00	.78	.16
	1984/85	8	5.07	.42	.08
113	1979/80-1983/84	26	4.79	.73	.15
	1984/85	8	4.98	.39	.08
138	1979/80-1983/84	26	4.60	.99	.22
	1984/85	8	4.78	.38	.08

1/ Midweek and monthly prices from February 7 (effective start of prorate suspension) to the end of the season. Prices are deflated by the index of prices received by farmers for all farm commodities, 1977 = 100.

Source: California f.o.b., National Agricultural Statistics Service, U.S. Dept. of Agr.; central California and southern California first and choice f.o.b., Federal-State Market News Service, U.S. Dept. of Agr.

Table 7--Mean, s.d., and c.v. of deflated wholesale prices in selected cities for C-A navels during the 1979/80-1983/84 prorated period and the 1984/85 suspension

Deflated price series, use, grade, and fruit size	Period 1/	Observations	Mean	Standard deviation	Coefficient of variation
		Number	Dollars per carton		c.v.
New York City, wholesale, fresh, first:					
48-113	1979/80-1983/84 2/	51	8.04	1.22	0.15
	1984/85	12	8.85	.71	.08
Chicago, wholesale, fresh, first:					
56	1979/80-1983/84	83	8.54	1.94	.23
	1984/85	12	8.93	.79	.09
72	1979/80-1983/84	86	8.06	1.15	.14
	1984/85	12	8.91	.77	.09
88	1979/80-1983/84	88	7.63	1.15	.15
	1984/85	12	8.77	.74	.08
113	1979/80-1983/84 3/	69	7.29	1.13	.16
	1984/85	12	8.67	.78	.09
Los Angeles, wholesale, fresh, first:					
56-113	1979/80-1983/84 2/	47	5.95	.83	.14
	1984/85	11	7.10	.41	.06

1/ Midweek prices from February 7 (effective start of prorate suspension) to the end of the season. Prices are deflated by the wholesale price index for fresh fruits, 1977 = 100.

2/ Data were available for only 1981/82-1984/85.

3/ Data were available for only 1979/80 and 1981/82-1984/85.

Source: Federal-State Market News Service, U.S. Dept. of Agr.

Table 8--Mean, s.d., and c.v. of the deflated retail price for C-A navels in urban areas during the 1979/80-1983/84 prorated period and the 1984/85 suspension

Period 1/	Observations	Mean	Standard deviation	Coefficient of variation
	Number	Cents per pound		c.v.
1979/80-1983/84	20	13.9	1.0	0.07
1984/85	4	17.6	2.0	.11

1/ Monthly prices from February 7 (effective start of prorate suspension) to the end of the season. Prices are deflated by the consumer price index (urban) for food, 1967 = 100.

Source: Bureau of Labor Statistics, U.S. Dept. of Labor.

Shipment Levels

Average weekly fresh domestic navel shipments were greater during the suspension than during the prorated periods. But average weekly fresh export and processing shipments were smaller during the suspension. The average quantity shipped per week to the fresh domestic market during the 1984/85 suspension was 8 percent greater than during the 1979/80-1983/84 prorated period and 5 percent greater than during the 1981/82 prorated period (table 4). The average quantity shipped per week to the export market was 13 percent less during the suspension, compared with the 1981/82 season, and 19 percent less than during the 1979/80-1983/84 period. The average of weekly shipments of all fresh navels was 3 percent greater during the suspension than during the 1981/82 prorated period and 5 percent greater than during the 1979/80-1983/84 prorated period. The average of weekly processing shipments was 36 percent less during the suspension than during the 1981/82 season and 63 percent less than during the 1979/80-1983/84 prorated period.10/

Price Levels 11/

Fresh navel prices at all marketing levels were higher during the 1984/85 suspension than during the prorated periods (tables 5-8). Prices of navel oranges for processing also were higher during the 1984/85 period than during the other periods. The higher prices were mostly attributable to relatively small fresh orange supplies during the 1984/85 winter season.

10/ Although seasonal navel supplies were about 3 percent less in 1984/85 than in 1981/82, seasonal fresh domestic shipments were about 8 percent greater, export shipments were about 4 percent greater, and processing shipments were about 38 percent less (table 1). Seasonal navel supplies were about 24 percent less in 1984/85 than the average during 1979/80-1983/84, and seasonal fresh domestic shipments were about 5 percent less, export shipments were about 3 percent less, and processing shipments were about 66 percent less.

11/ t-tests were calculated to examine whether means of deflated prices during suspension were significantly different from those during prorated period. Results are shown in appendix tables 1 and 2.

Handler Marketing Practices

Three aspects of handler marketing practices were examined: (1) price competitiveness among handler groups, (2) the share of district production shipped by various handler groups, and (3) the shares of total shipments sent to processing by various handler groups.

Weighted average f.o.b. prices for the 1984/85 season were computed for selected handlers according to their marketing organization affiliation.12/ The weeks prior to the suspension constituted the prorated period. Price competitiveness among cooperative-affiliated and independent handlers was determined by comparing their weighted average f.o.b. prices during the prorated and suspension periods. Cooperative-affiliated handlers may have been more price competitive during the suspension than were independent handlers. The weighted average weekly f.o.b. shipper price was slightly greater for cooperative-affiliated handlers than for independent handlers during the prorated portion of the 1984/85 season (table 9). However, the weighted average weekly price received by cooperative-affiliated handlers was less than that received by the independent handlers during the suspension.

Handlers were grouped each season according to their relative size (total shipments), district location, district origin of shipments, and whether they were affiliated with a cooperative marketing organization or were

Table 9--Mean, s.d., and c.v. of the deflated independent handler f.o.b. price and the deflated cooperative-affiliated handler f.o.b. price for C-A navels during the 1984/85 prorated and the 1984/85 suspension periods

Handler category and 1984/85 period 1/	Observations	Mean	Standard deviation	Coefficient of variation
	Number	Dollars per carton		c.v.
Cooperative:				
Prorate	15	6.98	0.55	0.08
Suspension	12	6.34	.80	.13
Independent:				
Prorate	15	6.90	.29	.04
Suspension	12	6.66	1.26	.19

1/ The f.o.b. prices are for the weeks of the 1984/85 season. The weeks from the beginning of the 1984/85 season to February 7, 1985 (effective start of suspension) form the prorate period, and the weeks from February 7, 1985, to the end of the season form the suspension period. Prices are deflated by the index of prices received by farmers for all farm commodities, 1977=100.

Source: Weekly prices from NOAC.

12/ F.o.b. prices are from a sample of medium and large handlers providing prices to NOAC.

independent.13/ Market share controlled by each handler category and the share of each handler category's shipments entering the processing market relative to the district's share in the 1984/85 season were compared with the average during the 1979/80-1983/84 seasons.

Independent handlers in district 1 marketed a larger share of their district's shipments during the 1984/85 season than during the prorated 1979/80-1983/84 seasons. The largest change occurred in the share of district 1 production handled by medium-size independent handlers (table 10). Ten medium-size independent handlers marketed 19.7 percent of district 1 production during the 1984/85 season. But, five to seven medium-size independent handlers marketed only 9.2 percent of district 1 production during the 1979/80-1983/84 seasons.

Cooperative affiliated handlers marketed a smaller share of district 1 production during 1984/85 than during 1979/80-1983/84. Twenty-nine cooperative-affiliated handlers marketed 46.5 percent of district 1 production during 1984/85, compared with between 26 to 32 cooperative-affiliated handlers who marketed an average of 60.9 percent of district 1 production during 1979/80-1983/84. The shift in market shares of district 1 production from cooperative-affiliated to independent handlers is probably due to an increase in the number of medium- and large-size independent handlers during 1984/85.14/ Market shares among handler categories in district 2 changed little during 1984/85.

The prorate, as administered by the NOAC, provides each handler, regardless of size, with equal access (in proportion to total shipments) to the regulated higher priced fresh domestic market. Handlers in each district, consequently, ship about the same share of their total shipments into the relatively lower priced processing market. With a suspension, however, some handlers could market a larger share of their navels into the higher priced fresh market and, thus, return a higher average price to their growers. This could happen because of differing marketing practices among handlers, better quality navel oranges among some handlers, or both.

The difference between each handler category's share of shipments entering processing and the average share for the district was computed to determine whether handlers in some categories marketed a smaller share of their shipments into processing during 1984/85. The resulting differences were compared with those for the 1979/80-1983/84 seasons to determine whether the relative share of processing shipments for particular handler categories changed.

No pronounced changes occurred in the various handler group's relative share of shipments to the processing market during the 1984/85 season, compared with the average for the 1979/80-1983/84 seasons. This suggests that no handler category benefited more than another during the 1984/85 season by shipping a relatively smaller share of their navel oranges into the lower priced processing market.

13/ District 3 shipment data were not examined because it had completed its marketing before the effective suspension.

14/ Most growers make contractual arrangements with handlers to market their navels at the onset of the market season. These contractual arrangements minimize shifting of growers among handlers during the market season.

Table 10--Handler category share of district shipments of C-A navels to all markets and handler category share of processing shipments less the district share of processing shipments, during the 1979/80-1983/84 season, and the 1984/85 season

District and handler category	Period	Handlers	Handler share of district shipments to all markets		Handler share of processing shipments less the district's share	
			Range	Average	Range	Average
		Number		Percent		
District 1 handler and district 1 shipment orgin:						
Small cooperative	1979/80-1983/84	8-12	6.3 to 8.9	7.6	-3.4 to 2.7	0
	1984/85	11	---	6.1	---	1.1
Medium cooperative	1979/80-1983/84	12-13	23.9 to 28.4	26.2	-2.4 to 4.3	.8
	1984/85	12	---	19.8	---	1.7
Large cooperative	1979/80-1983/84	6-7	23.7 to 28.6	26.1	-2.3 to 16.6	6.7
	1984/85	6	---	22.6	---	1.3
Small independent	1979/80-1983/84	7-15	1.5 to 2.9	2.2	-6.5 to 1.0	-2.4
	1984/85	17	---	3.0	---	2.5
Medium independent	1979/80-1983/84	5-7	8.3 to 11.2	9.2	-6.5 to 1.5	-1.8
	1984/85	10	---	19.7	---	-2.3
Large independent	1979/80-1983/84	5-7	23.4 to 27.4	25.0	-6.3 to -0.1	-2.3
	1984/85	6	---	25.9	---	-2.0
District 2 handler and district 1 shipment orgin:						
Cooperative	1979/80-1983/84	3-5	2.5 to 4.2	3.4	-5.1 to 4.8	-.3
	1984/85	8	---	2.8	---	.7
Independent	1979/80-1983/84	2/	.2 to .5	.3	-22.5 to -2.0	-11.5
	1984/85	2/	---	.1	---	-.6
District 1 handler and district 2 shipment orgin:						
Cooperative	1979/80-1983/84	2/	3.2 to 5.8	4.3	-15.9 to -10.1	-13.4
	1984/85	2/	---	---	---	---
Independent	1979/80-1983/84	2/	1.7 to 2.6	2.0	-22.0 to 3.9	-6.1
	1984/85	2/	---	6.5	---	-6.9
District 2 handler and district 2 shipment orgin:						
Small cooperative	1979/80-1983/84	8-10	25.1 to 28.9	26.6	-.5 to 9.7	2.6
	1984/85	9	---	24.0	---	-1.1
Large cooperative	1979/80-1983/84	4	49.0 to 52.4	50.9	-.3 to 4.4	1.1
	1984/85	4	---	52.4	---	2.3
Independent	1979/80-1983/84	7-9	15.4 to 16.5	16.2	-5.3 to 13.9	0
	1984/85	7	---	17.1	---	-1.4
District 4 handler and district 4 shipment orgin:						
Cooperative	1979/80-1983/84	2/	73.6 to 89.3	82.1	-.3 to .1	-.9
	1984/85	4	---	92.1	---	-3.4
Independent	1979/80-1983/84	6-8	10.7 to 26.4	17.9	-10.8 to 19.9	-3.8
	1984/85	9	---	7.9	---	.3

--- = No range or average.

1/ A negative value indicates that the share of shipments going to the processing market was less for the handler category than the average for all handlers in the district.

2/ To prevent information disclosure, the number of handlers is not reported if there were fewer than four.

Source: NOAC.

Most handler categories in districts 1 and 2 marketed nearly the same share of their shipments to the processing market, relative to their district's share during 1984/85, compared with the preceding five seasons. Large cooperative-affiliated handlers were an exception, marketing a slightly smaller share of their shipments into the processing market relative to their district's share.

ECONOMIC EFFECTS OF A PRORATE SUSPENSION

Relationships in prices, product use, and production of navel oranges suggest that a season-long prorate results in the diversion of some fresh marketable navels from the fresh domestic market to processing. Over time, grower prices have increased for fresh navels and decreased for processing navels (table 2). This has occurred as the share of production entering fresh use has declined and the share to processing use increased (table 1). Furthermore, production has increased. These observations are consistent with theoretical expectations of product diversion.

The shortrun (within-season) effects of suspending the prorate would be lower fresh navel prices and higher fresh use.15/ Processing use would decline, but processing prices would probably not change since the California-Arizona navel orange industry is a price-taker in the processing market. Grower revenue would fall below what it would be with a prorate. Continuation of a suspension would probably lead to a reduction in navel acreage below that which would exist with a prorate. This section presents estimates of the likely within-season effects of a prorate suspension on navel orange prices and grower revenue.

Procedure

The within-season effects of a suspension on uses, prices, and grower revenue are sensitive to the level of navel supplies. Because navel supplies fluctuate year-to-year in response to the weather, the shortrun effects of a suspension are estimated for three crop-sizes: small, normal, and large. Seasons selected as representative were 1981/82 (small supply), 1979/80-1983/84 average (normal supply), and 1982/83 (large supply).

The within-season effects of a suspension were determined by comparing the actual prices and uses during these three prorated periods with estimates of prices and uses had there not been a prorate. The total volume of navels was assumed unchanged in the short run following a suspension. The underlying proposition in the analysis was that with a prorate some fresh marketable navels may be withheld from the fresh market.16/ During a suspension, handlers were assumed to market all fresh-marketable navels in the fresh

15/ The short run is a period too short for navel orange production adjustments to occur due to a change in grove investments. Because of the high fixed costs of grove investments, the short run for removal of navel orange groves may vary from 1 to 20 years. Including the gestation period, the short run for expansion is 5-7 years. Shortrun effects in this report refer to those occurring within the first season of a suspension.

16/ "Fresh-marketable" refers to those navels which are profitable to sell fresh in a "free-market" setting. Such oranges must return a price at least high enough to cover variable packing and selling costs plus their value in processing use (opportunity cost).

markets. Only oranges that could not be profitably sold in the fresh market were assumed to go to processing. The critical variables in estimating prices and uses under a prorate-suspension scenario are: (1) free-market processing-use percentages and (2) changes in fresh and processing prices resulting from changes in the quantity of navel oranges entering the various uses. Relationships between product prices and quantity are measured by "price flexibilities."17/

Processing-Use Percentage

The share of the crop which is fresh-marketable varies year-to-year in response to crop size and weather and marketing conditions. In a large-supply season (with heavy fruit set), a larger share of the crop typically consists of smaller navels which are not fresh-marketable.18/ Information provided by industry personnel knowledgeable about the grading and marketing of navels revealed that in a large-supply season, 16-24 percent (20 percent chosen as most likely) of the navels are typically not fresh-marketable. In a normal-supply season, 15-21 percent (18 percent chosen as mostly likely) of the navels are not fresh-marketable. And, in a small-supply season, 12-18 percent (15 percent chosen as the most likely) of the navels are not fresh-marketable. Processing uses with a suspension were calculated by multiplying the supply of navels during the representative season by the corresponding free-market processing use percentage. Fresh uses were calculated as the total supply less processing use less other use.

Price Flexibilities

Price flexibilities were based on statistical analyses of the relationship between price and quantities of navels shipped into the various markets.19/ Price flexibilities were estimated using actual quantities and prices for the representative seasons. Price flexibilities equal to two standard deviations above and below the estimated values were used to represent the most probable range of values for the price flexibilities. In the small-supply season, the price flexibility for fresh navels was estimated to be between -1.11 and -1.63 (-1.37 as most likely), between -1.64 and -2.16 (-1.9 as most likely) during the normal-supply season, and between -1.97 and -2.49 (-2.23 as most likely) in a large-supply season. A price flexibility of zero was estimated for processing navels, indicating that changes in processing use had no effect on processing navel prices. This means that the C-A navel orange industry is a price-taker in the processing market. These price flexibilities were calculated in a similar way to those estimated by Thor and Jesse and are of similar magnitudes.20/

17/ A price flexibility is the percentage change in price associated with a 1-percent change in the quantity of navel oranges marketed in a given use.

18/ During large-crop seasons, prices for some navel oranges (small and/or lower grade) may be lower than the total of packing and selling costs and the value of the navel in processing. In such cases, returns are higher from processing use. Such navels would be included in the processing-use percentage. During small-crop seasons, higher prices may make it profitable to ship marginal quality navels to the fresh market, resulting in a lower processing-use percentage.

19/ See Appendix for a discussion of the statistical analysis.

20/ P.K. Thor and E.V. Jesse. Economic Effects of Terminating Federal Marketing Orders for California-Arizona Oranges, Econ. Res. Serv., U.S. Dept. Agr., TB-1664, Nov. 1981.

Shortrun Economic Effects of a Suspension

The within-season effects of a suspension were estimated as the difference between the estimated use, price, and grower revenue for the representative seasons and actual values for those seasons with a prorate in place.

Normal-Supply Season

Shortrun effects of a suspension in a normal supply season are: (1) increased fresh use, (2) decreased processing use, (3) decreased fresh market prices, and (4) decreased total grower revenue. Fresh use increases by an estimated 7,694 carloads to 56,615, a 16-percent increase, as more fresh-marketable navels enter the fresh markets (table 11).21/ Processing use consequently decreases to an estimated 12,829 carloads, a 37-percent decline. Total grower revenue decreases to an estimated $107 million, a 10-percent decrease from about $119 million. Grower revenue from the fresh markets decreases to an estimated $112 million, a decrease of about $16 million. Because of the negative on-tree returns for products, grower revenue losses from products decrease by $3.3 million to an estimated $-5.5 million.

Large-Supply Season

The 1982/83 navel crop, representing the large-supply season, was a record crop in California and Arizona. With a suspension, fresh use increases by an estimated 9,320 carloads to about 65,189, a 17-percent increase (table 12).22/ Processing use decreases by an estimated 9,320 carloads to about 16,835, a 36-percent decrease. Total grower revenue decreases by $20 million to an estimated $102 million.

Small-Supply Season

Effects of a suspension during a small-supply season are similar to those for normal- and large-supply seasons: processing use decreases, fresh use increases, and grower prices and gross revenue decrease. The magnitude of the effects are smaller during a short-supply season because fewer fresh-marketable oranges are diverted from fresh to processing use by prorate.

With a suspension, fresh use increases by an estimated 2,472 carloads, a 6-percent increase to 45,861 carloads (table 13).23/ Processing use decreases by an estimated 2,472 carloads, a 23-percent decrease, to 8,322 carloads. As a result, total grower revenue decreases to an estimated $150 million, a decrease of $1 million.

Sensitivity Analysis

Analysis of the shortrun economic effects of a suspension depend critically on the values for the free market processing-use percentage and the price flexibilities, especially the price flexibility for fresh navels. Several combinations of values for the processing-use percentage and for fresh navel

21/ These findings are based on a price flexibility for fresh navel oranges of -1.9 and a processing-use percentage of 18 percent.

22/ These findings are based on a price flexibility for fresh navel oranges of -2.23 and a processing-use percentage of 20 percent.

23/ These findings are based on a price flexibility for fresh navels of -1.37 and a processing-use percentage of 15 percent.

Table 11--Grower revenue, prices, and use of C-A navels with and without a prorate in a normal-supply season

Item	Actual, with prorate 1/	Estimated, without prorate 2/
	Carloads 3/	
Use:		
Fresh domestic	43,384	
Fresh export	5,537	
Total fresh	48,921	4/ 56,615
Products	20,523	5/ 12,829
Other	1,828	1,828
Total, all uses	71,272	71,272
	Dollars per box, on-tree equiv. 3/	
Prices:		
Fresh	5.24	6/ 3.96
Products	-.85	7/ -.85
Grower average	8/ 3.44	8/ 3.08
	1,000 dollars	
Gross revenues:		
Fresh	128,173	112,238
Products	-8,722	-5,452
Total	8/ 119,451	8/ 106,785

1/ Average during 1979/80-1983/84 seasons.
2/ Based on average fresh price flexibility of -1.9 and a free-market processing use of 18 percent.
3/ Box = 75 lbs., carload = 1,000 cartons, carton = 37 1/2 lbs.
4/ Actual fresh shipments plus 7,694 carloads of actual products diverted to fresh.
5/ Eighteen percent of total shipments.
6/ Estimated as P[(K + 2)/(2 - K)], where P = actual price, and K = (price flexibility)*(average percent change in total fresh). This mathematical formulation was derived from an arc price flexibility.
7/ Based on an assumption of a zero price flexibility for navel oranges used in products.
8/ Does not include returns to "other" uses.

price flexibilities were selected to evaluate the sensitivity of the estimated effects with a suspension.

In a small-supply season, price flexibilities for fresh navel oranges of -1.11 and -1.63 were selected as alternative values to -1.37, the most likely value. Price flexibilities for fresh navels of -1.64 and -2.16 were

Table 12--Grower revenue, prices, and use of C-A navel oranges with and without a prorate in a large-supply season

Item	Actual, with prorate 1/	Estimated, without prorate 2/
	Carloads 3/	
Uses:		
Fresh domestic	49,018	
Fresh export	6,851	
Total fresh	55,869	4/ 65,189
Products	26,155	5/ 16,835
Other	2,151	2,151
Total, all uses	84,175	84,175
	Dollars per box, on-tree equiv. 3/	
Prices:		
Fresh	4.58	6/ 3.24
Products	-.46	7/ -.46
Grower average	8/ 2.97	8/ 2.48
	1,000 dollars	
Gross revenue:		
Fresh	127,940	105,535
Products	-6,016	-3,872
Total	8/ 121,924	8/ 101,663

1/ Season average during 1982/83.
2/ Based on average fresh price flexibility of -2.23 and a free-market processing use of 20 percent.
3/ Box = 75 lbs., carload = 1,000 cartons, carton = 37 1/2 lbs.
4/ Actual fresh shipments plus 9,320 cars of actual products diverted from fresh.
5/ Twenty percent of shipments.
6/ Estimated as $P[(K + 2)/(2 - K)]$ where P = actual price, and K = (price flexibility)*(average percent change in total fresh). This mathematical formulation was derived from an arc price flexibility.
7/ Based on an assumption of a zero price flexibility for navel oranges used in products.
8/ Does not include returns to "other" uses.

selected as alternatives to -1.9, the most likely value in a normal-supply season. Price flexibilities for fresh navel oranges of -1.97 and -2.49 were selected as alternative values to -2.23, the most likely value in a large-supply season. Two additional processing-use percentages were selected, 3 percentage points above and below the most likely levels selected for the small- and normal-supply seasons. Processing-use percentages were set 4 percentage points above and below the most likely levels selected for the large-supply season.

Table 13--Grower revenue, prices, and use of C-A navels with and without a prorate in a small-supply season

Item	Actual, with prorate 1/	Estimated, without prorate 2/
	Carloads 3/	
Uses:		
Fresh domestic	38,274	
Fresh export	5,115	
Total fresh	43,389	4/ 45,861
Products	10,794	5/ 8,322
Other	1,295	1,295
Total, all uses	55,478	55,478
	Dollars per box, on-tree equiv. 3/	
Prices:		
Fresh	7.24	6/ 6.71
Products	-1.04	7/ -1.04
Grower average	8/ 5.59	8/ 5.52
	1,000 dollars	
Gross revenue:		
Fresh	157,068	153,878
Products	-5,613	-4,327
Total	8/ 151,455	8/ 149,551

1/ Season average during 1981/82.
2/ Based on average fresh price flexibility of -1.37 and a free-market processing use of 15 percent.
3/ Box = 75 lbs., carload = 1,000 cartons, carton = 37 1/2 lbs.
4/ Actual fresh shipments plus 2,472 cars of actual products diverted to fresh.
5/ Fifteen percent of total shipments.
6/ Estimated as $P[(K + 2)/(2 - K)]$ where P = actual price, and K = (price flexibility)*(average percent change in total fresh). This mathematical formulation was derived an arc price flexibility.
7/ Based on an assumption of a zero price flexibility for navels used in products.
8/ Does not include returns to "other" uses.

Estimated grower revenue effects of a suspension were more sensitive to changes in the price flexibility for fresh navels than to changes in the processing-use percentage. In a normal-supply season where 18 percent of the crop is considered not fresh-marketable and with a fresh-market price flexibility of -2.16, estimated total grower revenue decreases by about $16.9 million, or about 14 percent (table 14). Total grower revenue is estimated to

decline $12.7 million, or about 11 percent, with a fresh price flexibility of -1.9 and $8.2 million, or about 7 percent, with a fresh price flexibility of -1.64.

Changing processing-use percentages have less effect on grower revenue than changing price flexibilities. Grower revenue is estimated to decrease by $15.6 million in a normal-supply season when the processing-use percentage is 15 percent and the fresh-market price flexibility is 1.9.

Grower revenue declines about $12.7 million with an 18-percent processing-use percentage, and about $9.5 million with a 21-percent processing-use percentage. Similar results are obtained for the small- and large-supply seasons. Effects of different price flexibilities and processing-use percentages on grower revenue are illustrated in tables 15 and 16.

Table 14--Estimated within-season revenue reduction from prorate suspension for alternative fresh price flexibilities and processing use percentages in a normal-supply season 1/

Free-market processing-use percentage	Fresh price flexibility		
	-1.64	-1.9	-2.16
		1,000 dollars	
15	-10,161 2/(-8.5)	-15,578 (-13.0)	-20,780 (-17.4)
18	-8,254 (-6.9)	-12,665 (-10.6)	-16,932 (-14.2)
21	-6,200 (-5.2)	-9,526 (-8.0)	-12,768 (-10.7)

1/ Normal-crop season based on five-season average production, prices, and use during 1979/80-1983/84.

2/ Numbers in parentheses are percentage changes from actual revenue during 1979/80-1983/84 seasons.

Shortrun total grower revenue effects of a prorate suspension that are considered most likely range from those values in the upper left corners of tables 14-16 to the values in the lower right corners.24/ For the

24/ The reason for this is that smaller processing-use percentages are associated with larger absolute fresh-market price flexibilities and larger processing-use percentages are associated with smaller absolute fresh-market price flexibilities. With larger absolute price flexibilities, prices decline relatively more and a smaller share of the small and lower grade navels are therefore fresh-marketable. Conversely, with smaller absolute price flexibilities, prices decline relatively less and a larger share of the smaller and lower grade navels are fresh-marketable.

Table 15—Estimated within-season gross revenue reduction from prorate suspension for alternative fresh price flexibilities and processing-use percentages in a large-supply season 1/

Free-market processing-use percentage	Fresh price flexibility		
	-1.97	-2.23	-2.49
	1,000 dollars		
16	-20,550	-26,197	-31,606
	2/ (-16.9)	(-21.5)	(-25.9)
20	-15,833	-20,261	-24,542
	(-13.0)	(-16.6)	(-20.1)
24	-10,656	-13,699	-16,671
	(-8.7)	(-11.2)	(-13.7)

1/ Based on 1982/83 production, prices, and use.
2/ Numbers in parentheses are percentage changes from actual during the 1982/83 season.

Table 16--Estimated within-season gross revenue reduction from prorate suspension for alternative fresh price flexibilities and processing-use percentages in a small-supply season 1/

Free-market processing-use percentage	Fresh price flexibility		
	-1.11	-1.37	-1.63
	1,000 dollars		
12	583	-3,064	-6,632
	2/(0.4)	(-2.0)	(-4.4)
15	330	-1,905	-4,109
	(0.2)	(-1.3)	(-2.7)
18	102	-649	-1,395
	(0.1)	(-0.4)	(-0.9)

1/ Based on 1981/82 production, prices, and use.
2/ Numbers in parentheses are percentage changes from actual during the 1981/82 season.

normal-supply season, the most likely range of shortrun total grower revenue effects from a suspension is an estimated decrease between 8.5 and 10.7 percent. For the large-supply season, the most likely range of shortrun total grower revenue effects due to a suspension is an estimated decrease between 13.7 and 16.9 percent. In a small-supply season, the most likely range of shortrun total grower revenue effects from a suspension is an estimated decrease of 1.3 percent to an increase of 0.4 percent.25/

Consumer Price and Consumption Effects

If changes in grower prices with a suspension are transmitted through the marketing channel to the retail level, consumers would pay less for fresh navel oranges and consume slightly more. Retail expenditures by domestic (U.S. and Canada) consumers would fall an estimated $12.5 million for fresh navels, or about 5 cents per capita, with a suspension during a normal-supply season (table 17). Per capita fresh navel consumption would rise 1.13 pounds from 6.42 to 7.55.

Reduction of consumer expenditures from a suspension is greater during a large-supply season and less during a small-supply season. Total retail expenditures would have fallen about $17.7 million with a suspension during the 1982/83 season, but only about $1.8 million during the 1981/82 season. Similarly, per capita consumption of fresh navels would have increased about 1.36 pounds with a suspension during the 1982/83 season, but only 0.63 pounds during 1981/82. Consumer expenditure effects for consumption of fresh navels are slightly less than the grower income effects since changes in expenditures in the export and processing markets also affect grower income.

Grower and Consumer Welfare Effects

Of interest when evaluating the effects of a suspension are shortrun changes in the economic welfare of growers and consumers. For growers this can be defined as adjustments in the economic rent associated with fixed factors of production. Economic rent is a measure of the returns beyond those minimally needed to retain fixed investments in production such as navel groves and land. Change in economic rent in the short run with a fixed (that is, perfectly inelastic) supply equals change in grower revenues. Shortrun economic rents are estimated to decline with a suspension by about $12.7 million in the normal-supply season, $20.3 million in the large-supply season, and $1.9 million in the small-supply season (table 18).

Consumer surplus, a measure of consumer well-being, is the difference between what consumers actually pay for a commodity and the maximum price they would be willing to pay. If some consumers purchase the commodity at a lower price than the maximum they are willing to pay, they realize a consumer surplus. If changes in grower prices are fully transmitted through the marketing channel to the retail level, consumer surplus in the domestic fresh market with a

25/ During a small-supply season and with relatively small absolute values of the price flexibility for fresh navel oranges, estimated grower revenue increased with a suspension. This means that in a small-supply season, NOAC could possibly increase grower revenue by allowing a greater share of the navel orange crop into the fresh market.

Table 17--Estimated within-season effects of C-A navel orange suspension on consumer expenditures and per capita consumption

Item	Supply size 1/		
	Small	Normal	Large
Changes in consumer expenditures for navel oranges:		1,000 dollars	
Fresh domestic	-1,849	-12,532	-17,744
		Cents per capita	
Per consumer	-0.7	-5	-7
Per capita consumption of navel oranges:		Pounds per capita	
Fresh domestic with a prorate	5.66	6.42	7.18
Fresh domestic with a suspension	6.02	7.55	8.54

1/ The numbers appearing in the cells for the small-supply season were generated from table 13, normal-supply season from table 11, and large-supply season from table 12.

Table 18--Estimated within-season grower and consumer welfare effects of C-A navel orange suspension

Item	Supply size 1/		
	Small	Normal	Large
Changes in economic surplus:		1,000 dollars	
Consumers	10,470	30,228	35,964
Grower economic rent	-1,904	-12,666	-20,261
Net social welfare	8,566	17,562	15,703
Per capita net social welfare gain	3.3	Cents per capita 6.9	6.1

1/ Numbers appearing in the cells for the small-supply season were generated from table 13, normal-supply season from table 11, and large-supply season from table 12.

suspension is estimated to be greater by about $30.2 million in the normal-supply season, $35.9 million in the large-supply season, and $10.5 million in the small-supply season.26/

Net social economic welfare is defined as the sum of consumer surplus and grower economic rents. Estimated shortrun gains in consumer surplus exceed the losses in grower economic rents for all crop sizes considered. Net social welfare would have been greater with a suspension by about $17.6 million in the normal-supply season, $15.7 million in the large-supply season, and $8.6 million in the small-supply season.

The average welfare gain with a suspension would have been about 7 cents per capita in the normal-supply season, 6 cents per capita in the large-supply season, and 3 cents per capita in the small-supply season. The average consumer surplus gain would have been about 12 cents per capita in the normal-supply season, 14 cents per capita in the large-supply season, and 4 cents per capita in the small-supply season. Economic rent per grower would have decreased about $3,159 in the normal-supply season, $4,912 in the large-supply season, and $478 in the small-supply season.

The preceding net social welfare measures do not account for the increase in consumer welfare in the export market; that is, foreign consumers may also realize increased consumer surplus. Also, the welfare measures are based on a partial market analysis and, thus, do not measure the producer and consumer welfare implications of a suspension on the Florida and Texas orange markets and on other competing fruit markets. And, the longrun welfare implications of a suspension may be different from those for the short run.

Longrun Economic Effects of a Suspension

Information is not available to adequately estimate the production adjustment likely to occur with a longrun continuation of a suspension.27/ Therefore,

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26/ Changes in consumer surplus were based on the assumption of a linear retail demand within the relevant range of price change and on changes in price at the retail level equaling change in grower price. The consumer surplus measures could be different if these conditions do not hold. The formula used to calculate the change in consumer surplus is:

$$CS = (P_p - P_s)*Q_p^{fd} + (1/2)*(P_p - P_s)*(Q_s^{fd} - Q_p^{fd}).$$

Definitions:

CS = Change in consumer surplus in the fresh domestic market.

P_p = Grower price for fresh navels with a prorate.

P_s = Grower price for fresh navels with a suspension.

Q_p^{fd} = Fresh domestic shipments with a prorate.

Q_s^{fd} = Fresh domestic shipments with a suspension.

27/ The long run is the period of time required for growers to make adjustments in fixed inputs, namely navel orange groves. The long run for acreage expansion is typically defined in terms of the gestation period (5-7 years) for navel orange groves. The long run for acreage removal can vary from several years to more than 20 years.

the longrun effects of a suspension are discussed in terms of direction of change rather than as an absolute amount of change. The discussion draws heavily on theoretical results from Heifner et al and empirical research by Thor and Jesse.28/

Growers would reduce navel orange grove acreage in response to decreased shortrun grower returns under a suspension. Longrun grower returns would be no greater and perhaps less than with the prorate. Grower weighted average price would be no greater with a continuation of the suspension than with a prorate, and may be less.

The longrun price for fresh navels would probably be less with a suspension than with prorate. The exact magnitude of any decline in fresh prices depends on the increase in fresh uses. While processing use of navels would decline, the longrun price for processing navels would probably not change. Processing navel prices are determined mostly by the price of Florida and Brazilian frozen concentrated orange juice.

Major longrun effects of a continuation of a suspension would be a decrease in production and processing uses. Growers who are least efficient, highly financially leveraged, or both would most likely reduce navel acreage. Because of smaller processing use under a continuation of the suspension, citrus processing facilities would probably be underutilized. Some citrus facilities may be shut down or converted to other processing.

CONCLUSIONS

The market for C-A navels performed in about the same way during the 1984/85 season after the prorate was suspended as during comparable prorated periods. There were only minor differences between the prorate suspension and prorate periods in stability of shipments and prices. Higher prices during the 1984/85 season were mostly due to relatively small U.S. fresh orange supplies during the winter. Handler marketing practices appeared to change very little during the partial season with a suspension. The prorate helps to elevate grower revenue in the short run by diverting some fresh navels from the fresh market into processing. Consequently, prices for fresh-marketable navel oranges are higher than they would be without a prorate, and a larger share of the navel crop enters processing. Magnitude of these effects tends to be greater during seasons with larger navel supplies.

A suspension of the handler prorate could result in a number of shortrun gains and losses among consumers, processors, and growers. Shortrun increases in shipments to the fresh market could result in lower retail prices for fresh navels if lower grower prices were passed on through the marketing channel. Consumption of fresh navels would increase. C-A citrus processors could lose as their costs would rise and revenues fall as smaller quantities of navels enter processing. Lower prices for fresh navels, however, mean lower grower revenue.

28/ R. Heifner, W. Armbruster, E.V. Jesse, G. Nelson, and C. Shafer. A Review of Federal Marketing Orders for Fruits, Vegetables, and Specialty Crops, Agr. Mktg. Serv., U.S. Dept. Agr., AER-477, Nov. 1981; op.cit.

The prorate provides each handler equal access (in proportion to total shipments) to ship into the fresh domestic market. A prorate suspension would result in greater marketing freedom among handlers. Thus, handlers who have higher quality navels or superior marketing abilities may gain if they can sell a larger share of their navels into the fresh markets than other handlers.

Fresh orange producers in Florida and Texas also could incur shortrun revenue losses from a prorate suspension. Increased supplies of fresh C-A navels could lead to some substitution from Florida and Texas produced oranges to C-A navels among consumers. Prices and revenue for Florida and Texas fresh oranges would likely decline some. Increased supplies of fresh C-A navels could decrease the prices for competing fresh fruits such as apples, grapefruit, and bananas.

APPENDIX: NAVEL ORANGE PRICE FLEXIBILITIES

Price flexibilities are a measure of responsiveness of the market price of a commodity to a change in the quantity of the commodity marketed. Price flexibilities measure the percentage change in the market price associated with a 1-percent change in the quantity marketed. Thus, a price flexibility of -1.5 means that a 1-percent increase in the quantity marketed will decrease the market price by 1.5 percent. The larger the absolute value of the price flexibility, the larger is the change in price associated with a 1-percent change in the quantity marketed. A price flexibility of zero means that the market price is not affected by increases in the quantity marketed. Price flexibilities used in this study were derived from market price equations for California fresh and processing navel oranges.

Fresh Navel Orange Prices

The annual price for fresh California navel oranges is specified as a function of consumption of California fresh navel oranges (including the United States and Canada), consumption of substitute commodities (Florida early, mid-season, and navel oranges, Texas oranges, grapefruit, bananas, and apples), disposable income, and unexpected changes in the crop sizes for Florida early, mid-season, and navel, and California navel oranges.1/ The price for fresh California navel oranges and disposable income were expressed in real terms. To minimize problems of multicollinearity, disposable income and consumption were expressed on a per capita basis. Preliminary analysis revealed that the effects of per capita consumption of grapefruit, bananas, apples, Texas oranges, and disposable income on the price for fresh navel oranges were not significantly different from zero and, thus, they were excluded from the final specification. The exclusion of these variables from the price equation did not have any pronounced effect on the magnitude of the estimated coefficient for per capita consumption of California fresh navel oranges.

A semi-log functional form was used. The estimated coefficients and the corresponding standard errors for the independent variables in the market price equation for fresh navel oranges are:

$$(1)\quad CFNPD = \underset{(0.36)^*}{5.42} - \underset{(0.13)^*}{1.71}{*}CFNDS - \underset{(0.11)^*}{0.41}{*}FTQ + \underset{(0.32)^*}{0.71}{*}F1 - \underset{(0.50)^*}{1.17}{*}C2$$

$$R^2 = 0.94 \qquad D.W. = 1.87$$

1/ The United States and Canada are combined into one market to maintain consistency with the fresh domestic market as defined in the Federal marketing order for C-A navel oranges. Also, fresh domestic navel orange shipment data cannot be accurately delineated between the United States and Canada.

An asterisk (*) by the standard error indicates that the coefficient for the independent variable is significantly different from zero at the 5-percent level.2/

Definition of variables:

CFNPD = The seasonal weighted average e.o.t. price for California fresh navel oranges (deflated by the Consumer Price Index for all goods, 1967 = 100, $/carton).
CFNDS = The log of per capita consumption of California fresh navel oranges, includes the United States and Canada (fresh weight, lbs./capita).
FTQ = The log of per capita consumption of Florida early, mid-season, and navel oranges, includes the United States and Canada (fresh weight, lbs./capita).
F1 = The log of the ratio of the pre-season (October) USDA estimate of Florida early, mid-season, and navel orange crop size to actual crop size.
C2 = The log of the ratio of the mid-season (February) USDA estimate of California navel orange crop size to actual crop size.

Annual data were for 1962/63-1983/84.3/ The value of the Durbin-Watson test statistic indicates the absence of a first-order auto-correlation process among the residual terms. The estimated coefficients for all independent variables are significantly different from zero.

The negative coefficient for per capita consumption of fresh navel oranges means that fresh navel orange prices decline with increased supplies to the fresh domestic market.

Likewise, the negative coefficient for FTQ implies that increased supplies of Florida early, mid-season, and navel oranges also tend to decrease the price for California fresh navel oranges.

An unexpected decrease in the actual crop size of Florida early, mid-season, and navel oranges from the pre-season (October) estimate is found to increase the price for fresh navels. This means that an unexpected reduction in the Florida crop due to freeze damage increases the price for fresh navels.

An unexpected decrease in the actual crop size of California navels from the mid-season (February) estimate reduces the price for fresh navels. An unexpected decrease in the crop size may be caused by adverse weather lowering the quality of the oranges. Theoretically, an unexpected decrease in size can have a positive effect on price, while lower fruit quality is expected to have a negative effect on price. These two effects move in opposite directions and, as indicated by the negative coefficient, the magnitude of the quantity effect is overwhelmed by the quality effect.

The price flexibilities for fresh navel oranges during the small-supply season (1981/82) and large-supply season (1982/83), along with the normal-supply season (1979/80 to 1983/84) were computed using the predicted prices for the

2/ Least squares was used to estimate equation (1). Because of the possible simultaneity between fresh navel orange price and per capita consumption of fresh navels, the estimated coefficient for per capita consumption may be slightly biased.

3/ Annual data for 1984/85 were not available when the analysis was conducted.

respective season and the actual per capita consumption of fresh navel oranges.4/ Confidence intervals for the price flexibilities, equal to two standard deviations about the the computed value, were calculated.5/ In the small-supply season, the confidence interval for the price flexibility is -1.11 to -1.63, with -1.37 as the computed value. In the normal-supply season, the confidence interval for the price flexibility is -1.64 to -2.16, with -1.90 as the computed value. And, in the large-supply season, the confidence interval for the price flexibility is -1.97 to -2.49, with -2.23 as the computed value.

Processing Navel Orange Prices

The annual price for California processing navel oranges is hypothesized to be primarily a function of their juice value along with per capita disposable income in the United States and Canada, per capita consumption of California processing navel oranges, and unexpected changes in the crop size for Florida early, mid-season, and navel and California navel oranges during the season. Prices and income were expressed in real terms. To minimize problems of multicollinearity, disposable income and consumption were expressed on a per capita basis. Because C-A processing navel oranges constitute such a small share of the total frozen concentrated orange juice market, they can be considered as "price-takers." However, the relationship between frozen concentrated orange juice prices and processing prices of California navel oranges is not expected to be exact because the juice from navels is inferior (lower quality) to that of Florida and Brazilian oranges. The amount of California navel oranges processed and unexpected changes in the crop size of California navel oranges were found not to significantly affect the price for California processing navel oranges.

Estimated coefficients and standard errors for the independent variables in the market price equation for California processing navels are:

$$\underset{(0.46)}{0.31} + \underset{(0.086)*}{0.32}*FCOJP - \underset{(0.11)*}{0.46}*INC + \underset{(0.20)*}{0.44}*F1 + \underset{(0.03)}{0.03}*CNPS \quad (2)$$

CPNPD

$R^2 = 0.84$ D.W. = 1.60

An asterisk by the standard error (*) indicates that the estimated coefficient for the independent variable is significantly different from zero at the 5-percent level.

Definition of variables:

CPNPD = Seasonal weighted average e.o.t. price for California processing navel oranges (deflated by the Consumer Price Index for all goods, 1967 = 100, $/carton).

4/ For equation (1), the price flexibility equals the estimated coefficient for per capita consumption of fresh navel oranges multiplied by the inverse of the predicted fresh navel orange price.

5/ The standard deviation of the estimated coefficient for per capita consumption of fresh navels from equation (1) was multiplied by two and then added and subtracted from the computed price flexibility to form a confidence interval for the price flexibility.

FCOJP = Seasonal weighted average f.o.b. price per dozen 6-ounce cans of frozen concentrated orange juice (deflated by the Consumer Price Index for all goods, 1967 = 100, $/carton).

INC = Per capita disposable income for the United States and Canada. Canadian income is adjusted by U.S.-Canadian exchange rate, (deflated by the Consumer Price Index for all goods, 1967 = 100, $1,000 per capita).

F1 = Ratio of the pre-season (October) estimate of Florida early, mid-season, and navel orange crop size to actual crop size.

CNPS = Per capita consumption of California processing navel oranges includes the United States and Canada (fresh weight, lbs./capita).

Annual data were for 1962/63 to 1983/84. The value of the Durbin-Watson test statistic indicates the absence of a first-order auto-correlation process among the residual terms.

Except for the estimated coefficient for per capita consumption of California processing navel oranges, the estimated coefficient for each independent variable is significantly different from zero.

As indicated by the estimated coefficient for the price of frozen concentrated orange juice, an increase in the real frozen concentrated orange juice price causes the price of California processing navels to increase.

Increases in per capita real disposable income decrease the real price of processing navel oranges. As income increases there may be some substitution of frozen concentrated orange juice made from California navel oranges with other commodities.

Freeze damage to the Florida crop during the marketing season increases the real price for processing navel oranges in two ways. First, the total supply of oranges is reduced. Second, the adjustment to the reduced supply must be made during the remaining portion of the season rather than over the entire season. Both effects tend to increase market prices.

The effect on the price for California processing navels from changes in the per capita consumption of processing navels is small and not significantly different from zero. Consequently, the computed price flexibility for processing navels was approximately equal to zero.

Appendix table 1--Statistical comparison of mean and variance of C-A navel orange prices during the 1984/85 prorate suspension, and the comparable 1979/80 to 1983/84 prorated period 1/

Price series, use, grade, and fruit size	Deflated price 2/	
	Mean test	Variance test
	t - value	F - value
New York City, wholesale, fresh, first, 48-113: 3/		2.98 (P,50,11)*
Chicago, wholesale, fresh, first: 4/		
56		5.92 (P,82,11)*
72	2.44 (S,96)*	2.26 (P,85,11)
88	3.60 (S,98)*	2.05 (P,87,11)
113	4.04 (S,79)*	2.11 (P,68,11)
Los Angeles, wholesale, fresh, first, 56-113: 5/		4.17 (P,46,10)*
Central California, f.o.b., fresh, first:		
56	5.93 (S,85)*	1.44 (P,74,11)
72	10.22 (S,85)*	2.52 (P,74,11)
88		2.61 (S,11,74)*
113	7.65 (S,85)*	1.90 (S,11,74)
138	6.53 (S,85)*	1.49 (P,74,11)
Southern California, f.o.b., fresh, first:		
56		4.73 (P,37,7)*
72		4.94 (P,37,7)*
88		61.15 (P,37,7)*
113		7.62 (P,37,7)*
138		5.49 (P,37,7)*
Central California, f.o.b., fresh, choice:		
56	4.97 (S,94)*	1.80 (S,12,82)
72		2.99 (S,11,82)*
88	7.16 (S,94)*	3.50 (S,12,82)
113		3.00 (S,12,80)*
138	5.20 (S,86)*	1.24 (S,12,74)
Southern California, f.o.b., fresh, choice:		
56	1.10 (S,32)	58.58 (P,25,7)*
72	2.31 (S,32)*	2.46 (P,25,7)
88		3.43 (P,25,7)*
113		3.55 (P,25,7)*
138		4.58 (P,25,7)*

1/ The midweek prices were from February 7 (effective start of the prorate suspension) to the end of the season. Wholesale prices were deflated by the wholesale price index for fresh fruits, 1977 = 100. F.o.b. prices were deflated by the index of prices received by farmers for all farm commodities, 1977 = 100.

2/ The "P" or "S" indicates whether average prices or variance of price during the respective prorated or prorate suspension periods were greater. An asterisk ("*") with a "P" or "S" indicates whether average prices or variance of price during the prorated or prorate suspension periods, respectively, were significantly greater at the 5-percent level. The number(s) within the parentheses is (are) the degrees of freedom. Mean test results were not calculated for those cases where the variance between the two periods were significantly different. No standard mean test is available for those cases when the variances between the two periods were different.

3/ New York City wholesale prices were available only during 1981/82-1984/85.

4/ Chicago wholesale price (113) were available only during 1979/80 and 1981/82-1984/85.

5/ Los Angeles wholesale prices were available only during 1981/82-1984/85.

Source: Federal-State Market News Service, U.S. Dept. of Agr.

Appendix table 2--Statistical comparison of mean and variance of C-A navel orange prices during the 1984/85 prorate suspension, and the comparable 1981/82 prorated period 1/

Price series, use, grade, and fruit size	Deflated price 2/	
	Mean test	Variance test
	t - value	F - value
Central California, f.o.b., fresh, first:		
56		74.30 (S,11,11)*
72		8.47 (S,11,11)*
88		23.66 (S,11,11)*
113		184.00 (S,11,11)*
138		542.00 (S,11,11)*

1/Midweek prices from February 7 (effective start of prorate suspension) to the end of the season. Prices are deflated by the index of prices received by farmers for all farm commodities, 1977 = 100.

2/ The "P" or "S" indicates whether prices or variance of price during the respective prorated or prorate suspension periods were greater. An asterisk ("*") with a "P" or "S" indicates whether prices or variance of price during the prorated or prorate suspension periods, respectively, were significantly greater at the 5-percent level. The number(s) within the parentheses is (are) the degrees of freedom. Mean test results are not calculated for those cases where the variance between the two periods were significantly different. No standard accepted mean test is available in those cases when the variances between the two periods are different.

Source: Federal-State Market News Service, U..S. Dept. of Agr.

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