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GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS

World Trade in Fresh Oranges: An Analysis of the Effect of European Economic Community Tariff Policies

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Giannini Foundation Monograph Number 18 · January, 1967

CALIFORNIA AGRICULTURAL EXPERIMENT STATION

The purpose of this study is to evaluate the changes in world prices, consumption, and trade of fresh oranges expected as a result of potential future agricultural trade policies of the European Economic Community (EEC). Since the EEC dominates world imports of fresh oranges its trade policies could have important effects on the orange-producing regions of the world, including the United States.

For analytical purposes, the world is divided into the several major countries and trade blocs exporting and importing significant quantities of fresh oranges. Considering transportation costs, tariffs, and import taxes, spatial equilibrium models are used to estimate the price, consumption, and trade patterns for fresh oranges under various EEC policies as projected to 1970. The concepts of economic surplus have been used to provide further evidence of the welfare effects on producer and consumer groups in the countries affected by EEC policy.

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INTRODUCTION

A LARGE number of books and articles have been written describing the trade policies developed by the Common Market, or European Economic Community (EEC). Because the Common Market countries assume major importance as importers and consumers of agricultural commodities, concern is often expressed about the effects of these trade policies on nonmember producing and exporting countries. Analysis of future conditions is difficult because the Common Market agricultural and trade policies are still in the process of development: Negotiations are being carried on between the EEC and other nations to secure a substantial lowering of trade barriers; the future size of the Common Market is still uncertain—a large number of countries in Europe, Asia, and Africa have asked for discussions leading to possible membership or association or bilateral trade agreements. Agreements are in force, or have been initiated, with Greece, Turkey, and the 18 African signatories to the "AOC" Convention (Anderson, 1965, p. 4); discussions with Nigeria, Austria and other countries are underway.

The importance of the Common Market policies for world trade necessitates appraisal of the consequences for individual commodities. This study analyzes the situation with respect to oranges. A relatively high percentage of orange production is involved in foreign trade. In the period 1957–60, one-fifth of the world's production was exported, with Western Europe importing 84 per cent of these exports. Within the EEC, only Italy is a producer of oranges.

The objectives of this study are:

1. To summarize data relating to world orange (and tangerine) production, consumption, and trade in recent years.
2. To project orange production and consumption by country to 1970 at constant prices.
3. To estimate transportation costs, present and possible future tariffs, and price elasticities of demand for fresh oranges.
4. To estimate, using transportation model analysis, the impact of possible future tariff policies of the Common Market on producer and consumer prices in each of the major countries and on trade flows of fresh oranges in international trade.
5. To analyze the welfare effects of Common Market trade policies on producers and consumers of member and nonmember countries (in-

[1] Submitted for publication May 16, 1966.

cluding the possibility of changes in membership in the EEC).

This study considers the European Economic Community as consisting of the original six countries—France, Italy, West Germany, Netherlands, Belgium, and Luxemburg. The addition of other countries as members or associates is considered in the section on pages 47–48.

WORLD PRODUCTION, CONSUMPTION, AND TRADE IN ORANGES AND TANGERINES, 1957–60

Average production, exports, imports, and consumption of oranges and tangerines for the three-year period 1957–60 are summarized in table 1. Countries are grouped according to major world production and consumption regions. World production and consumption of oranges and tangerines has steadily increased in the past few decades, reaching a level in 1960 roughly twice the level in the immediate prewar period. Rising population and income levels have increased demand to such an extent that this output expansion has taken place at generally profitable prices.

The major production areas of the world are located in the subtropical areas of North and Central America, South America, South Africa, the Mediterranean region, and Asia and Oceania. The specific locations of important production outside of Asia and Oceania are indicated in figure 1. Asia and Oceania produce almost exclusively for their domestic consumption, with only minor amounts entering into world trade. The remaining areas can be classified by the season in which their production reaches world markets. Citrus-growing areas in the southern hemisphere such as South Africa, Argentina, and Brazil have maturity seasons approximately six months out of phase with citrus areas in the northern hemisphere such as the Mediterranean and the United States. Hence, table 2 shows that South America and South Africa ship during the "summer" season—a period extending from about April to December, with the bulk of shipments taking place in the summer months. The Mediterranean region ships only during the "winter" season, extending from approximately October to June, with the bulk of the shipments taking place in the winter months. The United States produces and ships some summer oranges, primarily California-Arizona Valencias. However, the bulk of production and shipments from North and Central America consist of winter oranges. Although the winter and summer seasons have traditionally been rather distinct, an attempt to extend the length of shipping period by both winter and summer producers has caused more overlapping of the two seasons in recent years.

Table 1 shows that the Mediterranean region dominates world exports (70 per cent of the total), and that Western Europe is the most important importing region (importing 84 per cent of the total quantity exported). Most of the world trade in oranges and tangerines involves shipments between these regions. The Common Market countries of France, West Germany, and Benelux import 54 per cent of the world orange and tangerine imports, while the Common Market plus the United Kingdom account for 72 per cent of the total. Table 3 illustrates the dependence of the Common Market and United Kingdom on Mediterranean imports by showing the quantities received from each of the major exporting countries. Table 3 also shows that, for the West European consuming countries as a whole, about 15 per cent of imports are summer oranges and about 85 per cent winter oranges. However, the proportion of summer-winter consumption varies widely

TABLE 1

AVERAGE PRODUCTION, EXPORTS, IMPORTS, AND CONSUMPTION OF ORANGES AND TANGERINES, MAJOR COUNTRIES OF THE WORLD, 1957–1960

Region and country	Production	Exports	Imports	Consumption
	*1,000 metric tons**			
North and Central America	5,792 (265)	534 (265)	340 (151)	5,598 (151)
United States	4,922 (213)	434 (213)	...	4,488
Canada	...	...	340 (151)	340 (151)
Others	870 (52)	100 (52)	...	770
South America	3,215	109	...	3,106
Brazil	1,755	99	...	1,656
Argentina	633	4	...	629
Others	827	6	...	821
South Africa	423 (26)	254 (26)	...	169
Union of South Africa	313 (26)	252 (26)	...	61
Others	110	2	...	108
Mediterranean Region	4,317 (129)	2,147 (129)	37	2,207
Europe	2,419 (71)	1,150 (71)	1	1,270
Italy	802 (27)	241 (27)	...	561
Spain	1,331 (44)	884 (44)	...	447
Portugal	91	...	1	92
Greece	195	25	...	170
North Africa	791	523	0	268
Morocco	384	271	...	113
Algeria	351	218	...	133
Tunisia	56	34	...	22
Near East	1,107 (58)	474 (58)	36	669
Israel	456 (58)	362 (58)	...	94
Others†	651	112	36	575
Western Europe	...	...	2,573 (307)	2,573 (307)
France	...	...	622	622
West Germany	...	...	761 (140)	761 (140)
Benelux	...	...	273	273
Belgium-Luxemburg	...	...	115	115
Netherlands	...	...	158	158
United Kingdom and Ireland	...	...	571 (167)	571 (167)
Scandinavia‡	...	...	186	186
Switzerland-Austria-Yugoslavia	...	...	160	160
Switzerland	...	...	68	68
Austria	...	...	63	63
Yugoslavia	...	...	29	29
Eastern Europe and USSR	...	...	114	114
Asia and Oceania	1,583	36	16	1,563
Japan	847	16	...	831
Australia	144	10	...	134
New Zealand	...	...	14	14
China and others	592	10	2	584
WORLD TOTAL	15,330 (420)	3,080 (420)	3,080 (458)	15,330 (458)

* Figures not in parentheses include both fresh and processed. Figures in parentheses represent quantities processed *which enter world trade* (e.g., U. S. consumes large quantities processed which are aggregated wtih fresh consumption in U. S. data above). Total processed exports do not exactly equal total processed imports because of inadequacies of basic trade data.

† Cyprus, Egypt, Libya, Turkey, Lebanon, Jordan, and Syria are producing countries. Consuming countries include other minor countries in the Near East.

‡ Denmark, Finland, Norway, and Sweden.

SOURCE: Unpublished FAO data obtained from J. Wolf. Production, export, and import data are essentially the same as reported in FAO (1961, appendix tables 1, 2, and 3). Data here represent slight subsequent adjustments and more detailed country data from FAO. Apparent consumption derived as production − exports + imports.

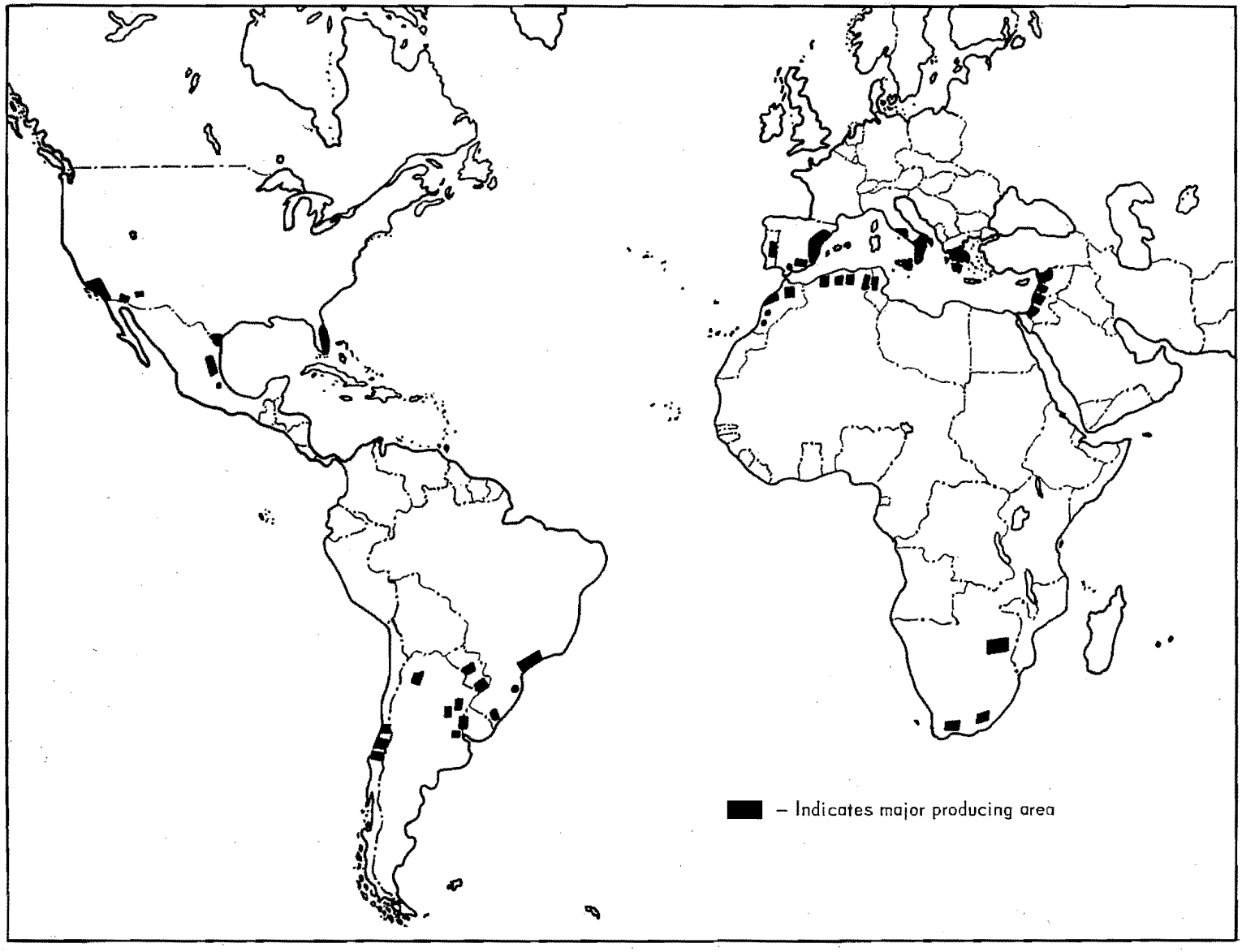

Fig. 1. Location of the major orange producing areas of the world.

TABLE 2

SUMMARY OF 1957–1960 AVERAGE PRODUCTION AND CONSUMPTION FOR ORANGES AND TANGERINES, BY SEASONS

Region and country	Production			Consumption		
	Total	Summer	Winter	Total	Summer	Winter
	*1,000 metric tons**					
North America	5,527	413	5,114	5,447	363	5,084
South America	3,215	3,215	...	3,106	3,106	...
South Africa	397	397	...	169	169	...
Italy	775	...	775	561	...	561
Spain and Portugal	1,378	...	1,378	539	...	539
Spain	1,287	...	1,287	447	...	447
Portugal	91	...	91	92	...	92
Greece	195	...	195	170	...	170
North Africa	791	...	791	268	...	268
Morocco	384	...	384	113	...	113
Algeria	351	...	351	133	...	133
Tunisia	56	...	56	22	...	22
Near East	1,049	...	1,049	669	...	669
Israel	398	...	398	94	...	94
Rest of Near East	651	...	651	575	...	575
France	...	...	...	622	40	582
West Germany	...	...	...	621	61	560
Benelux	...	...	...	273	57	216
United Kingdom and Ireland	...	...	...	404	143	261
Scandinavia	...	...	...	186	31	155
Switzerland-Austria-Yugoslavia	...	...	...	160	27	133
Switzerland	...	...	...	68	11	57
Austria	...	...	...	63	11	52
Yugoslavia	...	...	...	29	5	24
Eastern Europe	...	...	...	114	19	95
TOTAL	13,327	4,025	9,302	13,309	4,016	9,293

* Figures omit processed consumption which enter world trade; Asia and Oceania also omitted. Hence, total production and consumption do not exactly balance. In empirical work to follow, totals are balanced by increasing consumption in Eastern Europe by 9 metric tons in summer and 9 metric tons in winter. Proportion of winter and summer consumption in European consuming countries based on import trade figures in table 3, expanded proportionately to equal total consumption.

SOURCE: Same as for table 1.

among the importing countries, primarily because of institutional arrangements with specific producing regions. For instance, France consumes only about 6 per cent of its entire imports in the summer season, mostly because of its ties with North African producers of winter oranges (Morocco, Algeria, and Tunisia). On the other hand, the United Kingdom consumes about 35 per cent of its oranges in the form of summer fruit, primarily because of its relationships with the Union of South Africa.

Processed uses of citrus have become relatively important in the past ten years. The data in parentheses in table 1 indicate the estimated fresh equivalent amounts of oranges and tangerines which are processed *and* enter world trade. That is, large amounts of citrus products which are consumed domestically, mainly in the United States, do not enter the processing figures in table 1. Because data on processed citrus are incomplete and lack detail and refinement, the data shown are only rough estimates. For this reason, total exports and imports of processed fruit do not exactly balance.

TABLE 3

TRADE AMONG MAJOR EXPORTERS AND IMPORTERS, FRESH ORANGES AND TANGERINES, 1957–1960 AVERAGE BY SEASONS

Exporting regions and countries	Importing regions and countries							Exports		
	France	West Germany	Belgium-Luxemburg	Netherlands	Benelux (Belgium-Luxemburg-Netherlands)	Total Common Market	United Kingdom	Total	Summer	Winter
	*1,000 metric tons**									
North America	...	...	...	...	...	...	...	...	...	...
United States†	1.7	2.2	6.0	5.2	11.2	15.1	...	40.3	25.2	15.1
	(2.8)	(3.8)	(10.0)	(8.6)	(18.6)	(25.2)	...	...	...	...
Mexico	...	...	...	3.8	3.8	3.8	...	3.8	...	3.8
South America	...	...	...	...	...	...	...	...	...	...
Brazil	(20.2)	(15.7)	(4.0)	(14.9)	(19.8)	(55.7)	(28.0)	83.7	83.7	...
South Africa	...	...	...	...	...	...	...	...	...	...
Union of South Africa	(16.3)	(40.1)	(1.7)	(10.0)	(11.7)	(68.1)	(109.7)	177.8	177.8	...
Italy	1.2	94.3	1.7	2.5	4.2	99.7	2.9	102.6	...	102.6
Spain and Portugal	...	...	...	...	...	...	...	...	...	...
Spain	148.4	345.8	60.0	66.0	126.0	620.2	83.5	703.7	...	703.7
Greece	...	1.5	...	...	...	1.5	...	1.5	...	1.5
North Africa	...	...	...	...	...	...	...	...	...	...
Algeria	214.8	7.0	...	...	...	221.8	...	221.8	...	221.8
Morocco-Tunisia	202.5	57.9	0.1	8.1	8.2	268.6	8.4	277.0	...	277.0
Near East	...	...	...	...	...	...	...	...	...	...
Israel	6.5	39.6	13.8	22.6	36.4	82.5	134.3	216.8	...	216.8
Cyprus	...	...	...	...	...	...	21.6	21.6	...	21.6
TOTAL imports from major exporters	614.4	607.9	98.2	141.7	239.9	1,462.2	388.4	1,850.6	...	...
Summer	39.3	59.6	16.6	33.5	50.1	149.0	137.7	...	286.7	...
Winter	575.1	548.3	81.6	108.2	189.8	1,313.2	250.7	...	...	1,563.9
	per cent									
Percentage of imports, by season										
Summer	6.4	9.8	16.9	23.6	20.9	10.2	35.4	...	15.5	...
Winter	93.6	90.2	83.1	76.4	79.1	89.8	64.6	...	...	84.5
Imports from major exporters as percentage of total consumption	98.7	97.9	...	...	87 9	96.5	96.1	...	...	...

* Figures in parentheses represent shipments of summer oranges; rest of figures are winter shipments.
† Assumes same proportion of summer to winter shipments in all countries.
SOURCE: Unpublished FAO data obtained from J. Wolf.

PROJECTED WORLD PRODUCTION AND CONSUMPTION OF ORANGES AND TANGERINES, 1970

Table 4 summarizes the 1970 production and consumption projections for oranges and tangerines, along with the comparable data for the base period 1957–60. Supporting data underlying the consumption projections are also presented.

The 1970 low and high production projections in table 4 (columns 2 and 3) have been made by FAO (1962). The comments made in the FAO report describe the basis of these production projections (FAO, 1962, Part II, p. 55):

"The estimates of production in 1970 are based where possible on known tree numbers or areas and projected yields. (Footnote: Since citrus trees take some seven to nine years to reach the full bearing stage, data available on tree numbers around 1960 can provide a reliable guide to the areas likely to be in bearing in 1970. Such data were, in fact, available for most of the major exporting countries.) Where possible, account has been taken of new plantings and the likely removal of old trees. As far as yields are concerned, it was assumed that they will rise slightly as a result of improved cultivation practices, but the effect of this on output will clearly be much smaller than that of change in areas. For many citrus producing countries, however, statistics on plantings and the age distributions of trees are either inadequate or nonexistent, and in those instances the 1970 outlook could only be assessed by an extrapolation of postwar production trends. In view of these uncertainties in projecting future output, it was found preferable to give a range for the projected production.

"Thus, world production of oranges and tangerines in 1970 is projected at between 45 and 60 per cent above the average of 1957–59. Very sharp increases are expected in both the main summer orange exporting countries, Brazil and South Africa, where large new plantings have been made in recent years. Furthermore, supplies may also be expected to grow rapidly in the Mediterranean region, particularly in Israel, Morocco, Tunisia, and Spain. Production plans in Tunisia call for a doubling of output by 1970, while in Morocco and Israel one-third to one-half of the present citrus area is still in the nonbearing stage. The danger of frost damage to Spanish groves and the recent appearance of the Tristezza disease make any long-range forecast of Spain's production extremely difficult. Under favorable conditions, even the high estimate used in this paper may grossly understate the country's 1970 capacity, while on the other hand, frost and disease could reduce output considerably below the volume anticipated. Production increases in the United States will come mainly from new plantings in Florida and Texas, since planting in California has come to a standstill and is now mostly restricted to replacement of losses due to residential development.[2] As information on production and plantings of most nonexporting countries, especially in Asia and Oceania, is rather scarce, the projections are based on an extrapolation of past trends."

Table 4 also develops the 1970 consumption estimates for each country and region of the world. Essentially, 1970 consumption for each country = [1957–60 consumption] [1 + per cent

[2] More recent developments in California-Arizona orange production present a different picture than this 1960 FAO report. Although acreages of Valencia and Navel oranges continue to decline in Southern California because of urban development, the rapid rate of new plantings in the San Joaquin Valley and in Arizona has been more than offsetting. Industry sources are now projecting increases of about 35 per cent in 1970 California-Arizona production compared with the 1957–60 level. The effects of these higher projections are explicitly considered in the later analyses.

TABLE 4

PRODUCTION AND CONSUMPTION OF ORANGES AND TANGERINES, 1957–1960 AVERAGE AND 1970 PROJECTIONS, WITH SUPPORTING DATA USED IN PROJECTING 1970 CONSUMPTION*

Region and country	Production			Consumption												
	1957–60 average	1970 projection		1957–60 average consumption		Population		Per capita income			Projected income elasticity		1970 projected total consumption		1970 projected per capita consumption	
		Low	High	Total	Per capita	Mid-1958	1970 projection	Mid-1958	1970 projection							
									Low	High	Low	High	Low	High	Low	High
	1,000 metric tons			*1,000 metric tons*	*kilograms*	*millions*		*dollars*					*1,000 metric tons*		*kilograms*	
	1	2	3	4	5	6	7	8	9	10	11		12	13	14	15
North and Central America	5,792 (265)	7,825 (282)	8,525 (282)	5,598 (151)	22.0	254.9	324.6	...	...	...	...	...	7,447 (157)	8,808 (157)	22.9	27.1
United States	4,922 (213)	6,825 (230)	7,425 (230)	4,488	25.7	174.8	215.0	2,235	2,593	3,017	.25	.65	5,741	6,790	26.7	31.6
Canada				340 (151)	20.0	17.0	21.9	1,720	1,995	2,322	.35	.60	465 (157)	531 (157)	21.2	24.2
Others	870 (52)	1,000 (52)	1,100 (52)	770	12.2	63.1	87.7	545	685	756	.60	1.00	1,241	1,487	14.2	17.0
South America	3,215	4,985	5,245	3,106	23.3	133.1	177.9	...	...	...	...	...	4,655	5,564	26.0	31.3
Brazil	1,755	3,115	3,255	1,656	25.7	64.4†	86.3†	390	476	526	.50	1.00	2,463	2,996	28.5	34.7
Argentina	633	1,090	1,160	629	27.5	22.9‡	27.9‡	825	965	1,048	.60	.80	846	936	30.3	33.5
Others	827	780	830	821	17.9	45.8	63.7	560	728	801	.60	1.00	1,346	1,632	21.1	25.6
South Africa	423 (26)	640 (26)	790 (26)	169	1.1	154.5	204.4	...	...	...	...	...	249	303	1.2	1.5
Union of South Africa	313 (26)	520 (26)	650 (26)	61	4.2	14.4	18.1	835	1,002	1,194	.50	1.00	85	110	4.7	6.1
Others	110	120	140	108	0.8	140.1	186.3	210	246	281	.80	1.00	164	193	0.9	1.0
Mediterranean Region	4,317 (129)	6,615 (264)	7,435 (264)	2,207	9.6	230.6	286.6	...	...	...	...	...	3,297	4,085	11.5	14.2
Europe	2,419 (71)	3,460 (76)	3,904 (76)	1,270	13.2	95.8	104.6	...	...	...	...	...	1,854	2,353	17.7	22.4
Italy	802 (27)	1,065 (32)	1,145 (32)	561	11.5	48.9	52.8	925	1,554	1,702	.70	.90	897	1,067	17.0	20.2
Spain	1,331 (44)	1,900 (44)	2,200 (44)	447	15.0	29.7	33.0	525	840	945	.40	.90	615	853	18.6	25.8
Portugal	91	158	179	92	10.2	9.0	9.5	490	662	740	.50	.70	114	132	12.0	13.9
Greece	195	337	380	170	20.7	8.2	9.3	520	832	936	.30	.70	228	301	24.5	32.4
North Africa	791	1,380	1,535	268	9.8	27.4	37.0	315¶	378¶	450¶	.60	.80	406	485	11.0	13.1
Morocco	384	690	755	113	...	...	...	...	...	...	...	...	171	204	...	...
Algeria	351	550	600	133	...	...	...	...	...	...	...	...	203	242	...	...
Tunisia	56	150	180	22	...	...	...	...	...	...	...	...	32	39	...	...
North East	1,107 (58)	1,765 (188)	1,096 (188)	669	6.2	107.4	145.0	311§	384§	443§	.80	1.00	1,037	1,247	7.2	8.6
Israel	456 (58)	800 (188)	900 (188)	94	47.0	2.0	2.7	...	...	...	...	...	145	175	53.7	64.8
Others‖	651	965	1,096	575	5.4	105.4	142.3	...	...	...	...	...	892	1,072	6.3	7.5
Western Europe	...	...	...	2,573 (307)	11.4	225.0	243.7	...	...	...	...	...	3,451 (473)	4,356 (473)	14.2	17.9
France	...	...	...	622	13.9	44.8	49.3	1,405	2,164	2,360	.40	.80	834	1,053	16.9	21.4
West Germany	...	...	...	761 (140)	13.9	54.7	59.1	1,490	2,399	2,622	.60	1.10	1,126 (256)	1,512 (256)	19.0	25.6
Benelux	...	...	...	273	13.2	20.7	22.8	...	...	...	...	...	384	460	16.8	20.2
Belgium-Luxemburg	...	...	...	115	12.2	9.4	10.1	1,395	1,772	2,009	.70	.80	150	161	14.9	15.9
Netherlands	...	...	...	158	14.0	11.3	12.7	1,260	2,054	2,230	.50	.90	234	299	18.4	23.5
United Kingdom and Ireland	...	...	...	571 (167)	10.4	54.6	57.3	1,515**	1,924**	2,166**	.50**	.60**	683 (217)	755 (217)	11.9	13.2
Scandinavia††	...	...	...	186	9.4	19.8	21.6	1,396	1,859	2,085	.40	1.00	229	302	10.6	14.0
Switzerland-Austria-Yugoslavia	...	...	...	160	5.3	30.4	33.6	...	...	...	...	...	195	274	5.8	8.2
Switzerland	...	...	...	68	13.1	5.2	5.6	1,480	2,116	2,368	.35	1.00	84	117	15.0	20.9
Austria	...	...	...	63	9.0	7.0	7.1	1,235	1,976	2,223	.40	1.00	79	115	11.1	16.2
Yugoslavia	...	...	...	29	1.6	18.2	20.9	730	1,234	1,467	.40	1.00	32	42	1.5	2.0
Eastern Europe and USSR	...	...	...	114	0.4	304.0	357.0	...	...	...	...	...	200‡‡	239‡‡	0.6	0.7
Asia and Oceania	1,583	2,180	2,450	1,563	1.0	1,509.3	1,957.4	...	...	...	...	...	2,367	2,851	1.2	1.5
Japan	847	1,300	1,500	831	9.0	91.8	100.1	910	1,693	1,893	.50	.70	1,296	1,595	12.9	15.9
Australia	144	180	200	134	13.7	9.8	12.4	1,575	1,780	2,000	.40	.70	179	202	14.4	16.3
New Zealand	...	...	...	14	6.1	2.3	2.9	1,560	1,763	1,981	.45	.60	18	20	6.2	6.9
China and others	592	700	750	584	0.4	1,405.4	1,842.0	165¶¶	191¶¶	223¶¶	.90¶¶	1.00¶¶	874	1,034	0.5	0.6
WORLD TOTAL	15,330 (420)	22,245 (572)	24,445 (572)	15,330 (458)	5.4	2,811.4	3,551.6	...	...	...	...	...	21,666 (630)	26,206 (630)	6.1	7.4

* Figures include both fresh and processed. Figures in parentheses represent quantities processed which enter world trade.
† Includes Paraguay.
‡ Includes Uruguay.
¶ Includes other minor countries of North Africa.
§ Includes other minor countries in Near East.
‖ Cyprus, Egypt, Libya, Turkey, Lebanon, Jordan, and Syria are producing countries. Consuming countries include other minor countries in Near East.
** United Kingdom only.
†† Denmark, Finland, Norway, and Sweden.
‡‡ Index of import demand directly from FAO (1962*a*, table 3, part II, p. 59).
¶¶ Omits China.

SOURCE: Columns 1, 4: Table 1.

Columns 2, 3: Basic projections from FAO (1962*a*, table 2, part II p. 58), obtained from J. Wolf, FAO, Rome.
Columns 6, 7, 8, 9, and 10: FAO (1962a, table M-2, p. A-3, 4).
Column 11: Table 5.
Columns 12, 13: 1970 consumption = [1957–60 consumption] [1 + per cent increase in population from 1957–60 to 1970] [1 + (per cent increase in per capita income from 1957–60 to 1970) (income elasticity of demand)]. Low consumption projection based on a combination of low per capita income and low income elasticity. High consumption projection based on a combination of high per capita income and high income elasticity.
Columns 5, 14, 15: Per capita consumption obtained by dividing total consumption by relevant population figures.

increase in population] [1 + (per cent increase in per capita income) (income elasticity)].[3] The "low" consumption projections combine low per capita income and low income elasticity estimates, while the "high" consumption projections combine high per capita income and high income elasticity estimates. For example, the 1970 United States low consumption estimate = (4,488) (1.23) [1 + (0.16) (0.25)] = (4,488) (1.23) (1.04) = 5,741. Thus, consumption is seen to increase as a result of the "population effect" (1.23) and the "income effect" (1.04). These increases in consumption are based on the assumptions of an assumed constant price level and unchanged relative prices between oranges and competing fruits.

With generally large increases in per capita income levels projected for most of the major consuming countries, the estimates of income elasticity of demand take on considerable importance. Table 5 presents a summary of the estimates employed in deriving the income elasticity figures used in projecting consumption in table 4. The income elasticity estimates reported by FAO (1959, appendix tables 5 and 9, and discussion, pp. 17–18) were derived from cross-section studies of household budgets and analyses of time series data. In general, demand for citrus is relatively more elastic with respect to income than food as a whole. Furthermore, in most countries demand is more income elastic for citrus than for most other fresh fruits. A later study by FAO, projecting demand to 1970, reduced the earlier income elasticity estimates somewhat, based on the assumption that income elasticities tends to fall with increases in the level of income.[4]

In our study we chose low and high income elasticities reflecting the likely range of outcomes for 1970. For the low estimates, we chose the FAO income elasticity estimates for "all fruits and vegetables" (FAO, 1962, pp. A-14, 15), partly because these estimates were available for all countries, both producing and consuming. In addition, because citrus is generally more income elastic than other fruits, the estimates for all fruits and vegetables should serve as reasonable lower limits to the income elasticity for oranges. The high income elasticity estimates were selected to be generally consistent with the FAO high estimates for 1965, because they could be expected to reasonably reflect an upper limit in citrus consumption for 1970.

Processed oranges differ considerably from fresh oranges in terms of income elasticities, prices paid to producers, transportation costs, and many other characteristics. Data on processed oranges also are quite fragmentary. For these reasons it was decided to project independently the exports and imports of processed oranges and to eliminate them from further analysis—i.e., to work only with fresh oranges and tangerines. Inasmuch as processed oranges have recently represented only about 12 to 13 per cent (fresh equivalent) of the total world trade in oranges, their exclusion is not likely to be serious unless prices should drop sharply, forcing substantial diversion of fresh oranges to the processed outlets. Figure 2 summarizes the trends and projections of exports and imports of all citrus juices by major exporting and importing countries and the total for the world. The data are not sufficiently detailed to distinguish among various kinds of citrus juices or between concentrated and single-strength juices. Hence, data are not strictly comparable among countries or even necessarily in the time series for a single country. However, despite these difficulties, FAO concludes that "these statistics may be regarded with some degree of confidence as reliable indicators of at least the long-term trends of

[3] Percentages expressed in decimal form throughout.

[4] FAO (1962a, part II, pp. 54–60). Income elasticities are not presented directly in this report, but were obtained by the authors from the unpublished underlying computations.

TABLE 5

SUMMARY OF INCOME ELASTICITY OF DEMAND ESTIMATES PUBLISHED AND ESTIMATED FOR ORANGES AND TANGERINES

Region	FAO estimates for 1965*		FAO estimates for 1970†		FAO all vegetables and fruits for 1970‡	High estimates by authors¶
	Low	High	Low	High		
North and Central America	...	...	...	...	.30	...
United States	...	...	.20	.40	.25	.65§
Canada	.45	.60	.38	.45	.35	.60
Others	...	...	...	...	.50–.70	1.00
South America	...	...	...	...	...	...
Brazil	...	...	.70	.80	.50	1.00
Argentina	...	...	.25	.60	.60	.80
Others	...	...	...	...	.60	1.00
South Africa	...	...	...	...	...	...
Union of South Africa	...	...	1.50	1.60	.50	1.00
Others	...	...	...	...	.80	1.00
Mediterranean Region	...	...	...	...	...	...
Europe	...	...	...	...	...	...
Italy	...	...	.35	.48	.70	.90
Spain	...	...	.35	.50	.40	.90
Portugal	...	...	...	...	.50	.70
Greece	...	...	...	...	.30	.70
North Africa	...	...	...	...	.60	.80
Morocco	...	...	.55	.70	...	...
Algeria	...	...	...	...	...	...
Tunisia	...	...	...	...	...	...
Near East	...	...	...	...	.80	1.00
Israel	...	...	...	...	...	...
Others	...	...	...	...	...	...
Western Europe	...	...	...	...	...	...
France	.60	.80	.50	.60	.40	.80
West Germany	.80	1.10	.55	.65	.60	1.10
Belgium-Luxemburg	.60	.70	...	...	.70	.80
Netherlands	.70	.90	.55	.65	.50	.90
United Kingdom and Ireland	.50	.60	.38	.50	.50	.60
Scandinavia	.80	1.00	.65	.70	.40	1.00
Switzerland	.60	1.00	.38	.50	.35	1.00
Austria	.90	1.00	.55	.70	.40	1.00
Other countries	.80	1.00	...	...	...	1.00
Eastern Europe	...	...	...	...	...	...
Asia and Oceania	...	...	...	...	...	...
Japan	...	...	.45	.45	.50	.70
Australia	...	...	...	.45	.40	.70
New Zealand	.40	.60	.25	.40	.45	.60
Others	...	...	...	...	.90	1.00

* FAO (1959, Appendix table 9). These estimates were made for projecting fresh citrus production to 1965.
† Derived from unpublished FAO data underlying 1970 projections for oranges and tangerines in FAO (1962a, part II, pp. 54–60).
‡ FAO (1962a, appendix table M-4, p. A-14, 15).
¶ Judgment estimates based on data in remainder of this table. Generally consistent with FAO high estimate for 1965.
§ Based on estimate of 0.67 derived by Nerlove and Waugh (1961).

the industry" (FAO, 1961, p. 8). Thus, we have used the FAO data to project the trend to 1970, with the resulting projection used as a crude index of the changes in exports and imports of processed oranges and tangerines between 1957–60 and 1970. These projections are converted to a fresh equivalent basis and reported in parentheses in table 4 (columns 2, 3, 12, and 13). As noted,

TABLE 6

SUMMARY OF 1970 PRODUCTION AND CONSUMPTION PROJECTIONS FOR ORANGES AND TANGERINES, BY SEASONS*

Region and country	Low production			High production			Low consumption			High consumption		
	Total	Summer	Winter	Total	Summer	Winter	Total	Summer	Winter	Total	Summer	Winter
	1,000 metric tons						*1,000 metric tons*					
North America†	7,543	249	7,294	8,243	270	7,973	7,290	463	6,827	8,651	549	8,102
United States (Ariz.-Calif.)	...	249	1,065	...	270	1,164	...	...	...	...	...	...
United States (East Coast)	...	...	5,281	...	...	5,761	...	...	...	...	...	...
Central America	...	...	948	...	...	1,048	...	...	...	...	...	...
South America	4,985	4,985	...	5,245	5,245	...	4,655	4,655	...	5,564	5,564	...
South Africa	614	614	...	764	764	...	249	249	...	303	303	...
Italy	1,033	...	1,033	1,113	...	1,113	897	...	897	1,067	...	1,067
Spain and Portugal	2,014	...	2,014	2,335	...	2,335	729	...	729	985	...	985
Spain	1,856	...	1,856	2,156	...	2,156	615	...	615	853	...	853
Portugal	158	...	158	179	...	179	114	...	114	132	...	132
Greece	337	...	337	380	...	380	228	...	228	301	...	301
North Africa	1,390	...	1,390	1,535	...	1,535	406	...	406	485	...	485
Morroco	690	...	690	755	...	755	171	...	171	204	...	204
Algeria	550	...	550	600	...	600	203	...	203	242	...	242
Tunisia	150	...	150	180	...	180	32	...	32	39	...	39
Near East	1,577	...	1,577	1,808	...	1,808	1,037	...	1,037	1,247	...	1,247
Israel	612	...	612	712	...	712	145	...	145	175	...	175
Rest of Near East	965	...	965	1,096	...	1,096	892	...	892	1,072	...	1,072
France	...	...	...	...	...	...	834	131	703	1,053	166	887
West Germany	...	...	...	...	...	...	870	137	733	1,256	198	1,058
Benelux	...	...	...	...	...	...	384	60	324	460	72	388
United Kingdom and Ireland	...	...	...	...	...	...	466	73	393	538	85	453
Scandinavia	...	...	...	...	...	...	229	36	193	302	48	254
Switzerland-Austria-Yugoslavia	...	...	...	...	...	...	195	31	164	274	43	231
Switzerland	...	...	...	...	...	...	84	13	71	117	18	99
Austria	...	...	...	...	...	...	79	13	66	115	18	97
Yugoslavia	...	...	...	...	...	...	32	5	27	42	7	35
Eastern Europe	..	...	...	...	...	...	200	31	169	239	38	201
TOTAL	19,493	5,848	13,645	21,423	6,279	15,144	18,669	5,866	12,803	22,725	7,066	15,659

* Figures omit projected processed production and consumption which enter world trade. Asia and Oceania are omitted. The key assumptions for dividing consumption into summer and winter seasons are discussed in the text.

† North America production broken down between winter and summer by authors as follows: Total U. S. production projections to 1970 taken from Black (1961). Projections from California Navels taken from Sunkist (1960a). Projections for summer oranges assumes California Valencia acreage continues to fall, reaching 40,000 acres in 1970, with a yield of 200 boxes per acre. Arizona acreage assumed to be increased by 1,500 acres per year through 1965, with present 5,000 acres yielding at 200 boxes per acre and new acreage yielding 150 boxes per acre by 1970. Trends in production and new plantings from Sunkist (1960b). Resulting projections adjusted to fresh consumption, assuming 86 per cent of California-Arizona Navels and 65 per cent of California-Arizona Valencias continue to be consumed fresh. Recent California-Arizona projections are higher than those shown in this table. Therefore, later analyses in the text examine the effects of higher California-Arizona production.

SOURCE: Total production and consumption projections from table 4. Winter and summer breakdown of production and consumption based on methods explained in footnotes above.

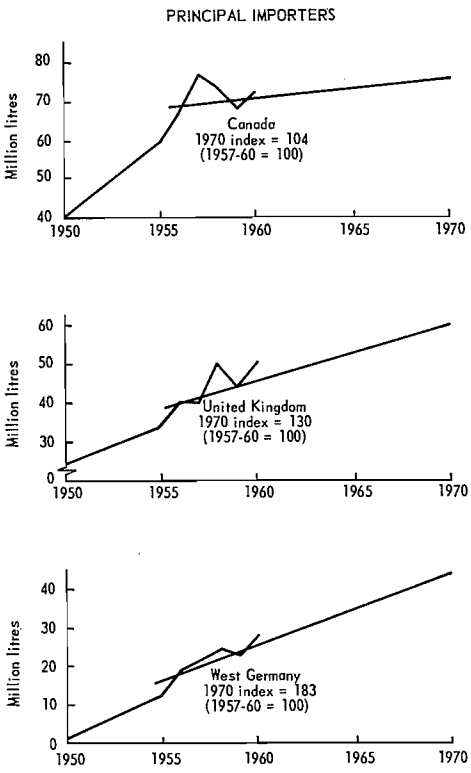

Fig. 2. Imports and exports of all citrus juices, 1950–1960, and projected to 1970, principal countries and world total. Source: FAO (1961, tables 3,4). Freehand 1970 projections by the authors.

total exports and imports of processed products do not balance exactly in 1970, but no further adjustment is made for this slight discrepancy. Hereafter, all data will represent only fresh oranges and tangerines.[5]

Table 6 presents the final 1970 production and consumption projections for oranges and tangerines, high and low, by season, and by region and country. The "total" production and consumption figures by country are those developed in table 4, minus estimated processed amounts exported and imported. In table 6 and in later analyses, the region "Asia and Oceania" is omitted from consideration. It is assumed that this region will continue to be essentially isolated from the rest of world orange trade because of great distances and therefore high transportation costs to European markets, and because projected production and consumption are reasonably in balance at constant price levels.

Because of the distinct seasonal nature of production in all countries except the United States, the "total" projected 1970 production in table 6 is readily broken down between summer and winter seasons. "Total" projected 1970 consumption is divided into summer and winter seasons using the following assumptions: (1) North America will continue winter and summer fruit in the same proportions as in 1957–60; (2) all other producing areas will continue *not* to import oranges or tangerines in their "off season"; and (3) the European importing countries will each consume winter and summer fruit in 1970 in the same proportion as Europe as a whole consumed in 1957–60 (i.e., about 15 per cent summer and 85 per cent winter).

Each of these assumptions deserves comment. If United States production of Valencias expands at a slower rate than Navels, North America's consumption of summer oranges will probably expand at a slower rate than winter consumption. However, the projections are predicated on a *constant* price level, indicating what consumers would presumably choose to purchase at recent average prices. Hence, a change in relative prices could change the proportions of winter and summer consumption, but *if* prices remain constant, it is assumed that consumers will tend to maintain their seasonal preferences.

The second assumption recognizes the fact that, in the past, producing countries have *not* imported oranges and tangerines in the opposite season of production (see table 1), and that some countries have legislation which impedes

[5] More accurately, only processed citrus which enters world trade (i.e., exports and imports) is subtracted from total production and consumption. Some producing countries, particularly the United States, consume large quantities of processed citrus.

such imports. Whether this situation will continue to 1970 is open to speculation. However, it seems questionable that the amount of imports into producing countries in their "off season" would become a significant factor in the market by 1970.

The third assumption is perhaps most open to question. In the past, the proportions of winter to summer fruit consumed have varied considerably among European countries (see table 3), but these proportions could be traced directly to the institutional relations between exporter and importer (e.g., North Africa–France and South Africa–United Kingdom). With a general movement toward relaxation of trade barriers under impetus of the Common Market, it appears doubtful that European consuming countries would choose, at constant prices, to continue to import summer and winter oranges and tangerines in the 1957–60 proportions. Hence, the assumption is made that individual European consuming countries would adjust their pattern of consumption, at constant prices, until each consumes winter and summer fruit in the same proportion (85 per cent, winter; 15 per cent, summer). This ratio is what the European group as a whole consumed in the base period 1957–60, and, perhaps more important, is the approximate relationship between projected 1970 winter and summer production *available* for export to the European countries by the producing countries.

The long-range production and consumption projections summarized in table 6 were made by FAO about 1960–61 and have not been revised at the time of this writing. However, the years elapsed since the projections were made permits a comparison of the projections with the course of actual observations (summarized and discussed in detail in appendix B). Comparison of 1970 projections with the latest available data (production through 1964–65 and consumption through 1963) suggest that the 1970 "high" production–"high" consumption projection is more likely to be attained than the other three alternative combinations considered for *winter* oranges. For *summer* oranges, the 1970 "low" production–"high" consumption projections appear most plausible. For this reason, primary emphasis is placed on the results based on these "most likely" sets of projections. Appendix C summarizes the range of results corresponding to the "less likely" projection sets.

Mechanism for balancing demand and supply projections

From table 6 it can be seen that the quantities projected to be produced and consumed in 1970 at constant prices do not balance. One purpose of the later empirical analysis is to find the changes in price levels and shipping patterns necessary to equate demand and supply in 1970. The mechanics of this procedure are discussed in subsequent sections. However, a general indication of the assumptions underlying the procedure may be helpful here.

It is assumed that supply in 1970 is predetermined at the projected level, i.e., that the supply function in each producing country is completely inelastic. The rationale for this assumption is that orange trees require three to four years from planting until significant bearing and even longer before reaching full production. Therefore, the supply in 1970 is largely determined by trees planted by 1964–65, unless tree removal rates are radically changed in the intervening period. This assumption does not deny the probability that there is a positive supply response of orange production to prices in the long run. However, the time lag in response from planting time to significant production is sufficiently long in oranges so that five-year supply projections can be safely made without reference to price.

Consumption, on the other hand, is assumed to be responsive to price in the time period under consideration. Thus,

a complete demand curve is constructed for each country in 1970: A single point on that demand curve is established by the point estimate of quantity consumed in 1970 at current prices; the shape of the demand curve through that point is based on estimates of the price elasticity of demand. Thus the predetermined (inelastic) quantities supplied are moved into consumption by changes in prices along the individual country demand curves. The procedure for finding equilibrium solutions to the projected situations employs an iterative procedure with a standard transportation model.

The hypothesized directions of change in the general level of prices for the alternative sets of 1970 projections are summarized here. It remains for later analyses to give quantitative content to these hypotheses.

Summer season				Winter season			
Production		Consumption	Price level	Production		Consumption	Price level
Low	=	Low	Little change	Low	>	Low	Decrease
Low	<	High	Increase	Low	<	High	Increase
High	>	Low	Decrease	High	>	Low	Decrease
High	<	High	Increase	High	<	High	Increase

DEMAND, TRANSPORTATION, AND TARIFF RELATIONSHIPS AMONG COUNTRIES

As stated, the 1970 projected production and consumption qauntities do not balance at constant prices. This section indicates the mechanism for equating production and consumption through the pricing system.

Projection procedure for estimating import and export demand

In international citrus trade, most consumer demand functions in the important citrus importing countries have been estimated at the wholesale import level. In this study, therefore, the price elasticity of demand has been estimated for the major consuming countries measured at the import demand level; more precisely, at the location of consumption, but before retail margins were added to the wholesale price. Transportation costs from producing country to consuming point as well as tariffs and any special import taxes have been included in determining the wholesale price level. In simple terms, the structure of prices is assumed to follow equations (1) and (2):

(1) $P_{cw} = P_{pe} + T_r + T_a$

(2) $P_{cc} = P_{cw} + M$

where:

P_{cw} = wholesale price in consuming country

P_{pe} = export price in producing country

T_r = transportation cost from producing country to point of consumption

T_a = tariff plus any special import taxes in consuming country

P_{cc} = consumer price

M = margin between wholesale and retail price in consuming country.

Hence, equation (1) states that the wholesale price in the consuming country equals the export price in the producing country plus transportation costs, tariffs, and special import taxes. Equation (2) states that consumer prices equal wholesale prices plus retail margins.

While the above definitions are straightforward, the problem of implementing them empirically involves numerous difficulties. The reasoning followed in moving from the 1957–60 actual situation to the projected situation

for 1970, and the necessary simplifying assumptions made, are set forth in figure 3. Three basic situations are considered: Part A assumes a continuation of 1957–60 tariff structures to 1970. This would presumably represent a reasonable future projection in the absence of the Common Market. Part B represents a shift from the present tariff structure to one of "free trade"—i.e., no tariffs. Although this situation represents an unlikely development, it provides a useful and interesting point of comparison. Part C shows the assumed situation with a lowering of tariffs. For example, this would be the case in certain European countries if a common external tariff for the Common Market replaces individual country tariffs. Of course, for certain other countries, a common external tariff would mean revising present tariffs upward.

In part A., figure 3, all of the data for the present situation (1957–60) are known: i.e., consumer prices (P_{cc}), wholesale prices (P_{cw}), wholesale-to-retail margin (M), tariffs and special import taxes (T_a), and transportation costs (T_r). Previously, the 1970 consumption has been projected to 1970 based on constant prices (i.e., constant P_{cc} and P_{cw}). Hence, one point is given on both the 1970 wholesale demand (D_w) and consumer demand (D_c) functions. Using the point on the wholesale demand function to establish its level or position, the price elasticity of demand at wholesale (assumed constant) determines the shape of the wholesale demand curve. All other demand functions are derived from the wholesale demand function (D_w). The following simplifying assumption is then made: margins (M) and transportation costs (T_r) will remain constant in absolute terms to 1970 *for all levels of quantity demanded.* This assumption is probably reasonable for transportation costs. Most of the major shipping routes apparently carry, and should continue to carry, sufficient traffic to take advantage of any significant scale economies in transportation. Hence, exporters face essentially constant unit transportation costs. The assumption of constant margins (M) is not used directly in the transportation model solutions in this study since demand elasticity is measured at wholesale. However, in measuring welfare effects on consumers, the constant margin (M) is used in estimating the consumer demand curve from the wholesale demand curve.[6] Most tariffs and taxes are based on a percentage of the wholesale import price. Therefore, T_a is applied as a constant percentage of the wholesale price in the empirical work to follow.

Under the assumptions discussed above, figure 3, part A, shows the relationship between consumer, wholesale import, and export demand under a continuation of present tariff structure. Part B shows that the export demand function would shift upward by the amount of the tariff in 1957–60 (T_{a1}) if all tariffs are removed. Part C shows the position of the export demand function relative to wholesale import demand when tariffs have been lowered from T_{a1} to T_{a2}.

The above discussion is in terms of tariffs as the only barriers to trade. In recent years, such nontariff-trade barriers as quotas and quality regulations have been employed in some cases. Most quotas have been based on favored treatment granted by importers to producing countries which were formerly their colonies. Such arrangements appear to be weakening and, for the cases to be analyzed later, are assumed to be removed entirely. Because the quality regulations to be employed in the future by EEC countries are currently under

[6] Levie (1959, p. 5) points out that margins (defined as the difference between CIF and retail prices) average about 125 per cent for tropical and subtropical fruit. When quantities are scarce and prices rise, margins reach 150 per cent; when quantities rise and prices fall, margins drop to 90 to 110 per cent. However, Levie's estimates on this point do not appear sufficiently precise to recommend an assumption other than a constant margin.

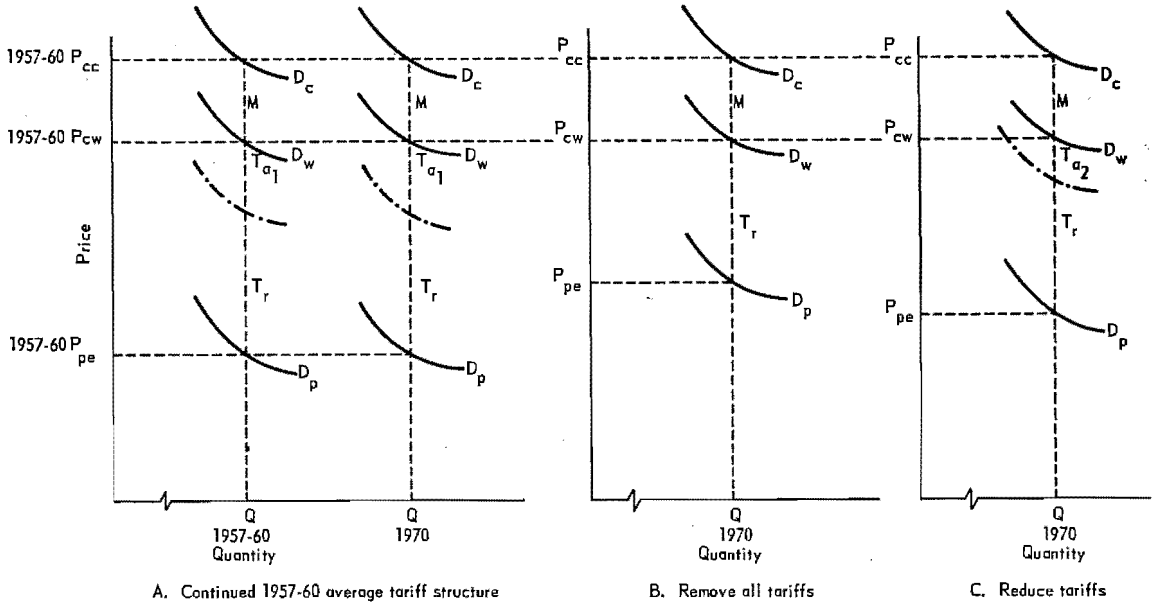

Fig. 3. Demand relationships 1957–1960 and projected 1970, at retail, wholesale, and producer levels, under three different tariff assumptions.

debate, no restrictions due to quality alone were included for these countries. Stringent quality regulations on orange imports have been imposed by the United States. The effects of removing these are discussed later.

The following sections examine in detail each of the critical components of the pricing structure: demand elasticities, transportation costs, and tariffs.

Estimates of price elasticities of demand

Table 7 summarizes the available estimates of price elasticities of demand related to oranges and tangerines, some further statistical estimates made by the authors, and the final set of price elasticities adopted for the analyses in this study. Although some of the previously published estimates relate to "sales" rather than "quantity," or are measured at the retail or farm level rather than wholesale, they are presented to provide as complete a picture as possible. In addition to those elasticities given here for the main consuming countries, it is necessary to know something of price elasticity of demand for domestic consumption in the producing countries.

Table 8 presents the data and regression estimates of demand obtained by the authors for three of the important Mediterranean producing countries for which at least some data could be obtained. Although these time series are very short (particularly for Morocco), and the data undoubtedly less reliable than for Western European countries and the United States, the resulting estimates of price elasticity are consistently close to 0.9[7] and the underlying price coefficients statistically significant at levels of from 10 to 20 per cent.[8]

[7] Price elasticity is defined throughout as

$$E_p = -\frac{\partial q}{\partial p} \cdot \frac{p}{q}.$$

Thus, all price elasticities are stated as positive values.

[8] The associated estimates of income elasticities are high (unreasonably so for Spain) and generally unreliable statistically, but are presented here only as a matter of interest since income elasticities were estimated separately at an earlier stage. Income was included in the demand equations of table 8 to attempt an isolation of the *net* effect of prices on quantity demanded.

TABLE 7

SUMMARY OF PRICE ELASTICITIES OF DEMAND ESTIMATES RELATED TO CITRUS OR ORANGES AND TANGERINES

Region and country	Available statistical studies				Estimates of price elasticities of demand adopted for this study	
	Authors	Definition of variables		Statistical estimates of price elasticity of demand	Constant	"Best" estimate
		Price	Quantity			
North America	.....	.....	.....	...	0.8	0.8
United States	Nerlove and Waugh (1961)	Prices received by growers	Quantity of oranges	0.72, 0.80	0.8	0.8
Others	.....	.....	.....	...	0.8	0.8
South America	.....	.....	.....	...	0.8	0.8
South Africa	.....	.....	.....	...	0.8	0.8
Mediterranean Region	.....	.....	.....	...	...	...
Europe	.....	.....	.....	...	...	...
Italy	Dean and Collins (see table 8)	Prices received by growers	Quantity of oranges	0.9	0.8	0.9
Spain and Portugal	Dean and Collins (see table 8)	Wholesale prices	Quantity of oranges (Spain only)	0.9	0.8	0.9
Greece	.....	.....	.....	...	0.8	0.9
North Africa	Dean and Collins (see table 8)	Retail price (Casablanca)	Quantity of oranges (Morocco only)	0.9	0.8	0.9
Near East	.....	.....	.....	...	0.8	0.9
Western Europe	.....	.....	.....	...	...	...
France	Goreux and Wolf (1959)	Retail prices	Quantity of oranges	0.84	0.8	0.6
West Germany	Levie (1959)	Import prices (CIF)	Sales of tropical and subtropical fruit	0.8	0.8	0.8
	Goreux and Wolf (1959)	Retail prices	Quantity of oranges	1.01	...	...
Benelux	.....	.....	.....	...	...	...
Belgium-Luxemburg	.....	.....	.....	...	0.8	0.7
Netherlands	Levie (1959)	Import prices (CIF)	Quantity of oranges	0.7	0.8	0.7
	Netherlands Economic Institute (1960)	Import prices (CIF)	Quantity of oranges and tangerines	1.0	0.8	0.7
United Kingdom and Ireland	Levie (1959)	Import prices (CIF)	Quantity of oranges and tangerines	1.67	0.8	1.7
	Bain and Brown (1958)	Retail prices	Quantity of oranges (monthly data)	1.5	...	...
	Brown (1959)	Retail prices	Quantity of oranges (monthly data)	1.7	...	...
Scandinavia	Levie (1959)	Import prices (CIF)	Sales of oranges and tangerines	0.4	0.8	0.4
Switzerland-Austria-Yugoslavia	.....	.....	.....	...	0.8	0.8
Eastern Europe and USSR	.....	.....	.....	...	0.8	0.8

TABLE 8

DATA AND DEMAND EQUATIONS FOR DOMESTIC CONSUMPTION ESTIMATED FOR ITALY, SPAIN, AND MOROCCO

Year	Italy*			Spain†			Morocco‡		
	Q	P	I	Q	P	I	Q	P	I
	Per capita availability	Real farm price	Per capita real income	Per capita consumption	Real wholesale price	Per capita real income	Per capita consumption	Real retail price	Per capita real income
	index			*kilograms*	*index*		*kilograms*	*index*	
1950	8,601	5,092	89.9	....	....	....	....	....	....
1951	6,897	5,507	93.9	8.33	1.24	7.44	....	....	....
1952	8,225	4,662	95.0	11.91	1.36	7.97	....	....	....
1953	9,389	5,136	100.0	12.60	2.29	8.01	....	....	....
1954	8,151	4,943	102.6	5.21	1.80	8.88	8.67	75.6	56.3
1955	9,803	4,208	108.2	14.31	2.38	8.92	7.62	62.8	53.0
1956	7,480	5,050	109.5	17 16	2.41	9.58	6.73	79.0	50.7
1957	8,868	5,253	114.1	5.61	4.23	10.67	8.97	50.4	47.4
1958	11,352	4,138	115.2	13.37	4.52	10.48	11.09	51.2	50.5
1959	10,807	3,912	121.7	14.95	3.03	10.33	....	....	....
1960	....	....	....	21.69	4.19	10.25	....	....	....

Italy: First Differences: $\Delta Q = 98.81 - 1.70\,\Delta P + 13.67\,\Delta I$ (0.87) (26.05) $R^2 = 0.35$ $E_P = -.92$ $E_I = 1.6$

Spain: Actual Data: $Q = -36.41 - 4.87\,P + 6.74\,I$ (2.74) (2.56) $R^2 = 0.59$ $E_P = -.88$ $E_I = 4.6$

Morocco: Actual Data: $Q = 4.52 - 0.1256\,P + 0.2346\,I$ (0.0603) (0.2670) $R^2 = 0.65$ $E_P = -.93$ $E_I = 1.4$

(standard errors in parentheses)

* Total quantity = domestic consumption (i.e., total production minus exports); price is farm value per unit deflated by cost of living index. Income is national disposable income per capita divided by the cost of living index. Unpublished data obtained from Franceso DeStefano, Centro Di Specializzazione Per Il Mezzogiorno, Portici, Italy.

† Total quantity = domestic consumption (FAO unpublished data from J. Wolf); wholesale price is "blanca" quality (FAO data from J. Wolf). National income, population, and cost of living index from unpublished FAO data obtained from M. de Nigria. Price and income deflated by cost of living index.

‡ Total quantity = domestic consumption (FAO unpublished data from J. Wolf); retail price of oranges in Casablanca (unpublished FAO data from J. Wolf). National income, population, and cost of living index from unpublished FAO data obtained from M. de Nigria (pertain to Southern Zone only). Price and income deflated by cost of living index.

The final two columns of table 7 show the estimates of price elasticity of demand adopted by the authors for 1970 for the various countries of the world. The first set uses a constant price elasticity of 0.8 in all countries—from the estimates available from various sources, this figure was approximately an overall average. The second set uses the "best" estimates available from the various sources. In deriving the "best" estimates, most weight was given to those which were measured at the wholesale level. Since the domestic price elasticity in three important Mediterranean exporting countries was approximately 0.9, this estimate was adopted for all Mediterranean exporting countries. Unfortunately, sufficient data were not available to make even crude estimates of domestic demand elasticities in the major sumer exporting regions of South America and South Africa. Hence, elasticities were set arbitrarily at the average level of 0.8. The purpose of adopting two different sets of elasticities is to allow appraisal of the sensitivity of price levels and trade to changes in price elasticity. For purposes of comparison, sensitivity analyses will also be made using different (constant) levels of price elasticity for all countries of 0.6 and 1.0.

TABLE 9

PUBLISHED TRANSPORTATION COSTS FOR CITRUS FRUIT, BY SHIP AND BY RAIL

Ship				Rail			
Origin	Destination	Cost per ton *dollars*	Approximate distance *miles*	Origin	Destination	Cost per ton *dollars*	Approximate distance *miles*
Los Angeles, Calif., U. S.	Northern Europe	58.00	9,600	Sicily, Italy	Chiasso, Italy	10.45	725
Florida, U. S.	Northern Europe	48.00	5,300	Sicily, Italy	Zurich, Switzerland	18.85	850
Los Angeles, Calif., U. S.	Sweden	64.00	10,600	Sicily, Italy	Frankfurt, Germany	29.00	1,040
Buenos Aires, Argentina	Northern Europe	63.00	7,700	Kehl, Germany	Frankfurt, Germany	8.45	125
Sicily, Italy	Sweden	30.00	3,600	Valencia, Spain	Kehl, Germany	30.45	755
Valencia, Spain	Sweden	22.00	3,000	Hamburg, Germany	Dortmund, Germany	6.70	190
Israel	Sweden	36.00	4,900	Marseille, France	Paris, France	19.00	440
Sicily, Italy	Hamburg, Germany	20.00	3,000	Valencia, Spain	Cerbere, France	1.60	250
Sicily, Italy	London, U. K.	25.00	2,600	Cerbere, France	Paris, France	21.25	500
S. Africa (Conference line ships)	London, U. K.	40.00	7,800	Dieppe, France	Paris, France	8.10	95
S. Africa (Chartered ships)	London, U. K.	56.00	7,800				
Algeria	Marseille, France	14.00	500				
Valencia, Spain	Hamburg, Germany	18.00	2,400				
Israel	Hamburg, Germany	22.00	4,300				
Casablanca, Morocco	Hamburg, Germany	32.00	1,900				
Casablanca, Morocco	Dieppe, France	24.00	1,300				

SOURCES: Private correspondence with Sunkist Growers, Inc., Los Angeles, California, and with J. H. Burke, FAS, U. S. Department of Agriculture, Washington, D. C.

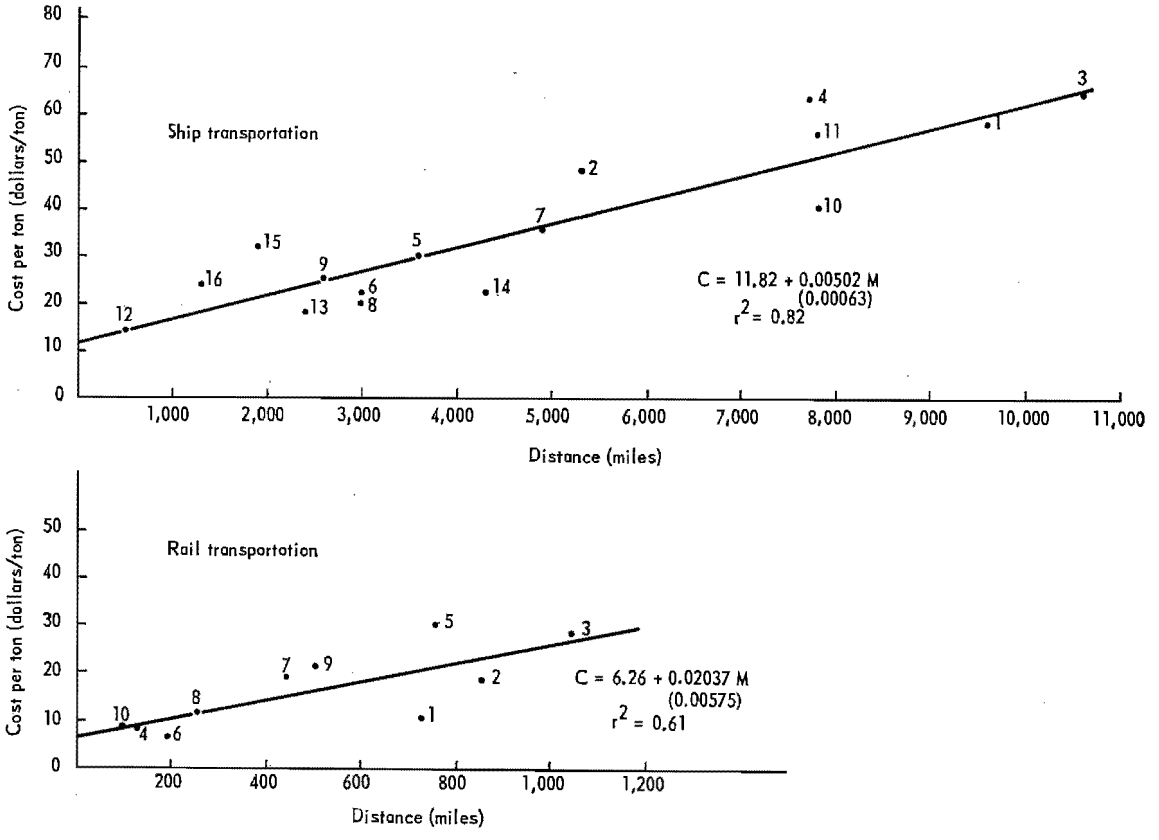

Fig. 4. Citrus transportation costs in relationship to distance shipped, sea and rail. Numbers of observations correspond to those in table 9.

countries. Likewise, South America is assumed to import (if necessary) only in the summer season. Therefore, transportation costs *to* South America are computed only from the other two summer producers.

Average 1957–60 and future Common Market tariffs

Estimates of average 1957–60 tariffs and internal taxes and future Common Market tariff duties and taxes are presented for winter oranges in table 11 and summer oranges in table 12. The tables show the effective rates expressed as a percentage of the wholesale import value. Data on these rates were taken mainly from publications of FAO and the EEC. Appendix A gives the sources of these duties and the computations involved in deriving the final estimates.

Table 11 shows that under 1957–60 tariffs, France provided favored treatment for its North African colonies of Algeria and Morocco. All of Algeria's exports and up to 150,000 metric tons of Morocco's exports to France were duty free, while France imposed the highest tariff wall (29.7 per cent) on imports from other exporting countries. Import duties in West Germany and Benelux also ran higher than the duties in the non-EEC countries (United Kingdom, the Scandinavian countries, Switzerland, Austria and Yugoslavia and the countries of Eastern Europe).

Several important changes will occur when the complete transition is made to the Common Market tariffs. Algeria and Morocco will lose their favored position

TABLE 10

MATRIX OF LEAST-COST TRANSPORTATION COSTS FROM PRODUCING TO CONSUMING COUNTRIES*

Producing country	Consuming country								
	France (Paris)	West Germany (Frankfurt)	Benelux (Amsterdam)	U. K. and Ireland (London)	Scandinavia (Copenhagen)	Switzerland-Austria-Yugoslavia (Central point)	Eastern Europe (Krakow)	N. America (New York)	S. America (Buenos Aires)
	dollars per ton								
U. S.—West Coast	78 (59 + 10 + 9)	84 (62 + 10 + 12)	77 (60 + 10 + 7)	77 (59 + 10 + 8)	74 (64 + 10 + 0)	84 (59 + 10 +15)	88 (62 + 10 + 16)	†	72 (62 + 10 + 0)
U. S.—Florida	56 (37 + 10 + 9)	62 (40 + 10 + 12)	55 (38 + 10 + 7)	55 (37 + 10 + 8)	52 (42 + 10 + 0)	62 (37 + 10 + 15)	66 (40 + 10 + 16)	†	‡
South America	68 (49 + 10 + 9)	74 (52 + 10 + 12)	67 (50 + 10 + 7)	67 (49 + 10 + 8)	64 (54 + 10 + 0)	74 (49 + 10 + 15)	78 (52 + 10 + 16)	58 (48 + 10 + 0)	†
South Africa	70 (51 + 10 + 9)	76 (54 + 10 + 12)	69 (52 + 10 + 7)	69 (51 + 10 + 8)	66 (56 + 10 + 0)	73 (48 + 10 + 15)	80 (54 + 10 + 16)	65 (55 + 10 + 0)	46 (36 + 10 + 0)
Italy	28 (0 + 0 + 28)	27 (0 + 0 + 27)	31 (0 + 0 + 31)	42 (24 + 10 + 8)	39 (29 + 10 + 0)	22 (0 + 0 + 22)	30 (0 + 0 + 30)	48 (38 + 10 + 0)	‡
Spain (+ Portugal)	22 (0 + 0 + 22)	24 (0 + 0 + 24)	27 (0 + 0 + 27)	39 (21 + 10 + 8)	36 (26 + 10 + 0)	24 (0 + 0 + 24)	32 (0 + 0 + 32)	44 (34 + 10 + 0)	‡
Greece	33 (0 + 0 + 33)	29 (0 + 0 + 29)	34 (0 + 0 + 34)	45 (27 + 10 + 8)	42 (32 + 10 + 0)	24 (0 + 0 + 24)	24 (0 + 0 + 24)	50 (40 + 10 + 0)	‡
North Africa	38 (19 + 10 + 9)	41 (15 + 10 + 16)	37 (20 + 10 + 7)	37 (19 + 10 + 8)	34 (24 + 10 + 0)	40 (15 + 10 + 15)	48 (15 + 10 + 23)	43 (33 + 10 + 0)	‡
Near East (Israel)	49 (30 + 10 + 9)	55 (33 + 10 + 12)	48 (31 + 10 + 7)	48 (30 + 10 + 8)	45 (35 + 10 + 0)	40 (20 + 10 + 10)	45 (20 + 10 + 15)	54 (44 + 10 + 0)	‡

* The top number in each cell of the table is total transportation cost by the least-cost route and mode of transportation. The lower figures in parentheses provide a breakdown of total transportation costs into (in order) sea freight + unloading from ship + rail freight.

† Later analyses assume local consumption always satisfied first by local production, hence, transport costs not computed.

‡ Later analyses assumes that if South America imports oranges and tangerines, the imports will not be in the winter season.

TABLE 11
SUMMARY OF TARIFF DUTIES AND TAXES FOR WINTER ORANGES

Exporting country	Importing country							
	North America (U. S.)	France	West Germany	Benelux	United Kingdom	Scandinavia	Switz.-Aus.-Yugo.	Eastern Europe
	1957–1960 Average tariffs (as percentage of import value)							
Morocco (≤ 150,000 metric tons) plus Algeria	14.2	0	14.0	20.2	8.7	9.3	10.9	0
Morocco (> 150,000 metric tons) plus Tunisia	14.2	29.7	14.0	20.2	8.7	9.3	10.9	0
Italy	14.2	29.7	13.4	19.5	8.7	9.3	10.9	0
Spain	14.2	29.7	14.0	20.2	8.7	9.3	10.9	0
Greece	14.2	29.7	14.0	20.2	8.7	9.3	10.9	0
Near East	14.2	29.7	14.0	20.2	8.7	9.3	10.9	0
United States	0	29.7	14.0	20.2	8.7	9.3	10.9	0
	1970 Tariffs (as percentage of import value)							
Morocco (≤ 150,000 metric tons) plus Algeria	14.2	18.6	22.6	25.8	8.7	9.3	10.9	0
Morocco (> 150,000 metric tons) plus Tunisia	14.2	18.6	22.6	25.8	8.7	9.3	10.9	0
Italy	14.2	0	0	0	8.7	9.3	10.9	0
Spain	14.2	18.6	22.6	25.8	8.7	9.3	10.9	0
Greece	14.2	18.6	22.6	25.8	8.7	9.3	10.9	0
Near East	14.2	18.6	22.6	25.8	8.7	9.3	10.9	0
United States	0	18.6	22.6	25.8	8.7	9.3	10.9	0

SOURCE: See appendix A.

with France. Italy will be in the much more favorable position that she can export to other EEC countries without paying tariffs, while all other exporting countries face substantial tariffs to the EEC. The tariffs in France are lowered significantly while those in West Germany and Benelux are raised. Tariffs in other countries are unaffected.

The transition from present to Common Market tariffs will be much less drastic in the case of summer oranges (table 12). Again, the duties into France will be lowered while those into West Germany and Benelux will be raised. Other export-import tariff relationships are unaffected. The United Kingdom will likely continue its favored treatment of orange imports from South Africa.

In addition to the tariffs and taxes of tables 11 and 12, the EEC has established a system of reference prices and compensatory taxes to protect price levels in the Common Market countries. Under this system if imports threaten to enter the EEC at prices below the reference price, such imports may be burdened by a compensatory tax. To date, the reference prices established (from approximately $110 to $170 per metric ton, CIF, EEC) have been well below levels at which fresh oranges have been imported into the EEC. Since EEC prices under the various 1970 spatial equilibrium models also are well above recent reference prices (as will be shown later), it is assumed that the possible restriction of trade by the reference price-compensatory tax device will be inoperative.

TABLE 12
SUMMARY OF TARIFF DUTIES AND TAXES FOR SUMMER ORANGES

Exporting country	Importing country							
	North America (U.S.)	France	West Germany	Benelux	United Kingdom and Ireland	Scandinavia	Switz.-Aus.-Yugo.	Eastern Europe
	1957–1960 average tariffs (as percentage of import value)							
U. S. (West Coast)	....	20.8	14.0	19.7	6.2	9.9	11.5	0
South America	14.2	20.8	14.0	19.7	6.2	9.9	11.5	0
South Africa	14.2	20.8	14.0	19.7	0	9.9	11.5	0
	1970 tariffs (as percentage of import value)							
U. S. (West Coast)	....	15.0	19.0	21.7	6.2	9.9	11.5	0
South America	14.2	15.0	19.0	21.7	6.2	9.9	11.5	0
South Africa	14.2	15.0	19.0	21.7	0	9.9	11.5	0

SOURCE: See appendix A.

PRICES, CONSUMPTION, AND SHIPPING PATTERNS IN 1970 UNDER ALTERNATIVE TARIFF CONDITIONS

Analytical procedure for solving spatial equilibrium models

The empirical problem is to find the equilibrium prices and shipping patterns which result under alternative conditions of demand and supply in the various countries, transportation costs, and tariffs. The method is illustrated for two countries in figure 5. Assume that only Country 1 is a producing country. The transportation cost of shipping from Country 1 to Country 2 plus import duties in Country 2 equals OB. The equilibrium solution is found when the quantity produced in Country 1 is distributed between the two markets such that the prices in the two markets differ only by the transportation cost and tariff. This is shown in figure 5 where the total quantity produced in Country 1 is OF + BI. The equilibrium shipping pattern occurs when BI is consumed in Country 1 and OF is shipped to Country 2. The difference in price between Country 1 and Country 2 is then OD − BD = OB = transportation cost plus tariff.

The empirical procedure used is a generalization of the above reasoning to several producing and consuming countries. To find 1970 shipping patterns, consumption, and prices, the following steps are taken:

1. Determine the position of the wholesale demand curve in each country. As discussed previously, the point estimate of 1970 consumption at current prices gives one point on the 1970 demand function. Given the demand elasticities estimated earlier, the position of the entire demand curve is given by solving the demand function $Q = bP^{-e}$ for b, given Q = 1970 projected quantity, P = current price and e = price elasticity of demand.
2. Adjust the current price levels in all countries upward or downward by equal amounts until 1970 world demand = world supply.
3. Use the above quantities demanded and supplied in each country in a transportation model to determine the optimum (least-cost) shipping

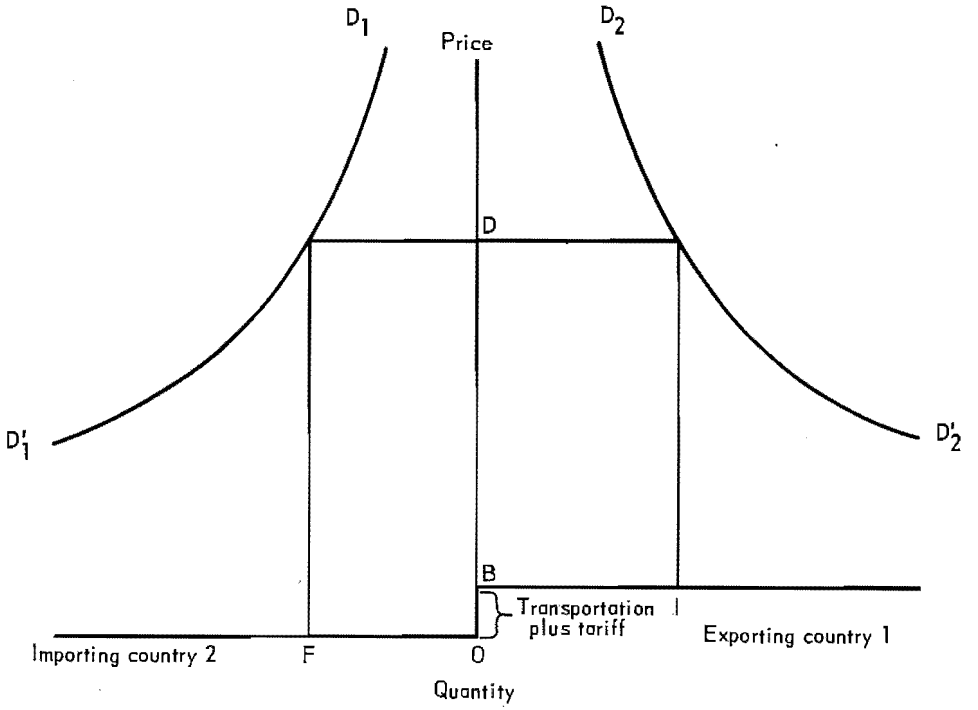

Fig. 5. Diagram of two-market equilibrium (see text).

pattern. The "transportation costs" used in the transportation model are the sum of the transportation costs shown above in table 10 plus projected 1970 tariffs given in tables 11 and 12. This solution implies a set of price differentials among trading countries equal to transportation and tariff charges.

4. Check the implied price differentials from step 3 against the original set of adjusted prices in step 2. If the two sets are consistent, the problem is finished. That is, a set of prices have been found such that (a) world demand = world supply and (b) price differentials among countries are consistent with the transportation model solution.
5. If the set of price differentials implied by the transportation model are *not* consistent with the original adjusted prices in step 2, revise the original prices and quantities such that (a) world demand = world supply, and (b) price differentials among countries are consistent with the transportation model solution.
6. Using the revised quantities demanded and supplied in each country, compute a new transportation solution and a new set of price differentials. Compare these with the prices used in step 5. Continue this iterative procedure until a consistent set of prices is found.

This general procedure has been used by several researchers, including Judge and Wallace (1958), King and Shrader (1963), and Bawden, Carter, and Dean (1966). The fact that the demand functions used were nonlinear, and that tariffs were a percentage of import value, complicated the adjustment procedure after each step. Still, in most cases, optimum solutions were obtained with a high degree of accuracy within five iterations.

The results presented in the following two sections show the equilibrium 1970 prices, consumption, and shipping pat-

terns under alternative tariff conditions for winter and summer oranges, respectively. Four alternative tariff situations for 1970 are considered:

1970–Tariff I: Continuation of 1957–60 tariffs to 1970 for all countries.

1970–Tariff II: Change to the common EEC tariff in the EEC countries by 1970, other countries holding tariffs at the 1957–60 average level.

1970–Tariff III: Reduction of tariffs in the EEC countries to zero by 1970, other countries holding tariffs at the 1957–60 average level.

1970–No Tariffs: Free trade in 1970; i.e., reduction of tariffs in all countries to zero.

As discussed earlier, results in the text are limited to the sets of production-consumption projections deemed "most likely" in 1970 in view of recent trends. For comparison, results for other projections are summarized in appendix C.

Empirical results for winter oranges

Table 13 summarizes the projected 1970 production, consumption, exports, imports, trade flows, and prices of winter oranges under the four alternative tariff situations as derived from spatial equilibrium model solutions. In addition, the first row of each section of table 13 gives the actual situation for the base period 1957–60, providing a point of reference for the projected 1970 solutions. In the base period, North Africa shipped mainly to France, the Near East to the United Kingdom, and Italy to West Germany, while Spain shipped substantial quantities to all the European countries. The United States was a minor exporter.

If the EEC had not come into effect, the most likely tariff situation in 1970 would presumably be an approximate continuation of the rates prevailing in the 1957–60 base period. Under these conditions (1970-Tariff I) table 13 indicates a general rise in prices in all countries because of a greater overall upward shift in world demand relative to supply. The greatest price rises would have occurred in North Africa and France because of continued trade regulations restricting shipments to France from other countries, and in North America because of a strong upward shift in demand relative to supply.

The most realistic situation in 1970, however, appears to be a transition to the common EEC tariff for all EEC countries, while other countries hold tariffs at the 1957–60 level (1970-Tariff II). Table 13 indicates that a shift to the EEC tariff results in a number of substantial changes in shipping patterns and prices. Loss of its favored position in France causes North Africa to divert a substantial part of its exports to the United Kingdom and Scandinavia. Italy ships to Benelux, and Spain and Portugal take over the bulk of shipments to France and West Germany. The Near East ships mainly to the countries located nearby. North America becomes independent of the rest of the world winter orange trade, unable to meet its own demand at prices sufficiently low to export to Europe, while protecting its domestic market by import quality restrictions. In the past, the United States has maintained such strict quality restrictions on orange imports that only negligible quantities have been imported, even though price differences often have suggested such trade as a possibility. Because this situation is expected to continue, the 1970 spatial equilibrium solutions I, II, and

TABLE 13

EXPORTS, IMPORTS, TRADE FLOWS, AND PRICES OF WINTER ORANGES FOR ACTUAL 1957-60 CONDITIONS AND PROJECTED FOR 1970 UNDER FOUR ALTERNATIVE TARIFF SITUATIONS

Exporting countries	Economic situation*	Importing countries							Exporting country totals			
		France	West Germany	Benelux	U. K. plus Ireland	Scandi-navia	Switz.-Aus.-Yugo.	Eastern Europe	Exports†	Consump-tion	Production	Prices‡
		trade flows (1,000 metric tons)							*1,000 metric tons*			*dollars/MT*
North Africa	1957-60 Actual	417	65	8	8	n.a.§	n.a.	n.a.	499	268	791	145.00
	1970-Tariff I	537	...	...	306	245	...	...	1,088	447	1,535	160.96
	1970-Tariff II	284	...	...	452	253	...	...	989	546	1,535	124.72
	1970-Tariff III	...	...	397	411	233	...	...	1,041	494	1,535	141.30
	1970-No Tariff	...	...	359	438	250	...	...	1,047	488	1,535	143.60
Italy	1957-60 Actual	1	94	4	3	n.a.	n.a.	n.a.	103	561	775	132.00
	1970-Tariff I	...	89	...	...	...	...	...	89	1,024	1,113	138.94
	1970-Tariff II	...	...	301	...	...	...	...	301	812	1,113	185.72
	1970-Tariff III	...	171	...	...	...	...	...	171	942	1,113	154.30
	1970-No Tariff	...	182	...	...	...	...	...	182	931	1,113	156.60
Spain and Portugal	1957-60 Actual	148	346	126	84	n.a.	n.a.	n.a.	704	539	1,378	134.00
	1970-Tariff I	260	916	213	...	...	...	...	1,389	946	2,335	140.94
	1970-Tariff II	539	849	...	...	...	...	...	1,388	947	2,335	140.72
	1970-Tariff III	705	764	...	...	...	...	...	1,469	866	2,335	157.30
	1970-No Tariff	730	749	...	...	...	...	...	1,479	856	2,335	159.60
Greece	1957-60 Actual	...	2	...	...	n.a.	n.a.	n.a.	2	170	195	135.00
	1970-Tariff I	...	...	...	...	...	...	89	89	291	380	140.94
	1970-Tariff II	...	80	...	...	...	...	...	80	300	380	135.72
	1970-Tariff III	...	107	...	...	...	...	...	107	273	380	152.30
	1970-No Tariff	...	110	...	...	...	...	...	110	270	380	154.60
Near East	1957-60 Actual	6	40	36	156	n.a.	n.a.	n.a.	238	669	1,049	114.00
	1970-Tariff I	...	...	150	133	...	222	106	611	1,197	1,808	119.94
	1970-Tariff II	76	...	53	...	...	229	201	559	1,249	1,808	113.72
	1970-Tariff III	275	...	16	...	...	211	186	688	1,120	1,808	130.30
	1970-No Tariff	240	...	50	...	...	229	184	703	1,105	1,808	132.60
North America	1957-60 Actual	2	2	15	...	n.a.	n.a.	n.a.	19	5,094	5,114	213.00
	1970-Tariff I, II, III, and No Tariff	...	...	...	...	...	...	...	...	7,294	7,294	242.93
TOTAL imports	1957-60 Actual¶	575	548	190	251	155	133	95	...	...	...	...
	1970-Tariff I	797	1,005	363	439	245	222	195	...	...	...	...
	1970-Tariff II	899	929	354	452	253	229	201	...	...	...	...
	1970-Tariff III	980	1,042	413	411	233	211	186	...	...	...	...
	1970-No Tariff	970	1,041	409	438	250	229	184	...	...	...	...
		dollars per metric ton										
Prices‡	1957-60 Actual	203.00	180.00	193.00	173.00	174.00	171.00	159.00	...	...	...	...
	1970-Tariff I	231.94	191.94	209.94	179.94	181.94	179.94	164.94	...	...	...	...
	1970-Tariff II	199.72	211.72	216.72	173.72	174.72	172.65	158.72	...	...	...	...
	1970-Tariff III	179.30	181.30	178.30	195.30	198.30	191.30	175.30	...	...	...	...
	1970-No Tariff	181.60	183.60	180.60	180.60	177.60	172.60	177.60	...	...	...	...

* See page 27.

† Includes exports only to importing countries for "1957-60 Actual" situation.

‡ Comparable prices by country not available for 1957-60 conditions. Prices shown for "1957-60 Actual" situation result from a transportation model for 1957-60 conditions, with the West German price set at $180 per metric ton (actual average 1957-60 price for West Germany).

§ n.a. = not available.

¶ For EEC and U. K. includes imports only from exporting countries shown for EEC (over 96 percent of total consumption in these countries), while for Scandinavia, Switzerland-Austria-Yugoslavia, and Eastern Europe comprises total imports. Total imports for the latter countries were estimated earlier (table 2) although detailed trade data were not available.

III in table 13 do not permit imports to the United States even though price differences would make this profitable for Mediterranean producers. The next section shows the effect of relaxing this assumption as well as considering other special aspects of the United States position.

The exact shipping patterns in table 13 are sensitive to small changes in transfer rates. Thus, because certain alternative routes could be used with little increase in cost, the importance of the specific routes employed should not be overemphasized. Also, established trade patterns may become institutionalized to the extent that slight cost advantages in alternative shipment patterns may not be fully exploited.

Greater confidence, however, can be placed in the magnitude of price differences among countries under EEC tariffs in 1970 because these differences would not change greatly with small changes in transfer rates and shipment patterns. Compared with a continuation of 1957–60 tariffs to 1970 in all countries (1970-Tariff I), the imposition of EEC tariffs (1970-Tariff II) sharply reduces prices in North Africa as that area loses its special market relationship with France. On the other hand, prices in Italy increase sharply, as might be expected, since only Italian exports to EEC countries are duty free. At the same time, prices in the other Mediterranean countries drop slightly. United States and North American prices are not affected because, as explained above, this area is independent of Europe in the solutions. Prices in France drop sharply as it is relieved of its policy of protecting prices in North Africa. Prices in the other EEC countries increase because of the higher EEC tariffs imposed. The non-EEC consuming countries in Europe are benefited by the high EEC tariffs. That is, part of the world exports are diverted away from the EEC countries, lowering prices in the non-EEC consuming countries.[9]

For purposes of later analysis, table 13 also shows the spatial equilibrium result if the EEC as a bloc decided to eliminate its tariff on winter oranges (1970-Tariff III). The results are generally as would be expected. Prices in the EEC drop sharply and increase in all other areas. The welfare implications of such a policy change are evaluated in a later section.

Table 13 also demonstrates the result of a complete elimination of winter orange tariffs in all countries (1970-No Tariff). This "free trade" solution also provides a reference point in the later welfare analysis. The price effects of such a change again can be anticipated on theoretical grounds.

Special consideration of the United States position. The 1970 spatial equilibrium solutions I, II, and III in table 13 assume no imports of winter oranges into the United States because of quality restrictions. However, if the United States remained in a deficit position over a long period, some channels for imports might be opened up. If the assumption of no winter imports into the U.S. were relaxed, North Africa and the Near East (probably Israel) could ship profitably to the United States. The result would be a lowering of prices by approximately $20 per ton in the United States, accompanied by price increases of approximately $20 in the rest of the world. Thus, prices in the United States would fall to around $220 per ton, still somewhat above the $213 per ton price level of 1957–60, but substantially lower than the $243 price predicted if imports to the United States are foreclosed by quality restrictions.

The "high" 1970 production projec-

[9] The particular set of FAO production-consumption projections chosen as "most likely" in 1970 has a substantial effect on the price levels in the individual countries. Although for winter oranges the most reasonable projection at the time of this writing is the "high production-high consumption" combination, subsequent events may suggest use of a different set. For this reason, appendix table C-1 provides the prices and quantities resulting from spatial equilibrium solutions to the *1970-Tariff I, 1970-Tariff II,* and *1970-No Tariff* situations.

tion used in the above models assumes a 43 per cent increase in winter orange production in the United States between the 1957–60 period and 1970. However, some industry sources in the United States feel that this still may be an underestimate of U.S. production in 1970. Further computations show that if 1970 U.S. production increased by 70 per cent from the 1957–60 base period, the U.S. price level would drop to about $195 per ton. At this price level, exports to the U.S. no longer would be profitable for Mediterranean producers. But neither would the United States be in a position to export to Europe without cutting export prices to "dumping" levels. However, the possibilities of price discrimination by the United States between its domestic and foreign markets would appear to be severely limited by the reference price system of the EEC. One other possibility for exports to the EEC might be oranges of particular grades and sizes, although these would likely be minor.

Some checks on the predictive power of the model. The results presented for 1970 in table 13 have used a transportation model to predict 1970 trade flows and price relationships for oranges. This procedure raises the question: How closely can we expect *actual* flows and prices to follow those *predicted* by the optimizing procedure implied in the transportation model? There are, of course, no *ex ante* objective tests for the reliability of such future predictions. Our only check is to compare actual with predicted results for some past time period. Good predictions for a previous period would lend support for the procedure. Hence, the results of a transportation model based on 1957–60 production, consumption, transportation costs, and tariffs were compared with actual flows for that same period (table 14). Unfortunately, flow data for certain routes could not be obtained, and comparable price data by countries are not published. Although the comparisons made are only partial, they nevertheless are of some interest.

The comparison in table 14 shows that the transportation model solution indicated major shipments for most of the major actual trade routes—North Africa to France, Italy to West Germany, Spain to France, West Germany, and Benelux, and the Near East to the United Kingdom, Scandinavia, Switzerland-Austria-Yugoslavia, and Eastern Europe. Also, the comparison indicated that, for the major exporters, the transportation model "correctly" allocated a rather high proportion of their shipments. For example, approximately 74 per cent of the total quantities shipped individually by North Africa and by Spain and Portugal were allocated to the actual routes by the transportation model. For Italy and the Near East, the figures were 61 per cent and 60 per cent, respectively. Greece and North America exported minor quantities in 1957–60 and, for them, the actual and predicted shipments do not correspond closely.

The above comparisons involve two arbitrary elements: (1) the actual shipments on minor routes were not reported and were estimated with a proportionate allocation procedure employing total exports and imports by country, and (2) the transportation model has several alternative solutions involving combinations of alternative routes for minor shipments. However, neither of these elements seriously affect the overall comparisons.

Another check which can be made on the efficiency of the "actual" flows versus the optimum "predicted" flows is in terms of total transportation cost required to move world exports to the importing countries. In this case, the "actual" transportation cost exceeded the cost for the "least-cost" flows by only 7 per cent, again suggesting a relatively small divergence between the actual and optimum or predicted.

Since comparable country price data are not available, it is impossible to

TABLE 14

COMPARISON OF ACTUAL 1957–1960 TRADE FLOWS FOR FRESH WINTER ORANGES WITH THOSE PREDICTED FROM A TRANSPORTATION MODEL USING 1957–1960 TARIFFS AND TRANSPORTATION COSTS

Exporting area	1957–60 situation	Importing area							Total exports
		France	West Germany	Benelux	U. K. and Ireland	Scandinavia	Switz.-Aus.-Yugo.	Eastern Europe	
		1,000 tons of shipments							
North Africa	Actual	417	65	8	8	(10)	(8)	(7)	523
	Predicted	368	0	0	121	34	0	0	523
Italy	Actual	1	102	4	3	(45)	(29)	(30)	214
	Predicted	0	151	0	0	0	63	0	214
Spain	Actual	148	349	127	84	(54)	(45)	(32)	839
	Predicted	214	409	216	0	0	0	0	839
Greece	Actual	8	2	3	6	(3)	(2)	(1)	25
	Predicted	0	0	0	0	0	0	25	25
Near East	Actual	6	40	59	156	(40)	(47)	(32)	380
	Predicted	0	0	0	110	121	70	79	380
North America	Actual	2	2	15	4	(3)	(2)	(2)	30
	Predicted	0	0	0	30	0	0	0	30
TOTAL IMPORTS	Actual	582	560	216	261	155	133	104	2,011
	Predicted	582	560	216	261	155	133	104	2,011

SOURCE: Data in parentheses estimated by the authors based on proportionate allocation employing given border totals. Other actual data from table 13. Predicted data from solution of transportation model minimizing transportation plus tariff costs.

make a rigorous comparison between "actual" and "predicted" prices in 1957–60. However, the fact that most of the major trade flows actually employed were predicted by the transportation model provides some assurance that the trading countries do allocate exports approximately in line with transfer costs (transportation plus tariffs) and, hence, that price relatives among countries might be approximated by the model solution differentials.

Empirical results for summer oranges

Table 15 gives the spatial equilibrium solutions for summer oranges under each of the tariff situations. If the 1957–60 tariffs were simply retained to 1970 (1970-Tariff I), the results in table 15 suggest a considerable increase in world trade and generally higher prices compared with the 1957–60 base period. South America and South Africa would increase production and exports markedly while production in North America would drop enough so that this area would become a substantial importer rather than a small exporter.

A shift to the EEC common tariff (1970-Tariff II) would have little effect compared to a continuation of 1957–60 tariffs (1970-Tariff I) except within the EEC itself. A shift to the common tariff would lower French rates and increase rates in the other EEC countries. Hence, prices would drop in France and increase in the rest of the EEC. Other countries remain essentially unaffected.

If the EEC were to drop its tariff (1970-Tariff III), its prices would drop substantially while prices elsewhere

TABLE 15

EXPORTS, IMPORTS, TRADE FLOWS, AND PRICES OF SUMMER ORANGES FOR ACTUAL 1957–60 CONDITIONS AND PROJECTED FOR 1970 UNDER FOUR ALTERNATIVE TARIFF SITUATIONS

Exporting countries	Economic situation*	Importing countries								Exporting country totals			
		North America	France	West Germany	Benelux	U. K. plus Ireland	Scandinavia	Switz.-Aus.-Yugo.	Eastern Europe	Exports†	Consumption	Production	Prices‡
		trade flows (1,000 metric tons)								*1,000 metric tons*			*dollars/MT*
North America	1957–60 Actual	363	3	4	18	...	n.a.¶	n.a.	n.a.	25	363	413	155.00§
	1970-Tariff I	249	...	...	...	...	...	...	...	...	475	249	185.80
	1970-Tariff II	249	...	...	...	...	...	...	...	...	476	249	185.80
	1970-Tariff III	249	...	...	...	...	...	...	...	...	470	249	188.20
	1970-No Tariff	249	...	...	...	...	...	...	...	...	528	249	162.80
South America	1957–60 Actual	...	20	16	20	28	n.a.	n.a.	n.a.	84	3,106	3,215	79.00
	1970-Tariff I	226	149	66	...	...	...	...	...	441	4,544	4,985	101.80
	1970-Tariff II	227	156	56	...	...	...	...	...	439	4,546	4,985	101.80
	1970-Tariff III	221	177	95	...	...	...	...	...	493	4,492	4,985	103.20
	1970-No Tariff	279	175	95	...	...	...	...	...	549	4,436	4,985	104.80
South Africa	1957–60 Actual	...	16	40	12	110	n.a.	n.a.	n.a.	178	169	397	77.00
	1970-Tariff I	...	...	112	64	76	43	39	34	368	246	614	99.80
	1970-Tariff II	...	...	113	63	76	43	39	34	368	246	614	99.80
	1970-Tariff III	...	...	104	76	75	43	39	34	371	243	614	101.20
	1970-No Tariff	...	...	102	75	75	46	42	34	374	240	614	102.80
TOTAL imports (1,000 MT)	1957–60 Actual‖	...	39	60	50	138	31	27	19	...	...	...	...
	1970-Tariff I	226	149	178	64	76	43	39	34	...	...	...	...
	1970-Tariff II	227	156	169	63	76	43	39	34	...	...	...	...
	1970-Tariff III	221	177	199	76	75	43	39	34	...	...	...	...
	1970-No Tariff	279	175	197	75	75	46	42	34	...	...	...	...
		dollars per MT											
Prices‡	1957–60 Actual	155.00§	185.00	178.00	182.00	146.00	159.00	170.00	157.00	...	...	...	...
	1970-Tariff I	185.80	212.80	203.80	208.80	168.80	183.80	194.80	179.80	...	...	...	...
	1970-Tariff II	185.80	199.80	216.80	214.80	168.80	183.80	194.80	179.80	...	...	...	...
	1970-Tariff III	188.20	171.20	177.20	170.20	170.20	185.20	195.20	181.20	...	...	...	...
	1970-No Tariff	162.80	172.80	178.80	171.80	171.80	168.80	175.80	182.80	...	...	...	...

* See page 27.

† Includes exports only to importing countries for "1957–60 Actual" situation.

‡ Comparable prices by country not available for 1957–60 conditions. Prices shown for "1957–60 Actual" situation result from a transportation model for 1957–60 conditions, with the West German price set at $178 per metric ton (actual average 1957–60 price for West Germany).

¶ n.a. = not available.

§ Actual price of Sunkist orange exports for summer period.

‖ For EEC and U. K. includes imports only from the exporting countries shown (over 95 per cent of total consumption in these countries), while for Scandinavia, Switzerland-Austria-Yugoslavia, and Eastern Europe comprises total imports.

TABLE 16

SENSITIVITY OF PROJECTED 1970 PRICES AND QUANTITIES OF WINTER ORANGES TO VARIATION IN PRICE ELASTICITIES OF DEMAND*

Country	P and Q¶	Price elasticity estimates			
		0.6	0.8†	1.0	"Best" estimates‡
Algeria	P	127.10	124.72	122.85	123.30
	Q	283	303	325	314
Morocco	P	127.10	124.72	122.85	123.30
	Q	202	204	208	206
Tunisia	P	127.10	124.72	122.85	123.30
	Q	39	39	40	39
Italy	P	190.10	185.72	183.85	185.30
	Q	858	812	766	786
Spain and Portugal	P	143.10	140.72	138.85	139.30
	Q	948	947	951	951
Greece	P	138.10	135.72	133.85	134.30
	Q	297	300	304	302
Near East	P	116.10	113.72	111.85	112.30
	Q	1,235	1,249	1,271	1,263
France	P	203.10	199.72	197.85	198.30
	Q	888	899	910	900
West Germany	P	216.10	211.72	209.85	211.30
	Q	943	929	908	922
Benelux	P	221.10	216.72	214.85	216.30
	Q	358	354	349	358
United Kingdom and Ireland	P	180.10	173.72	174.85	175.30
	Q	442	452	448	443
Scandinavia	P	178.10	174.72	172.85	173.30
	Q	251	253	256	254
Switzerland-Austria-Yugoslavia	P	175.10	172.72	170.85	171.30
	Q	228	229	231	231
Eastern Europe	P	161.10	158.72	156.85	157.30
	Q	199	201	204	202
North America	P	249.80	242.93	232.83	242.93
	Q	7,294	7,294	7,294	7,294

* Assumes 1970 Tariff II used in tables 13 and 15. That is, assumes Common EEC tariff in the EEC countries, while tariffs in other countries held at 1957–60 average levels.
† Used throughout analysis in text.
‡ For specific estimates by country, see table 7.
¶ P = price in dollars per metric ton; Q = quantity in 1,000 metric tons.

would increase slightly. If other countries also drop their tariffs (1970-No Tariff), price effects would be mixed. The welfare implications of these tariff shifts are examined later.[10]

Special consideration of the United States position. The results in table 15 are based on the FAO projections indicating a decline of nearly 40 per cent in

[10] The results in this section are based on the "low production-high consumption" set of 1970 FAO projection for summer oranges. Appendix table C-2 provides estimates of prices and quantities of summer oranges in individual countries for the various tariff situations under the alternative sets of FAO production-consumption projections for 1970.

U.S. summer orange production. As indicated earlier, recent increased plantings of Valencia oranges in the California-Arizona area suggest an increase rather than decline in U.S. summer production by 1970. Further analysis indicates that production increases of up to about 20 per cent would depress prices only slightly in the U.S. For example, a 20 per cent increase rather than a 40 per cent decrease from 1957–60 to 1970 would depress prices only from $186 to about $178 per ton in the United States. The U.S. price is relatively insensitive to domestic production within this range because U.S. prices are tied to world market prices through imports from South America. However, if U.S. production in 1970 should exceed 1957–60 levels by more than 20 per cent, the U.S. market becomes independent of world production and prices would drop sharply. For example, if U.S. production increased by 35 per cent between 1957–60 and 1970 as some industry sources suggest, the U.S. price level would drop to about $155 per ton; a 50 per cent increase in production would depress U.S. summer orange prices to about $135 per ton. As explained above for winter oranges, the U.S. price would have to drop considerably further (to about $80 per ton) before it would be profitable, in the absence of price discrimination, to export substantial quantities to other countries.

Sensitivity of results to changes in price elasticities of demand

The results of the spatial equilibrium models for 1970 summarized for winter oranges in table 13 and for summer oranges in table 15 were based on the assumption of a constant price elasticity of demand of 0.8 in all countries. Sensitivity of the results to changes in this parameter were tested and the findings presented in table 16. Sensitivity is examined only for the winter orange category since it is the most important segment of the industry. A shift in elasticities from 0.8 to the "best" estimate for each country changed the winter orange prices in all countries less than $2 per ton. To further gauge the sensitivity of results to demand elasticities, solutions also were obtained where constant elasticities of 0.6 and 1.0 were used for all countries. The price changes resulting from a shift in elasticities from 0.8 to 1.0 were on the order of $2 to $3 per ton; for a change in elasticities from 0.8 to 0.6, the resulting price changes in most countries were on the order of $5 per ton or less.

Thus, it would appear that the results are not drastically affected by errors of estimation of price elasticities within the fairly broad range of 0.6 to 1.0. Appendix table C-3 indicates, however, that the effects of changes in price elasticities would have been more severe if either extreme set of 1970 production-consumption projections had been used.

WELFARE CONSIDERATIONS: COMPARISON OF GAINS AND LOSSES TO INDIVIDUAL COUNTRIES FROM CHANGES IN TARIFFS AND COUNTRY MEMBERSHIP IN THE EEC

Analytical framework

The previous analysis has quantified the price structure and shipping patterns which would result from cost-minimizing trade under alternative tariff arrangements. From a policy standpoint, either for an individual country or for the EEC, the important question is whether a particular market arrangement is "preferable," "more desirable," or "better" in some overall sense than other arrangements. Welfare economics is at the heart of such questions. Although the question could be formulated in terms of maximizing social welfare, few would suggest that such an

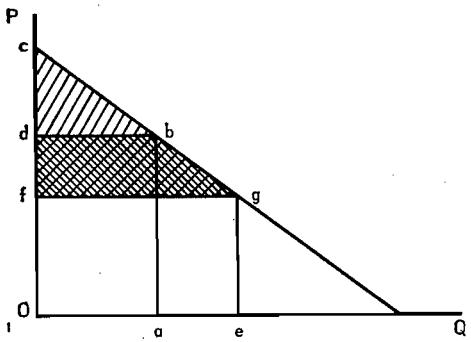

Fig. 6. Measurement of consumers' surplus (see text).

ambitious goal can be implemented empirically. The best that can be hoped for is an empirical formulation which recognizes the central principles of welfare economics and is at the same time operationally and computationally feasible.

One such approach, which has evoked a long-standing controversy in economic theory, is the use of consumers' and producers' (economic) surplus. Under fairly restrictive assumptions, economic surplus can be used as a device for measuring the desirability of market changes. A recent evaluation of this approach in water resource development is described by Marglin (1962). Recent empirical applications have been made by Winch (1963) concerning the economics of highway planning and by Wallace (1962) and Johnson (1965) on social costs of alternative farm programs.

The comparisons to be made involve quantitative measurements of gains or losses to consumers in terms of changes in consumers' surplus and gains or losses to producers in terms of changes in producers' surplus. Figure 6 shows the traditional Marshallian concept of consumers' surplus as derived from an aggregate market demand curve. Area Oabc measures the "total willingness to pay" for quantity Oa. However, if only a single market-clearing price Od is obtained, as under perfect competition, consumers will then pay only Oabd and receive a "surplus" equal to triangle dbc. If quantity Oe is placed on the market, price drops from Od to Of and consumers' surplus increases by the area fgbd. This area can be used as a legitimate money measure of the gain which accrues to consumers from the price change only under certain assumptions.[11] The long history of dispute about these assumptions breaks down into those revolving around (1) the concept of consumer's surplus for an individual consumer, and (2) the aggregation of these surpluses into a measure of social welfare.

To summarize some aspects of the argument briefly, assume a typical consumer with indifference curves U_1, U_2, and U_3, as shown in figure 7, and with money income OA. His "ordinary" demand curve is constructed by finding, given his money income OA, the quantities of oranges which he will purchase at a series of prices in order to maximize his utility. For example, at price P_1 (represented by budget line AP_1) the consumer maximizes utility by purchasing quantity OG. This provides one point on the "ordinary" demand curve as shown in the lower portion of figure 7. As price is raised to P_2 (represented by budget line AP_2), the quantity demanded drops to OE. At some price P_3 (represented by budget line AP_3), the quantity demanded drops to zero.

A "compensated" demand curve shows the quantity demanded at each price under the assumption that income is adjusted at each point such that the consumer remains on the original indifference curve U_1. For example, at price P_1, income is adjusted to a level OC (budget line CP_1') such that quantity OF is demanded, giving one point on the "compensated" demand curve. Hicks calls this adjustment in income needed to keep utility constant at U_1 (distance AC, figure 6) the "compensating variation" in income at price P_1. Likewise, the "compensating variation" in income at price P_2 (budget line BP_2') is AB, resulting in quantity OD demanded on

[11] For a more complete discussion of these points, see: Hicks (1953, Chapter 2), Patinkin (1963), Marglin (1962), and Winch (1965).

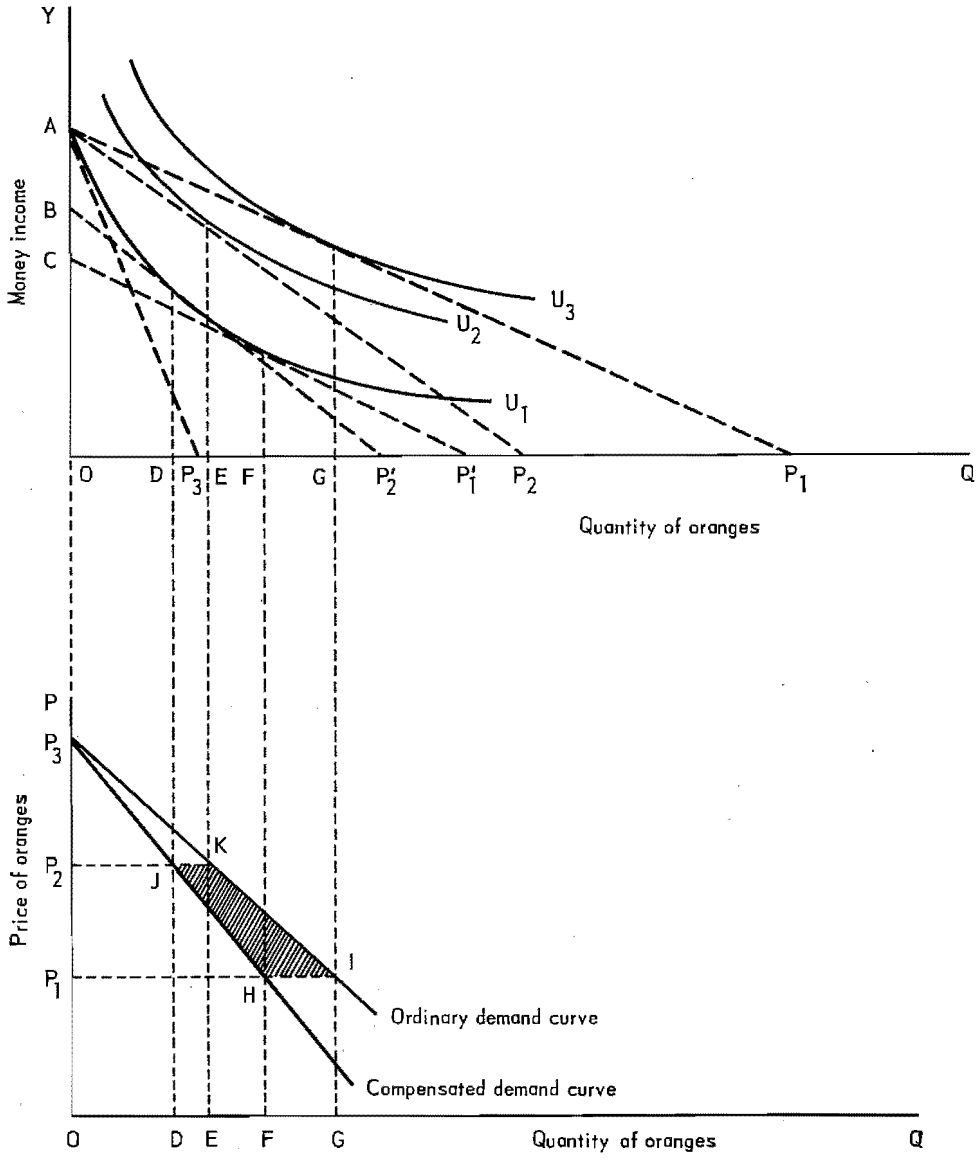

Fig. 7. Hicks' "compensating variation" in terms of an individual indifference map and derived demand curves (see text).

the "compensated" demand curve. When price rises to P_3, quantity demanded falls to zero and the "ordinary" and "compensated demand curves coincide.

Hicks (1953, p. 40) and Patinkin (1963, p. 91) have shown that the "compensating variation" in income at any price can be represented by the triangle-like area which lies above that price and under the compensated demand curve. For example, at price P_1, line segment AC = area P_1HP_3. One interpretation of the "compensating variation" is as follows: For a consumer presently purchasing some positive quantity of oranges at given prices and money income (say, quantity OF with money income OC and price P_1), the "compensating variation" is the increase in money income which would be required to ex-

actly compensate the consumer for foregoing entirely the privilege of buying oranges. That is, if the consumer were forced to reduce his orange consumption to zero, it would take an increase in income equal to AC to make him as well off as his original position (keep him on indifference curve U_1). A corollary to the above interpretation is that the *change* in compensating variation can be used to estimate the maximum amount of money (tax) which a consumer with given money income will pay for the privilege of buying at a lower price. For example, line segment BC (= area P_1HJP_2) shows the maximum tax which an individual with money income OB would pay for the privilege of buying at price P_1 rather than P_2.

In this analysis we adopt changes in "compensating variation" as a measure of consumers' gains and losses as approximated by changes in the demand triangle. The relevant areas under the compensated demand curve provide perfectly accurate measures of compensating variation or changes in compensating variation. Empirical work, however, generally provides estimates of the "ordinary" rather than the "compensated" demand curve. Under what circumstances can we use, without error, areas under the "ordinary" demand curve as measures of compensating variation? It is easily shown that the "ordinary" demand curve is identical with the "compensated" demand curve in the special case where, in terms of Hicksian "substitution" and "income" effects, the "income effect" is zero. That is, the two demand curves coincide where the income elasticity of demand is zero. In terms of figure 7, zero income elasticity prevails when the slopes of successive indifference curves at a given quantity of oranges all are equal, such that at a given price, the same quantity is demanded regardless of income level. Hence, relevant areas under the "ordinary" demand curve provide accurate measures of compensating variation in the special case of zero income elasticity of demand.

In cases where the income elasticity differs from zero, a divergence exists between the two demand curves. For example, when the income elasticity of demand is positive (as in figure 7), the ordinary demand curve lies to the right of the compensated demand curve. In this case, using the area under the ordinary demand curve overestimates the true compensating variation at price P_1 by the area HIP_3; it overestimates the *change* in compensating variation accompanying a price change from P_2 to P_1 by the shaded area HIKJ.

In the following empirical work, we use the change in compensating variation under the ordinary demand curve as an approximation to the *true* change in compensating variation. What is the approximate magnitude of the overestimate involved? For oranges, estimates of the income elasticity range from 0.20 to 1.10 (table 5). The proportion of total consumer expenditure spent on all citrus (including oranges) is extremely small as shown by the following typical figures: France—0.39 per cent; United Kingdom—0.23 per cent; United States—0.42 per cent; Spain—0.84 per cent; and Italy—0.42 per cent.[12] For illustration, assume an income elasticity (N) of 0.9 and a proportion of income spent on oranges of 0.004. Assume that the true compensating variation at the prevailing price C(p) is 10 times the current total expenditure on oranges. In other words, $C(p) = 10(SY_0)$, where S is the proportion of income spent on oranges and Y_0 is the initial money income level. The constant 10 is completely arbitrary, but perhaps serves as a reasonable upper limit; it says that a consumer would

[12] Data represent percentage of expenditure on citrus, where total expenditure is final expenditure at market prices by households and private nonprofit institutions on current goods and services *less* sales of similar goods and services (secondhand transactions) as reported in United Nations (1963, table 171, p. 519).

spend up to 10 times his current expenditure on oranges without feeling worse off than if denied completely the opportunity to buy oranges. In terms of figure 7, it implies for a consumer initially at point H on the compensated demand curve, that area $P_1HP_3 \leq 10$ area $OFHP_1$. For linear demand functions, as in figure 7, the exaggeration in compensating variation from using the ordinary rather than compensated demand curve is proportional to the increase in quantity demanded at a given price on the two curves. That is,

$$\frac{\text{area } HIP_3}{\text{area } P_1HP_3} = \frac{\text{area } HIKJ}{\text{area } P_1HJP_2} = \frac{HI}{P_1H} = \frac{JK}{P_2J}.$$

(For nonlinear demand functions, the above equalities would be reasonable approximations.) The proportionate increase in quantity demanded at a given price (say, P_1) on the ordinary versus compensated demand curve is due to the proportionate change in income in moving from one curve to the other. That is,

$\frac{\Delta q}{q_o} = N(\frac{\Delta Y}{Y_o})$, where q_o is initial quantity demanded and Y_o is initial money income level. Using the numerical estimates from above, $N = 0.9$ and $\frac{\Delta Y}{Y_o} = \frac{C(p_1)}{Y_o} = \frac{10(SY_o)}{Y_o} = 10(.004) = 0.04$.

Therefore, $\frac{\Delta q}{q_o} = N(\frac{\Delta Y}{Y_o}) = 0.9(0.04) = 0.036$ or 3.6 per cent. These figures suggest, then, that the maximum overstatement of the true compensating variation, or of the change in true compensating variation, is likely to be around 3.6 per cent. Hence, it seems reasonable to assume that for oranges this overestimate can be ignored without serious consequences.

Before turning to the problems of aggregation, let us develop the concept of measuring producers' gains or losses in terms of changes in "compensating variation" on the supply side. Ordinary and compensated supply curves for an individual producer can be derived by methods analogous to those employed above in deriving ordinary and compensated demand. It is assumed that the producer initially starts with a positive quantity and money income. Then as prices rise he becomes a supplier. The ordinary supply curve allows the producer to reach higher indifference curves as prices rise; the compensated supply curve adjusts income successively downward so that the producer remains on his initial indifference curve as prices rise.

Figure 8 shows the usual relationship of the ordinary and compensated supply curves. Area aec measures producers' surplus at price Oc, while area afc measures compensating variation. Here, use of producers' surplus underestimates the true compensating variation by area afe. Likewise, the change in producers' surplus which accompanies a price rise from Ob to Oc underestimates the change in true compensating variation by area dgfe. As indicated earlier, however, the orange supply function in each country is assumed to be completely inelastic, as shown in figure 9. Here the change in producers' surplus equals the compensating variation, and is simply the change in price times the fixed quantity supplied (shaded area dbce). Two additional comments on the assumption of inelastic supply may be warranted: (1) Although the supply function in each producing country is assumed to be completely inelastic, the supply function facing the EEC has positive elasticity; e.g., if EEC import prices rise while non-EEC prices remain constant, the non-EEC producing countries would allocate a larger proportion of their fixed supply to the EEC. (2) If a change in EEC tariffs should result in substantial price changes to producing countries, we would expect a positive, but lagged supply response in the long run. However, this response probably would not affect supplies significantly for perhaps four to five years after a tariff change.

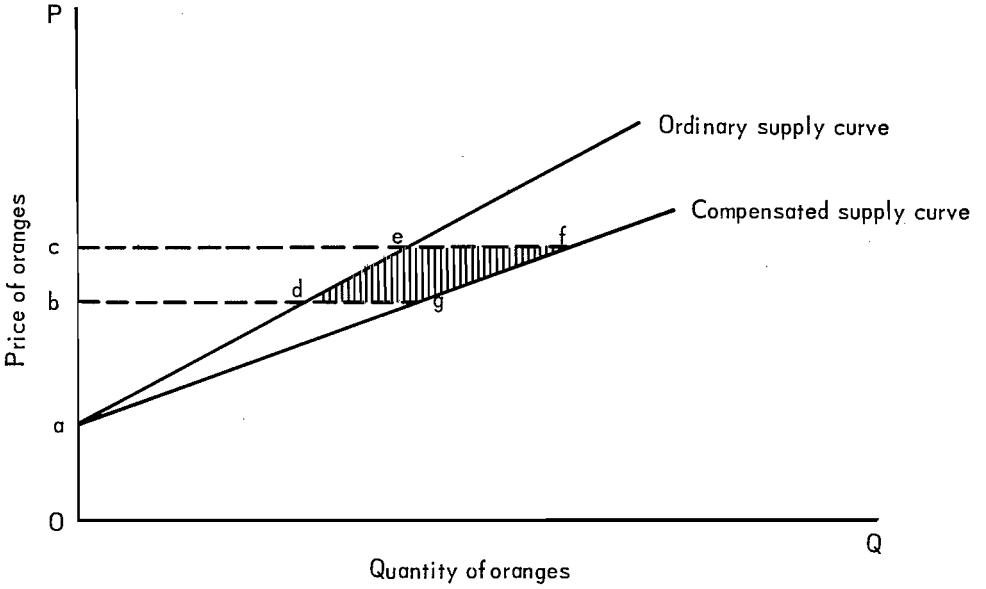

Fig. 8. Hicks' "compensating variation" for an individual producer (see text).

Also, the data required for quantification of the lagged response are scarce in several major producing countries. Therefore, we ignore the adjustments in producers' and consumers' surpluses which would result from lagged supply response and which would be required for a more valid long-run appraisal of tariff changes.

Use of economic surplus as a practical tool of policy making requires aggregation of individual surpluses—specifically, use of relevant areas in connection with observable *market* demand and supply curves. As Patinkin (1963) pointed out, the problems at this stage are complex and had not, at the time of his work, received a full and rigorous treatment. Such a treatment has since been attempted by Winch (1965).

As Winch points out, a distinction is made in welfare economics between those cases where compensation is paid and where it is not. There is widespread agreement that if a policy results in higher real incomes for all parties, it is a good thing; compensation may or may not be necessary to reach this result. Even though there is substantial agreement on this point, at least two kinds of value judgements are involved: (1) We do not count the dislike of one person seeing another person becoming relatively richer and (2) we do not judge the idea of compensation, or the specific compensation device employed (where compensation is necessary to achieve the desired income redistribution), as bad in itself. In our case, for example, assume that removal of a tariff lowers prices, resulting in a total gain in consumers' surplus which exceeds the total loss in producers' surplus. Then, theoretically, a compensation device could be devised to assess each consumer a tax less than his gain in consumer's surplus and compensate each producer by an amount greater than his loss in producer's surplus. This results in higher real incomes for all parties and, accepting the value judgments specified, results in a clear gain in welfare. In practice, such a "perfect" compensation device is unlikely to be devised, although a tax and subsidy redistribution device could probably provide a first approximation to the required welfare conditions.

In many cases, however, actual payment of compensation from gainers to

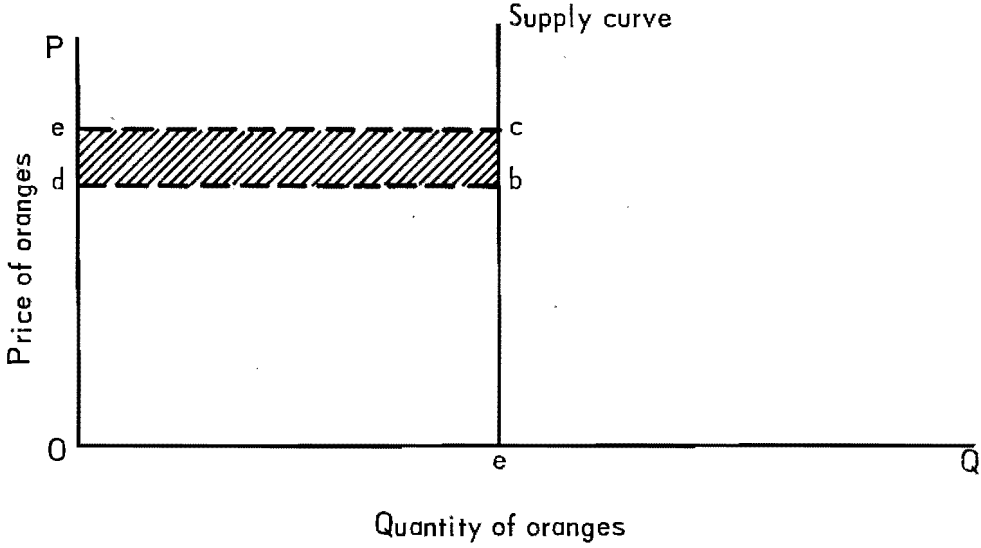

Fig. 9. Hicks' "compensating variation" for an individual producer with completely inelastic supply (see text).

losers is impractical either because it is too costly, or because it is politically infeasible. Where some parties gain and others lose, welfare economics can say nothing without still further value judgments on the part of society. For example, suppose a policy change results in a net dollar gain, but the gainers are already relatively rich and the losers relatively poor. We can make no statements about an increase in welfare without some value judgment regarding the psychological value of gainers' gains versus losers' losses. To quote from Winch (1965, p. 422):

"Any net gain or loss resulting from aggregation . . . is an accurate measurement of the gain or loss of welfare only if society is indifferent to the redistribution involved. If the redistribution is considered good in itself, aggregation underestimates a net gain or overestimates a net loss. If redistribution is considered bad, aggregation overestimates a net gain or underestimates a net loss. Policy decisions can therefore be based on the gain criterion in cases where the effects of the policy change would manifest themselves in price changes and where compensation is not practicable. Only where the criterion shows a net gain, but redistribution is considered bad, or where it shows a net loss, but redistribution is considered good, does the criterion fail to give a solution."

The indeterminacy of the net gain criterion in the cases described in the last sentence of the above quotation can be removed only with a further value judgment concerning the relative importance of a net gain (or loss)— and its presumed relationship to economic progress—versus a less (more) desirable income distribution. The authors do not presume to make the value judgments necessary to resolve this case. However, even here there appears to be merit in identifying the gainers and losers and measuring quantitatively the amounts of these gains and losses. If, for example, the net gain to a country is positive while the income redistribution is considered unfavorable, it suggests searching for means of compensation. If the net gain is negative while the income redistribution is considered favorable, it suggests looking for alternative policies, including purely redistributional measures.

In our empirical work, we estimate

the net gain (or loss) resulting from changes in tariffs for a particular country or trading bloc on the basis of the algebraic sum of changes in its producers' and consumers' surpluses and in tariff revenues collected by the government. In so doing, we ignore changes in profits to transportation companies, the costs of implementing specific compensation devices, and any external effects. Thus, if within a country or bloc one group gains more than another group loses and compensation is paid, the change can be judged as desirable. If compensation is not paid, we can judge the change as desirable only if society is indifferent to (or favors) the redistribution of income involved.

The above concepts can be illustrated by reference to figure 10. Let the importing "country" in figure 10 refer to the EEC, where D_ID_I' is the aggregate EEC demand curve for oranges and S_I the aggregate EEC supply curve (Italy only). The exporting "country" refers to the rest of the world's producers. Then, for example, removal of the EEC tariff would have three separate effects within the EEC: (1) it would reduce producers' surplus (for Italian producers) = area E, (2) it would increase consumers' surplus in the EEC countries = area E + F + G, and (3) the EEC would lose the revenue raised by the tariff = jl × hg = area F + C. The algebraic sum of these changes is G–C. Hence, removal of the EEC tariff could result either in a gain or a loss to the EEC, depending on the relative size of G and C.[13] Of course, the income redistribution effects of such a change could be sizable. If G–C is positive (G > C), the net gain can be judged as "desirable" only if society is indifferent to, or favorably disposed toward, the income redistribution. If G–C is negative (C > G), the net loss can be judged as "undesirable" only if society is indifferent to, or unfavorably disposed toward, the income redistribution.

Removal of the EEC tariff would have a more straightforward effect on the exporting countries. Producers would gain by the area A + B + C while consumers' surplus would be reduced by area A. Thus, the removal of the tariff would always represent a net gain to the exporting countries of area B + C.

The total gains from trade for the world would be the sum of all gains and losses involved, or area G + B. Thus, removal of the tariff would also always result in a net gain to the world. However, the gain from tariff removal may be distributed among countries such that all countries gain (as where G > C in figure 10), or it may be distributed such that only the exporting countries gain while the importing countries lose (as where C < G in figure 10).

Welfare effects of EEC tariff policy

This section identifies and attempts to quantify the annual gains and losses accruing to various groups, countries, and trade blocs under alternative EEC tariff policies in 1970. Results are summarized separately for winter and summer oranges.

Winter oranges. Before turning to the effects of an elimination of EEC tariffs on winter oranges, we first examine the welfare implications of the shift from a continuation of pre-EEC tariffs to the common EEC tariff level (change from 1970-Tariff I to 1970-Tariff II). Using the 1970 spatial equilibrium solutions of table 13 as a basis for the analysis, the left-hand portion of table 17 shows the relevant gains and losses to individual countries and trade groups.[14] Italian producers, of course, benefit greatly by the shift to the EEC, as do French consumers who are released from special concessions to Algeria and Morocco. All other consumers in the EEC suffer losses because of

[13] The relative magnitudes of G and C depend, in turn, on the relative price elasticities of demand in the two countries.

[14] Given a demand function of the form $q = ap^{-e}$, the area which represents the charge in consumers' surplus corresponding to a change in price from p_0 to p_1, is given by evaluating the integral $\int_{p_0}^{p_1} ap^{-e}dp$.

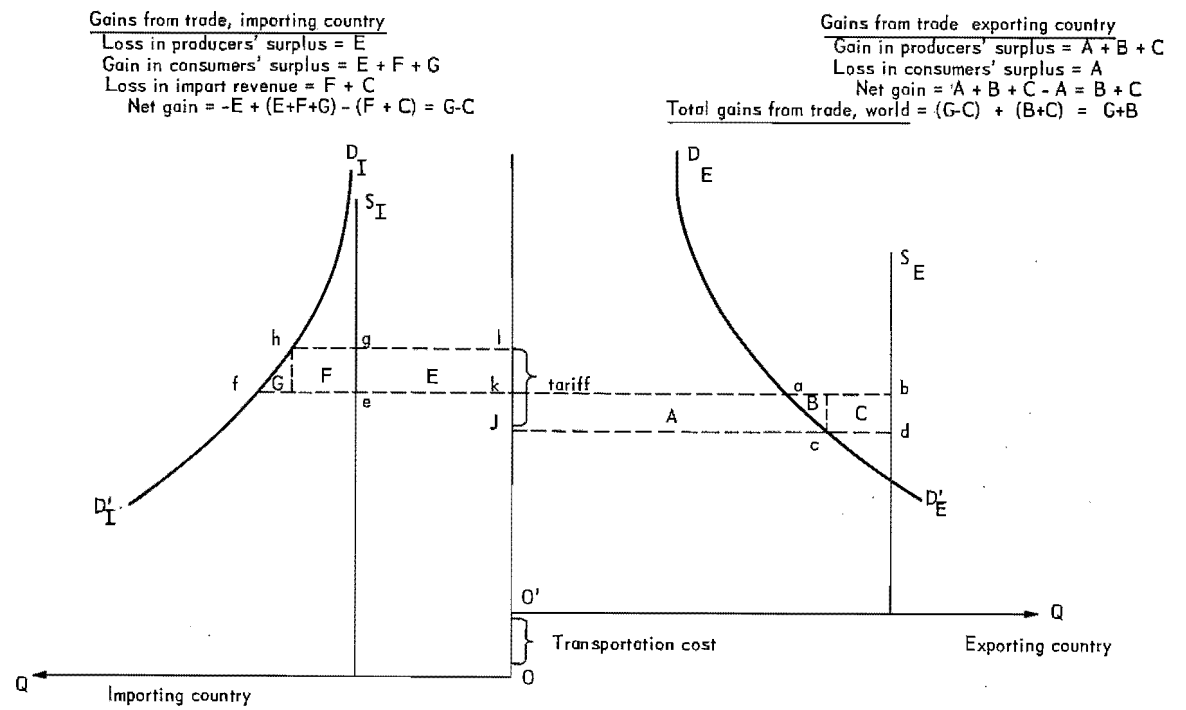

Fig. 10. Distribution of gains and losses from removal of an import tariff.

higher prices. However, granting the welfare assumptions outlined above, the EEC as a bloc receives a substantial net gain (43.25 million dollars) from the shift to the EEC tariff structure. The major losers are, of course, the non-EEC producers, particularly Algeria and Morocco, who formerly paid no tariff on all or part of their exports to France. Although these losses are partially offset by gains to consumers, the non-EEC producers sustain substantial losses (40.20 million dollars). The non-EEC consuming countries gain slightly from lower prices.

In summary, it appears that the EEC policy on winter oranges will result in a net welfare gain to the EEC bloc, assuming that the income redistribution is regarded by the EEC with indifference or favor. If the income redistribution is considered unfavorable, it suggests searching for means of compensation. Also, it is clear that the net gains to the EEC come primarily at the expense of producer groups in the non-EEC countries.

We now turn to the question of assessing the welfare effects of eliminating the EEC tariff on winter oranges. The basis for such an action might be the assertion that such a move would benefit EEC consumers more than it would hurt EEC producers. We are interested in investigating this assertion as well as evaluating the effects that such a move would have on other countries. Elimination of the tariff would cause losses to Italian producers of 34.97 million dollars, losses in tariff collections of 80.81 million dollars, and gains to EEC consumers of only 90.98 million dollars resulting in a net loss to the EEC bloc of 24.80 million dollars. Thus, unless the EEC has strong preferences for the redistribution of income which would accompany elimination of the tariff, the estimated net loss of 24.80 million dollars suggests that there is little direct incentive for the EEC to adopt a more liberal tariff policy. Two aspects of restricting imports through tariffs might

TABLE 17

GAINS AND LOSSES TO INDIVIDUAL GROUPS, COUNTRIES, AND TRADE AREAS FROM CHANGES IN TARIFF POLICY BY EEC COUNTRIES*

Country	Gains or losses from changing from pre-EEC tariffs to EEC tariffs (change from Tariff I to Tariff II)				Gains or losses from removal of EEC tariffs (change from Tariff II to Tariff III)			
	Producers	Consumers	Due to tariff collections	Net gain or loss	Producers	Consumers	Due to tariff collections	Net gain or loss
	million dollars							
Italy	52.07	−42.51	...	9.56	−34.97	27.32	...	−7.65
France	...	27.28	25.67	52.95	...	19.29	−33.40	−14.11
West Germany	...	−18.94	12.56	− 6.38	...	29.73	−44.45	−14.72
Benelux	...	− 2.43	−10.45	−12.88	...	14.64	− 2.96	11.68
TOTAL EEC	52.07	−36.60	27.78	43.25	−34.97	90.98	−80.81	−24.80
United Kingdom	...	2.74	− 0.04	2.70	...	− 9.37	0.15	− 9.22
Scandinavia	...	1.80	− 0.03	1.77	...	− 4.57	0.08	− 4.49
Switzerland-Austria-Yugoslavia	...	1.63	− 0.04	1.59	...	− 4.10	0.09	− 4.01
Eastern Europe	...	1.22	...	1.22	...	− 3.19	...	− 3.19
TOTAL non-EEC consuming countires	...	7.39	− 0.11	7.28	...	−21.23	0.32	−20.91
Spain	− 0.51	0.22	...	− 0.29	38.71	−15.11	...	23.60
Algeria	−41.57	17.44	...	−24.13	9.95	− 4.82	...	5.13
Morocco	−13.59	1.06	...	−12.53	12.52	− 3.25	...	9.27
Tunisia	− 0.95	0.20	...	− 0.75	2.98	− 0.62	...	2.36
Greece	− 1.98	1.55	...	− 0.43	6.30	− 4.72	...	1.58
Near East	−11.25	9.18	...	− 2.07	29.98	−19.57	...	10.41
TOTAL non-EEC producing countries	−69.85	29.65	...	−40.20	100.44	−48.09	...	52.35
TOTAL ALL COUNTRIES	−17.78	0.44	27.67	10.33	65.47	21.66	−80.49	6.64

* Based on solutions to spatial equilibrium solutions under 1970-Tariff I. II. and III as reported in table 13.

be mentioned at this point. First, the restriction of imports through tariffs is less costly to the consuming countries than restriction by quotas since, under a quota system, consumers pay higher prices without the substantial offset in tariff income. Second, tariff collections by individual countries are pooled into a common EEC fund for redistribution on bases largely unrelated to citrus production and consumption. Therefore, the people who lose by higher citrus prices may not be the same people who benefit from tariff revenues. For this reason, the net gains or losses accruing to the EEC as a whole should be emphasized more than gains or losses to *individual* countries and groups within the EEC.

As expected, the producing countries outside the EEC would gain substantially (52.35 million dollars) by elimination of the EEC tariff. Spain, as the largest exporter to the EEC, would stand to gain the most from such a move by the EEC.

The non-EEC consuming countries would lose 20.91 million dollars from elimination of the EEC tariff, as this would cause shipments to be diverted to the EEC, resulting in higher prices in the non-EEC consuming countries. Of course, total gains from trade would be positive for the world as a whole, totaling 6.64 million dollars.[15]

Appendix tables C–4 and C–5 summarize the gains and losses which would occur under the two extreme sets of 1970 FAO projections of production and consumption. The results from these projections are not greatly different than those presented in table 17 and suggest the same general conclusions.

In measuring the social gain or loss in the above manner for individual countries and blocs, we have assumed that the tariff-imposing country or bloc can act with respect to its position on oranges in isloation from other products. Therefore, we are probably overestimating the loss to the EEC of tariff removal on oranges because of possible corresponding relaxation of tariffs by other countries on other commodities. Unfortunately, there appears to be no way to handle such interrelationships short of a complete model involving all commodities. Despite this limitation, the analysis suggests that the EEC would sustain a substantial net loss from tariff removal on winter oranges. Furthermore, individual Italian producers would be affected more drastically than individual EEC consumers and are thus more likely as a group to exert effective political pressure for continuation of the winter tariff. Producing countries outside the EEC are probably overoptimistic in concluding that the EEC might unilaterally lower winter orange tariffs. Only if the EEC could obtain reciprocal tariff reductions on other commodities from other countries to offset these losses would it likely reduce orange tariffs.

Summer oranges. Table 18 summarizes the gains and losses associated with price and consumption changes if the EEC tariff on summer oranges were eliminated. Since the EEC has no summer orange production, there are no producer losses within the EEC from lower tariffs. In this case, the increase in consumers' surplus in the EEC (15.09 million dollars) is slightly greater than losses in tariff collections (14.58 million dollars), resulting in a net gain to the EEC of 0.51 million dollars. Again, the non-EEC producing countries gain and the non-EEC consuming countries lose from the removal of EEC tariffs. The results of table 18 are based on the FAO "low" production-"high" consumption projection. Appendix table C–6 shows that use of the other extreme FAO projection ("high" production-"low" consumption) does not change the picture significantly.

In summary, the EEC could gain only slightly by removing summer

[15] Total gains from trade are rather small relative to the gains or losses to individual countries. This is consistent with the conclusion of Johnson (1960, p. 335).

TABLE 18

GAINS AND LOSSES TO INDIVIDUAL COUNTRIES AND TRADE AREAS SHOULD THE EEC AS A BLOC REDUCE ITS TARIFFS ON SUMMER ORANGES TO ZERO, OTHER COUNTRIES MAINTAINING THEIR PRESENT TARIFFS*

Country	Prices		Consumption		Gains (+) or losses (−) from removal of EEC tariffs			
	1970–Tariff II	1970–Tariff III	1970–Tariff II	1970–Tariff III	Producers	Consumers	Due to tariff collections	Net gain or loss
	dollars per metric ton		*1,000 metric ton*		*million dollars*			
France	199.80	171.20	156	177	....	4.76	− 4.71	0.05
West Germany	216.80	177.20	169	199	....	7.25	− 6.96	0.29
Benelux	214.80	170.20	63	76	....	3.08	− 2.91	0.17
TOTAL EEC†	...	...	388	452	....	15.09	−14.58	0.51
United Kingdom	168.80	170.20	76	75	....	− 0.11	...	− 0.11
Scandinavia	183.80	185.20	43	43	....	− 0.06	0.01	− 0.05
Switz.-Aus.-Yugo	194.80	195.20	39	39	....	− 0.01	....	− 0.01
Eastern Europe	179.80	181.20	34	34	....	− 0.04	....	− 0.04
TOTAL non-EEC consuming countries	...	...	192	191	....	− 0.22	0.01	− 0.21
North America	185.80	188.20	476	470	0.60	− 1.24	− 0.08	− 0.72
South America	101.80	103.20	4,546	4,492	6.98	− 6.42	....	0.56
South Africa	99.80	101.20	246	243	0.86	− 0.34	....	0.52
TOTAL non-EEC producing countries	....	....	5,268	5,205	8.44	− 8.00	− 0.08	0.36
TOTAL ALL COUNTRIES	....	....	5,848	5,848	8.44	6.87	−14.65	0.66

* See page 27.

†Italy is unaffected because it does not import or export during the summer season.

TABLE 19

GAINS AND LOSSES TO VARIOUS COUNTRIES FROM ALTERNATIVE CHANGES IN THE COMPOSITION OF THE EEC

(Winter Oranges, Projected 1970 Tariff Conditions)

Country	Net gains (+) or losses (−) from addition of following countries to EEC*				
	Spain and Portugal	Greece and Near East	North Africa	All non-EEC producing countries	United Kingdom and Ireland
	million dollars				
Italy	− 3.68	− 3.51	− 3.55	− 7.65	−0.27
France	−14.80	1.70	10.47	−14.11	1.53
West Germany	−32.93	−25.26	−33.11	−14.72	0.32
Benelux	2.22	14.27	4.62	11.68	0.39
TOTAL EEC	−49.19	−12.80	−21.57	−24.80	1.97
United Kingdom and Ireland	− 0.31	3.42	− 5.35	− 9.22	−1.66
Scandinavia	0.56	2.67	− 2.31	− 4.49	0.45
Switz.-Aus.-Yugo	0.52	− 0.32	− 0.04	− 4.01	0.41
Eastern Europe	0.46	− 0.89	− 0.87	− 3.19	0.37
TOTAL non-EEC consuming countries	1.23	4.88	− 8.57	−20.91	−0.43
Spain and Portugal	52.23	−12.96	−13.28	23.60	−2.52
Algeria	− 0.65	− 3.45	11.15	5.13	−0.53
Morocco	− 1.22	− 5.67	19.52	9.27	−0.99
Tunisia	0.48	− 1.42	4.95	2.36	−0.26
Greece	− 0.25	3.81	0.26	1.58	−0.14
Near East	− 2.77	19.76	4.77	10.41	−2.60
TOTAL non-EEC producing countries	47.82	0.07	27.37	52.35	−7.04
TOTAL ALL COUNTRIES	− 0.14	− 7.85	− 2.77	6.64	−5.50

* Total of gains or losses to producers, consumers, and changes in tariff collections as shown in tables 17 and 18.

tariffs. However, they would lose substantially more than this amount by lowering winter tariffs, and since tariff policy is likely to be consistent between seasons, such reductions appear unlikely. Only as a part of more general tariff negotiations do concessions for oranges appear likely.

Welfare effects of changes in access to, or composition of, the EEC

In the past few years, practically every major exporter of winter oranges to the EEC has applied for special action by the EEC to lower or remove entirely the EEC tariffs on its shipments to the EEC. To assess the effects of such changes in access to the EEC, additional spatial equilibrium solutions were obtained where each major exporter of winter oranges was individually, in turn, permitted free access to the EEC while other exporters continued to face the tariff. The price and consumption effects of these changes are not of primary interest here but can be found in appendix table C–7. Of more direct interest are the gains and losses which would accrue to various countries under these revised arrangements. The first three columns of table 19 show that, as expected, the gains to the favored exporting countries in each case would be substantial. Spain and Portugal would gain 52.23 million dollars, Greece and the Near East 23.57 million dollars, and North Africa 35.62 million dollars. In all three cases, there would be substantial losses to the present EEC countries by permitting another producer inside

the tariff wall. That is, losses to EEC producers plus losses of tariff revenues would exceed gains to EEC consumers. Other countries would be affected relatively little.

Column 4 of table 19 shows the gains and losses to various countries if all of the producing areas were simultaneously granted free access to the EEC. In this case there would be no tariffs collected by the EEC, and the result would be the same as dropping the EEC tariff entirely. Thus, column 4, table 19 is the same as the final column of table 17. In this case all producing countries would gain, but each country would gain less than if it alone had free access to the EEC.

Another proposal, of course, has been that the United Kingdom be included in the EEC. While prospects for this currently appear dim, the final column of table 19 summarizes the effect for oranges alone. In this particular case, there would be a slight loss to the United Kingdom, slight gains to the present EEC countries except for Italy, and losses to all non-EEC producing countries.

Appendix table C–8 summarizes the gains and losses for the above conditions under the two extreme sets of 1970 FAO projections of production and consumption. Again, use of the extreme assumptions does not drastically affect the general order of results obtained.

SUMMARY AND CONCLUSIONS

This study has employed spatial equilibrium models to quantify the changes in world prices, consumption, and trade flows for oranges expected as a result of alternative projected tariffs and other policies of the EEC. In addition, the welfare effects of these policy changes have been evaluated using the classical concepts of economic surplus.

The empirical results are difficult to summarize concisely. The solutions suggest that orange prices will likely increase rather sharply in the EEC by 1970 (except for winter oranges in France), partly in response to a generally more rapid shift in demand relative to supply by 1970, and partly because the common EEC tariff is above the pre-EEC tariffs for all EEC countries except France. Of the producing countries, Italian prices increase sharply because she is the only producer inside the EEC tariff wall. On the other hand, prices drop markedly in North Africa as that area loses its special market relationship with France. The United States becomes independent of the EEC because, under projected 1970 demand-supply conditions, the United States is unable to meet North American demand at prices sufficiently low to export to Europe. Using recent production projections to 1970, the solutions indicate that prices of winter oranges in the United States are likely to decline, while summer prices are likely to remain relatively unchanged.

Using changes in producers' and consumers' surplus together with changes in tariff revenue collections as a measure of gains or losses to particular areas, it appears that the EEC would suffer substantial direct losses if it removed the EEC tariff on winter oranges and would gain only slightly from an elimination of EEC tariffs on summer oranges. Of course, producing countries outside the EEC would gain. Also, there would be a total world "gain from trade" with elimination of the tariff. However, this would be relatively small compared to gains and losses accruing to particular countries.

If the EEC retained tariffs but permitted certain producing countries special access to the EEC at zero tariffs as has been proposed, these particular producing countries would gain substantially, while the EEC as a bloc would lose.

In summary, there appears to be little

incentive (in fact, a disincentive) for the EEC either to reduce its tariffs on oranges or to permit special access to the EEC by outside producing countries. Thus, reductions in tariffs on oranges are likely to come about only as part of more general tariff negotiations involving mutual concessions.

APPENDIX A: SOURCES AND CALCULATION OF TARIFF RATES

1957–60 Tariffs—Winter Oranges

(1) France: The import conditions differ according to origin since Algerian oranges enter free and Moroccan oranges benefit by a duty-free quota of 150,000 tons (Lamarre and Pouderoux, 1961). The rate of 29.7 per cent for all other countries (and for Moroccan imports in excess of 150,000 tons) was derived by weighting the period duties by the length of these periods (FAO, 1963, table 2) as follows:

Months	Period	1957–58	1958–59	1959–60	1957–60 average
		per cent			
2.0	Nov. 1–Dec. 31	35.0	35.0	31.5	..
2.5	Jan. 1–Mar. 14	35.0	31.5	31.5	..
0.5	Mar. 15–Mar. 31	25.0	22.5	22.5	..
2.0	Apr. 1–May 30	25.0	22.6	22.5	..
	Average	31.43	29.29	28.29	29.7

(2) West Germany: There is a 10 per cent duty on all imports except from Italy, plus a 4 per cent compensation tax applicable to all agricultural produce and levied as in the customs on the value of the goods (FAO, 1963, table 2). Italy benefits from the internal rates for which reductions of 10 per cent were made on January 1, 1959 (FAO, 1963, table 2).

	1957–58	1958–59	1959–60	1957–60 average
	per cent			
Internal rate:	10.0	9.3*	9.0	9.4

* Rates were 10 per cent for 1958 and were reduced to 9 per cent for the first of 1959. Thus, the average for this winter period was taken as 9.3 per cent.

(3) Benelux: A duty rate of 13 per cent is applied to all imports, except from Italy, which has benefited from the internal rate since 1960 (FAO, 1963, table 2). The applicable rate used for Italy is an average of the 1957–60 rates (FAO, 1963, table 2).

	1957–58	1958–59	1959–60	1957–60 average
	per cent			
Italian rate:	13.0	12.07*	11.7	12.3

* Nov. 1–Dec. 31 = 13.0 per cent, Jan. 1–May 31 = 11.7 per cent.

In addition to these duty rates, there is a 10 per cent supplementary tax in Bel-

gium, a 2 per cent import tax in Luxemburg, and a 5 per cent import tax in the Netherlands (Lamarre and Pouderoux, 1961). The average tax of 7.2 per cent is found by weighting the individual taxes of these countries by their percentage of the total imports into the Benelux area (Belgium and Luxemburg are combined at a rate of 10 per cent in this computation).

Imports

Percentage Rate	Country	1957–58	1958–59	1959–60
10	Belgium and Luxemburg	80.5 (44%)	83.5 (46%)	114.8 (44%)
5	Netherlands	102.2 (56%)	98.9 (54%)	144.3 (56%)
		44% (10%) + 56% (5%) = 7.2%		

(4) United Kingdom: Customs duties on imports of fresh citrus fruit into the United Kingdom were found by weighting the interval rates by the length of this interval:

Months	Interval	Rate
3	Nov., Apr., May	3s. 6d./cwt = $10.58/MT (price/MT = $154) = 6.9%
4	Dec.–Mar.	10.0%
		Average = 8.7%

(5) Scandinavia: The level of duties and taxes for this group of nations is the weighted average of the rates for Denmark, Finland, Norway, and Sweden, based upon volume of imports (FAO, 1962b).

Country	Q (1957–60)	Duty	Internal taxes
Denmark	92.7 (17%)	6.5 Kroner/100 Kilograms* = 5.9%	None
Finland	69.0 (12%)	Jan.–June = 30.0% July–Dec. = 40.0% 32.9% (winter)	None
Norway	132.8 (24%)	Free	10% sales tax
Sweden	264.1 (47%)	Free	4% turnover tax
	558.6	Weighted average = 5.0%	Weighted average = 4.3%
Total = 9.3%			

* 65 Kroner/metric ton = $9.42/metric ton (price/MT = $160) = 5.9%

(6) Switzerland-Austria-Yugoslavia: The level of duties and taxes for this group is the weighted average of the rates for Switzerland, Austria, and Yugoslavia, based on volume of imports (FAO, 1962).

Country	Q (price = $180/MT)	Duty	Internal taxes
Switzerland	68 (42%)	100 Francs/MT = $23.10 = 12.8%	None
Austria	63 (40%)	400 Schillings/MT = $15.50 = 8.6%	5.25% turnover equalization tax
Yugoslavia	29 (18%)	None	None
		Weighted average = 8.8%	Weighted average = 2.1%
Total duty and tax = 10.9%			

Common Market Tariffs—Winter Oranges

(1) France, West Germany, and the Benelux countries have a common external tariff of 18.6 per cent (Lamarre and Pouderoux, 1961):

Months	Period	Duty	
		per cent	
5	Nov. 1–Mar. 31	20	
2	Apr. 1–May 31	15	Weighted average = 18.6%

To this amount West Germany adds a 4 per cent compensation tax applicable to all agricultural produce and levied on the value of the goods. Benelux has a 7.2 per cent import and supplementary tax which is a weighted average of the taxes imposed by the countries making up this group (computations here are the same as those for 1957–60 tariffs). No import duties are levied against Italy by these three countries because free trade exists among the countries of the EEC.

(2) United Kingdom, Scandinavia, and Switzerland-Austria-Yugoslavia: The import duties for the countries within each of these groups remain the same as under the 1957–60 tariff conditions.

1957–60 Tariffs—Summer Oranges

(1) France: Import duties on fresh summer oranges entering France were found by weighting the monthly rates for the period 1957–60 (FAO, 1963, table 2).

Months	Interval	1957–58	1958–59	1959–60
			per cent	
0.5	June 1–14	25.0	22.5	22.5
0.5	June 15–30	20.0	18.0	18.0
2.0	July 1–Aug. 31	17.0	15.3	15.3
1.0	Sept. 1–30	20.0	18.0	18.0
0.5	Oct. 1–15	35.0	31.5	31.5
0.5	Oct. 15–30	35.0	31.5	31.5
	Weighted average = 20.8%			

(2) West Germany: A 10 per cent duty is imposed on all fresh oranges entering the country (FAO, 1963, table 2). In addition to this duty, a 4 per cent compensation tax is also levied on the value of the oranges (Lamarre and Pouderoux, 1961) making a total charge of 14.0 per cent.

(3) Benelux: The average duty rate imposed by this group of countries during the 1957–60 period was 13 per cent (FAO, 1963, table 2). In addition to this duty, there was a 6.7 per cent internal tax based on the weighted average (by volume) of (FAO, 1962b):

Belgium	10 per cent tax	(34 per cent of imports)
Netherlands	5 per cent tax	(66 per cent of imports)
Weighted average = 6.7 per cent		

(4) United Kingdom: A duty rate of 3s.6d. per cwt is imposed on all imports during the summer period (FAO, 1962b). This amounts to $10.58/metric ton and

at a price of $171/metric ton for summer oranges makes a duty rate of 6.2 per cent. No duty is imposed on imports originating in South Africa.

(5) Scandinavia: Duties and taxes for this group of nations are computed as the weighted average of the rates of the individual countries (FAO, 1962b):

Country	Percentage of import, 1957–60	Duty per cent	Internal taxes per cent
Denmark	17	65 Kroner/MT = 9.42/MT (value = $168) = 5.6	None
Finland	12	Average = 38	None
Norway	24	None	10
Sweden	47	None	4
Total	100	Weighted average = 5.6	Weighted average = 4.3

Total duty plus taxes = 9.9 per cent

(6) Switzerland-Austria-Yugoslavia: The level of duties and taxes for this group is the average of the three countries weighted by percentage of imports (FAO, 1962b):

Country	Percentage of imports	Duty (price/MT = $168) per cent	Tax per cent
Switzerland	42	100 Francs/MT = $23.10/MT = 13.7	None
Austria	40	400 Schillings/MT = $15.50/MT = 9.2	5.25
Yugoslavia	18	None	None
Total	100	Weighted average = 9.4	Weighted average = 2.1

(7) North America: The duty rate taken for North America is that of the United States. This rate amounts to 1¢/pound or $22.04/metric ton (FAO, 1959). At a price of $155/metric ton for oranges, this rate is 14.2 per cent of the value.

Common Market Tariffs—Summer Oranges

(1) France, West Germany, Benelux: These countries impose a common external tariff of 15 per cent plus other supplementary taxes. Germany imposes a 4 per cent compensation tax and Benelux imposes a 6.7 per cent internal tax (Lamarre and Pouderoux, 1961).

(2) North America, United Kingdom, Scandinavia, Switzerland-Austria-Yugoslavia: The import duties for the countries within each of these groups remain the same as under the 1957–60 tariff conditions.

APPENDIX B: COMPARISON OF 1970 PRODUCTION AND CONSUMPTION PROJECTIONS WITH DATA THROUGH 1964–65

The basic long-range projections used in this study were made by FAO about 1960–61 and have not been revised at the time of this writing. However, the years elapsed since the projections were made allows a comparison of projections with the course of actual observations. From these comparisons the authors conclude that, for winter oranges, the 1970 "high" production-"high" consumption projections appear the most plausible of the four alternative combinations; for summer oranges, the 1970 "low" production-"high" consumption projections appear most reasonable. Therefore, primary emphasis in the text is placed on these particular sets of projections, although alternative higher projections for the United States also have been examined. This appendix provides the data on which these judgments were reached.

Table B-1 provides production data through 1964–65 while figures B-1 and B-2 provide a graphic representation of the data for major areas of the world. Figure B-1 shows that production of oranges in the Mediterranean area (winter oranges) has increased at a more rapid rate than even the "high" projections. In fact, the "low" level of 1970 projections was already attained by the 1964–65 season. All major production areas surrounding the Mediterranean—Southern Europe, the Near East, and North Africa—have participated in this increase of production. The only other major production area of winter oranges is North America, primarily the United States. This area has fallen below the projected increase primarily because of heavy freezes in Florida. However, recent industry information suggests that the high 1970 production projections for U.S. oranges still are reasonable, hence they are used in the spatial models. The analytical models in the text indicate that North America is an independent region under the range of projections used. Therefore, alternative production projections for the United States influence only North American prices and leave the European market area unaffected.

Figure B-2 shows the production data and projections for South America and the Union of South Africa, which, together with part of the United States production, comprise the major summer orange production areas in the world. For summer oranges, the "low" 1970 projection appears more likely of attainment.

Figures B-3 and B-4 compare the "price-corrected" quantities of oranges and tangerines consumed and projected for the major consuming countries of Central and Northern Europe. Figure B-5 shows comparable consumption data for the major Mediterranean producing countries. A note of explanation is in order on the nature of the "price correction" of the raw consumption data. Recall that the 1970 consumption projections were based on the assumption of prices held constant at the average 1957–60 level. Thus, in comparing actual and projected consumption, the actual consumption figures were adjusted to the quantity which would have been consumed at 1957–60 average prices. For example, actual consumption was 649,000 tons in Germany in 1963 at a price of $211 per ton. The question is, what quantity would Germany have consumed at the 1957–60 average price of $180 per ton? The adjustment in quantity was made along the demand curve of constant price elasticity = 0.8. Thus, the "price-corrected" quantity for Germany in 1963 was 737,000 tons—an estimate of the amount that would have been consumed at a price of $180 per ton. The consumption data for all

TABLE B-1

COMPARISON OF PRODUCTION OF ORANGES AND TANGERINES 1957–1965 WITH 1970 PROJECTIONS

Region and country	Year								1970 Projections	
	1957–58	1958–59	1959–60	1960–61	1961–62	1962–63	1963–64*	1964–65*	Low	High
	1,000 metric tons									
North and Central America	5,310	6,130	6,040	5,880	6,710	5,260	5,111	6,284	7,825	8,525
United States	4,398	5,223	5,098	4,783	5,650	4,158	3,796	4,938	6,825	7,425
Others	912	907	942	1,097	1,060	1,102	1,315	1,346	1,000	1,100
South America	3,120	3,270	3,390	3,500	3,570	3,590	3,636	3,453	4,985	5,245
Brazil	1,622	1,733	1,910	1,918	2,017	2,039†	2,110	1,886	3,115	3,255
Argentina	629	659	599	717	684	721	661	702	1,090	1,160
Others	869	878	881	865	869	830	865†	865†	780†	830
South Africa	366	329	323	406	422	413	503	546	640	790
Union of South Africa	338	299	293	373	386	374	461	501	520	650
Others	28	30	30	33	36	39†	42†	45†	120	140
Mediterranean Region	4,034	4,323	4,778	4,644	5,332	4,891	6,202	6,595	6,615	7,435
Europe	2,270	2,340	2,700	2,710	3,130	2,570	3,312	3,577	3,460	3,904
Italy	731	843	828	862	927	853	1,089	1,212	1,065	1,145
Spain	1,272	1,176	1,564	1,529	1,838	1,327	1,841	1,862	1,900	2,200
Portugal	84	105	116	99	131	156	158†	170†	158	179
Greece	183	217	188	215	230	231	224	333	337	380
North Africa	737	782	911	870	926	866	1,082	1,100	1,390	1,535
Morocco	348	385	476	444	454	485	642	629	690	755
Algeria	337	340	376	347	395	335	368	401	550	600
Tunisia	52	57	59	79	77	46	72	70	150	180
Near East	1,027	1,201	1,167	1,064	1,276	1,455	1,808	1,918	1,765	1,996
Israel	357	497	515	425	435	595	669	805	800	900
Others	670	704	652	639	841	860	1,139	1,113	965	1,096
Asia and Oceania	1,870	2,148	2,169	2,570	2,566	2,634	2,856	2,993	2,180	2,450
Japan	765	876	899	1,071	1,110	1,083	1,225	1,324	1,300	1,500
Australia	137	165	139	189	215	201†	211	169	180	200
China and others	968	1,107	1,131	1,310	1,241	1,350†	1,420†	1,500†	700	750
WORLD TOTAL	14,700	16,200	16,700	17,000	18,600	16,788	18,308	19,871	22,245	24,445

* Adjusted from FAS data to be comparable to FAO data. Data for 1964–65 are preliminary.
† Estimated by authors; data not available.
SOURCE: FAO (1960–63).
FAS (1964) and FAS (1965).

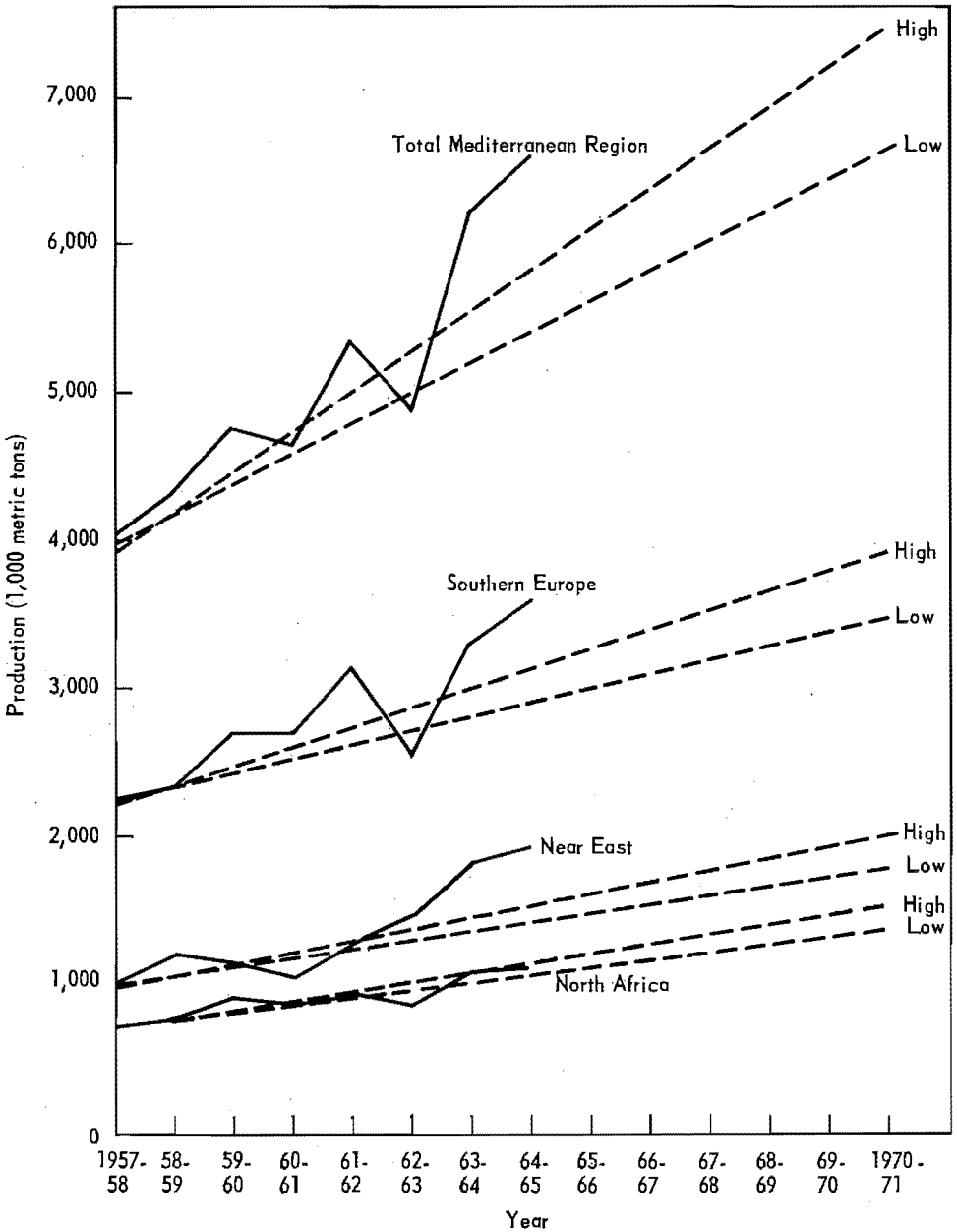

Fig. B-1. Comparison of orange and tangerine production with 1970 projections: Mediterranean region.

countries and years were corrected similarly and plotted in figures B-3, B-4, and B-5.

Figures B-3 and B-4 indicate that the "corrected" quantities consumed in the European countries are running quite close to the projected quantities under the "high" 1970 consumption projections. Figure B-5 shows that the "corrected" quantities consumed in the Mediterranean producing countries are running above the "high" projection. However, the data in these latter countries must be viewed with caution. Consump-

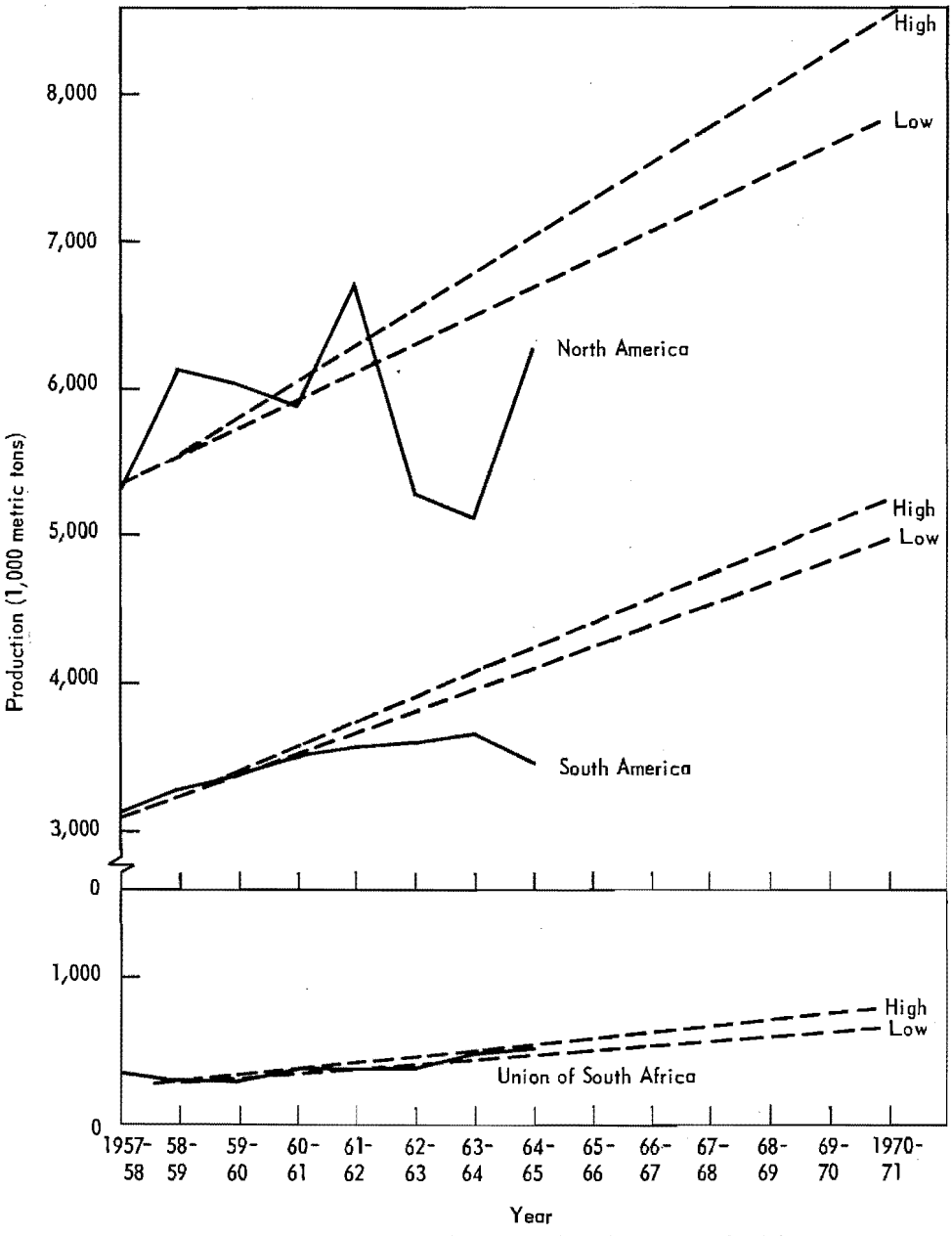

Fig. B-2. Comparison of orange and tangerine production with 1970 projections: North and South America, and the Union of South Africa.

tion is derived as a residual from production and trade data, while prices are either export prices or prices in a single major market. Still, it seems clear that consumption in these countries is increasing at least as rapidly as implied by the "high" consumption projections. Thus, the "high" consumption estimates are adopted as apparently more realistic for both winter and summer oranges and receive major emphasis in the text.

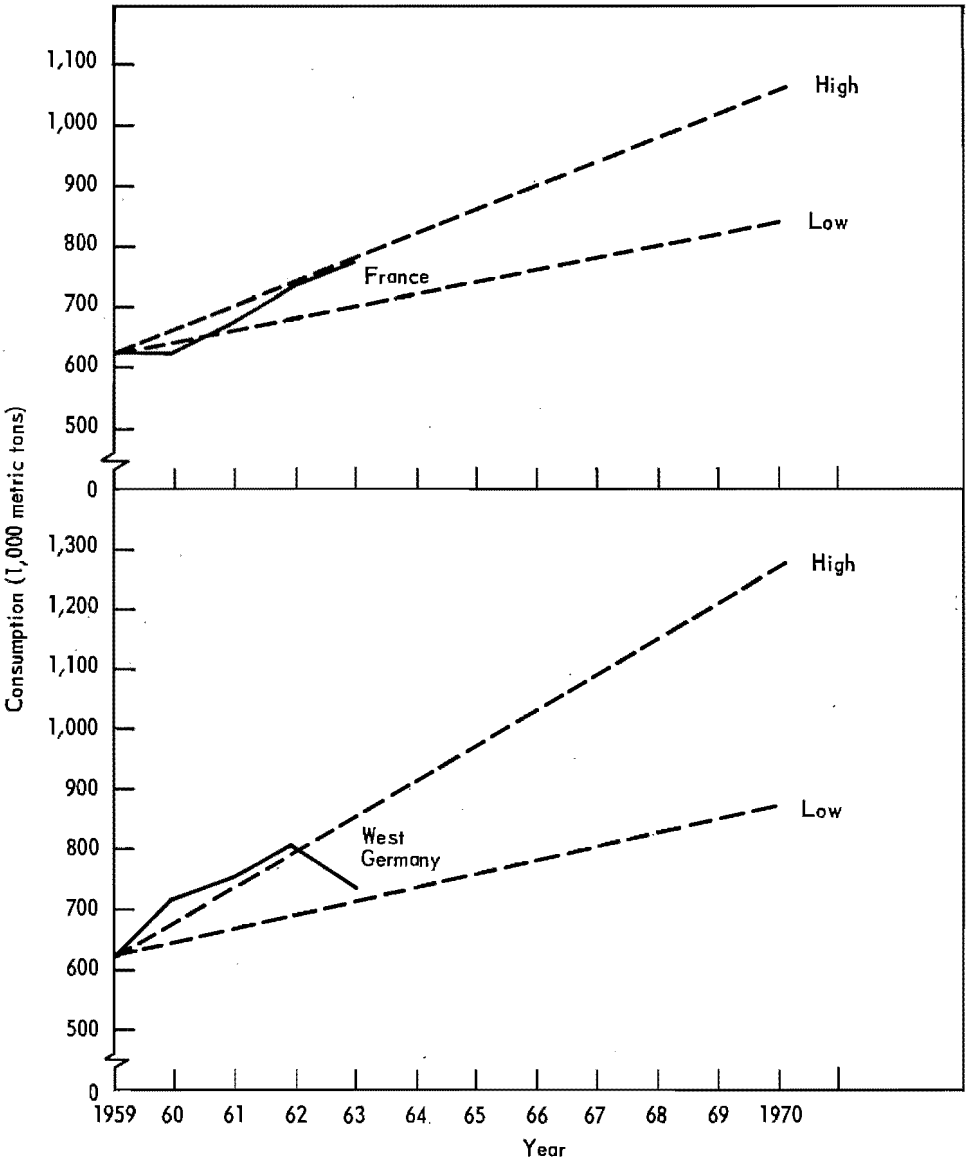

Fig. B-3. Comparison of orange and tangerine consumption with 1970 projections: France and West Germany.

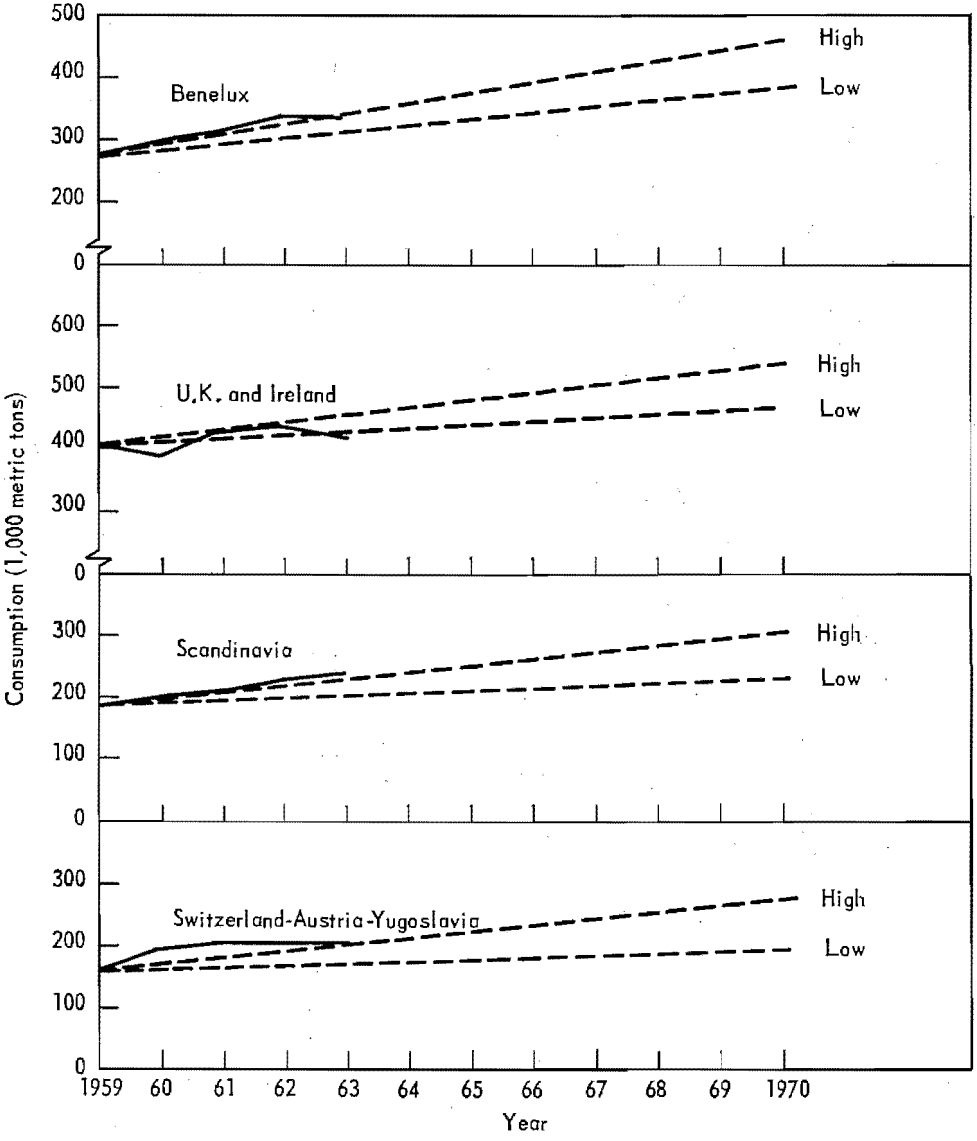

Fig. B-4. Comparison of orange and tangerine consumption with 1970 projections: Benelux, U.K. and Ireland, Scandinavia, and Switzerland-Austria-Yugoslavia.

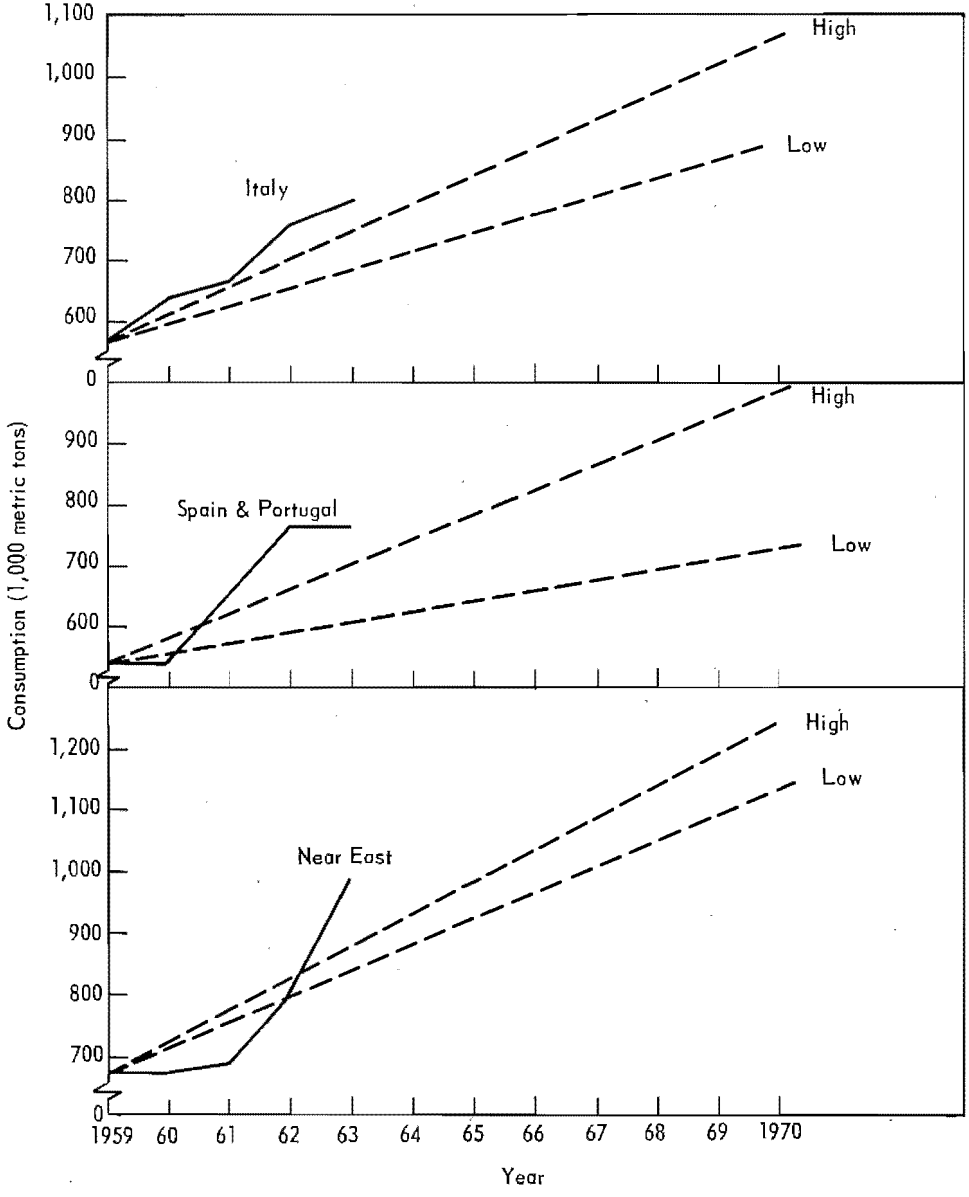

Fig. B-5. Comparison of orange and tangerine consumption with 1970 projections: Italy, Spain-Portugal, and Near East.

TABLE C–1

SUMMARY OF ACTUAL 1957–60 AND PROJECTED 1970 PRICES AND QUANTITIES CONSUMED OF WINTER ORANGES IN EACH COUNTRY UNDER ALTERNATIVE TARIFFS AND PRODUCTION-CONSUMPTION PROJECTIONS*

Countries	P and Q‡	1957–1960 conditions†	Low consumption-low production			Low consumption-high production			High consumption-high production			High consumption-low production		
			1970-Tariff I	1970-Tariff II	1970-No tariff	1970-Tariff I	1970-Tariff II	1970-No tariff	1970-Tariff I	1970-Tariff II	1970-No tariff	1970-Tariff I	1970-Tariff II	1970-No tariff
Non-EEC producing countries														
North America	P	213.00	196.10	196.10	196.10	175.28	175.28	175.28	217.19	217.19	217.19	242.93	242.93	242.93
	Q	5,084	7,294	7,294	7,294	7,979	7,979	7,979	7,979	7,979	7,979	7,294	7,294	7,294
Algeria	P	165.00	166.77	106.14	122.21	141.26	89.48	102.64	193.94	124.72	143.60	227.67	147.92	170.21
	Q	133	201	289	258	230	331	297	213	303	270	187	264	236
Morocco	P	125.00	111.77	106.14	122.21	94.26	89.48	102.64	130.94	124.72	143.60	154.67	147.92	170.21
	Q	113	187	195	174	214	223	200	196	204	183	172	178	159
Tunisia	P	125.00	111.77	106.14	122.21	94.26	89.48	102.64	130.94	124.72	143.60	154.67	147.92	170.21
	Q	22	35	36	33	40	42	37	38	39	35	33	34	30
Spain and Portugal	P	134.00	121.77	122.14	138.21	104.26	104.48	118.64	140.94	140.72	159.60	164.67	163.92	186.21
	Q	539	787	785	711	891	890	804	946	947	856	835	838	757
Greece	P	135.00	121.77	117.14	133.21	104.26	99.48	113.64	140.94	135.72	154.60	164.67	158.92	181.21
	Q	170	247	255	230	280	291	262	291	300	270	257	264	238
Near East	P	114.00	100.77	95.14	111.21	83.26	78.48	91.64	119.94	113.72	132.60	143.67	136.92	159.21
	Q	669	1,145	1,198	1,058	1,333	1,398	1,235	1,197	1,249	1,105	1,036	1,077	955
EEC countries														
Italy	P	132.00	119.77	161.14	135.21	102.26	138.48	115.64	138.94	185.72	156.60	163.67	216.92	183.21
	Q	561	969	765	880	1,100	863	997	1,024	812	931	898	717	821
France	P	203.00	204.77	177.14	160.21	179.26	155.48	140.64	231.94	199.72	181.60	265.67	227.92	208.21
	Q	582	698	784	850	777	870	943	797	899	970	715	809	869
West Germany	P	180.00	169.77	188.14	162.21	149.26	165.48	14.264	191.94	211.72	183.60	219.67	241.92	210.21
	Q	560	768	708	797	852	784	883	1,005	929	1,041	902	835	935
Benelux	P	193.00	186.77	192.14	159.21	164.26	169.48	139.64	209.94	216.72	180.60	239.67	247.92	207.21
	Q	216	333	325	378	369	360	420	363	354	409	326	318	367
Non-EEC consuming countries														
United Kingdom and Ireland	P	173.00	159.77	154.14	159.21	141.26	135.48	139.64	179.94	173.72	180.60	205.67	198.92	207.21
	Q	261	419	431	420	462	478	466	439	452	438	395	405	392
Scandinavia	P	174.00	160.77	154.14	156.21	141.26	136.48	136.64	181.94	174.72	177.60	207.67	200.92	204.21
	Q	155	206	213	210	228	234	234	245	253	250	221	226	223
Switz.-Aus.-Yugo	P	171.00	157.77	152.14	151.21	138.26	133.48	131.64	179.94	172.72	172.60	206.67	198.92	199.21
	Q	133	175	180	181	194	200	202	222	229	229	190	205	204
Eastern Europe	P	159.00	145.77	140.14	156.21	128.26	123.48	136.64	164.94	158.72	177.60	188.67	181.92	204.21
	Q	95	181	187	171	201	207	191	195	201	184	175	181	155

* See page 27.

† Prices in each country not entirely available or comparable in many cases. Therefore, prices represent those resulting from a transportation model for 1957-60 conditions, with West German price set at $180.00 per ton (the 1957-60 average price for West Germany).

‡ P = price in dollars per metric ton; Q = quantity in 1,000 metric tons.

TABLE C–2

SUMMARY OF ACTUAL 1957–60 AND PROJECTED 1970 PRICES AND QUANTITIES CONSUMED OF SUMMER ORANGES IN EACH COUNTRY UNDER ALTERNATIVE TARIFFS AND CONSUMPTION–PRODUCTION PROJECTIONS*

Countries	P and Q¶	1957–1960 conditions†	Low consumption-low production			Low consumption-high production			High consumption-high production			High consumption-low production		
			1970-Tariff I	1970-Tariff II	1970-No tariff	1970-Tariff I	1970-Tariff II	1970-No tariff	1970-Tariff I	1970-Tariff II	1970-No tariff	1970-Tariff I	1970-Tariff II	1970-No tariff
Non-EEC producing countries														
North America	P	155.00‡	159.30	160.10	139.30	151.90	152.90	132.00	174.60	175.40	153.10	185.80	185.80	162.80
	Q	363	453	451	503	470	467	528	500	497	554	475	476	528
South America	P	79.00	79.30	79.10	81.30	71.90	71.90	74.00	92.60	92.40	95.10	101.80	101.80	104.80
	Q	3,106	4,648	4,649	4,546	5,022	5,024	4,911	4,906	4,911	4,791	4,544	4,546	4,436
South Africa	P	77.00	77.30	77.10	79.30	69.90	69.90	72.00	90.60	90.40	93.10	99.80	99.80	102.80
	Q	169	249	249	243	269	269	263	260	260	260	246	246	240
EEC consuming countries														
France	P	185.00	186.30	173.10	149.30	176.90	164.90	142.00	201.60	189.40	163.10	212.80	199.80	172.80
	Q	40	130	138	156	136	144	162	155	163	184	149	156	175
West Germany	P	178.00	178.30	189.10	155.30	169.90	179.90	148.00	193.60	205.40	169.10	203.80	216.80	178.80
	Q	61	137	131	153	142	136	159	185	176	206	178	169	197
Benelux	P	182.00	182.30	186.30	148.30	172.90	176.90	141.00	198.60	203.40	162.10	208.80	214.80	171.80
	Q	57	60	59	71	62	61	74	67	66	79	64	63	75
Non-EEC consuming countries														
United Kingdom and Ireland	P	146.00	146.30	146.10	148.30	138.90	138.90	141.00	159.60	159.40	162.10	168.80	168.80	171.80
	Q	143	73	73	72	76	76	75	79	79	78	76	76	75
Scandinavia	P	159.00	159.30	159.10	145.30	150.90	150.90	138.00	173.60	173.40	159.10	183.80	183.80	168.80
	Q	31	36	36	39	38	38	40	45	45	48	43	43	46
Switz.-Aus.-Yugo.	P	170.00	170.30	170.10	152.30	161.90	161.90	145.00	184.60	184.40	166.10	194.80	194.80	175.80
	Q	27	31	31	34	32	32	35	40	40	44	39	39	42
Eastern Europe	P	157.00	157.30	157.10	159.30	149.90	149.90	152.00	170.60	170.40	173.10	179.80	179.80	182.80
	Q	19	31	31	31	32	32	32	36	36	35	34	34	34

* See page 27.

† Prices in each country are computed from a transportation model for 1957–60 conditions, with the West German price set at $178.00 per ton (the 1957–60 average price for West Germany).

‡ Actual figure of Sunkist orange export price for summer period.

¶ P = price in dollars per metric ton; Q = quantity in 1,000 metric tons.

TABLE C-3

SENSITIVITY OF PROJECTED 1970 PRICES AND QUANTITIES OF WINTER ORANGES TO VARIATIONS IN PRICE ELASTICITIES OF DEMAND*

Countries	P and Q¶	Price elasticity = 0.6		Price elasticity = 0.8†		Price elasticity = 1.0		Price elasticity = "best" estimates‡	
		High consumption-low production	Low consumption-high production	High consumption-low production	Low consumption-high production	High consumption-low production	Low consumption-high production	High consumption-low production	Low consumption-high production
Algeria	P	159.50	80.80	147.92	89.48	141.10	94.40	143.00	90.80
	Q	247	311	264	331	283	355	275	347
Morocco	P	159.50	80.80	147.92	89.48	141.10	94.40	143.00	90.80
	Q	176	222	178	223	181	226	181	228
Tunisia	P	159.50	80.80	147.92	89.48	141.10	94.40	143.00	90.80
	Q	34	42	34	42	35	42	34	43
Italy	P	232.50	128.80	216.92	138.48	207.10	145.40	210.00	140.80
	Q	760	910	717	863	680	814	703	846
Spain and Portugal	P	175.50	96.80	163.92	104.48	157.10	109.40	159.00	106.80
	Q	838	886	838	890	841	893	844	893
Greece	P	170.50	91.80	158.92	99.48	152.10	104.40	159.00	101.80
	Q	261	287	264	291	267	295	260	294
Near East	P	148.50	69.80	136.92	78.48	130.10	83.40	138.00	80.80
	Q	1,064	1,392	1,077	1,398	1,095	1,418	1,050	1,411
France	P	242.50	145.80	227.92	155.48	220.10	161.40	223.00	158.80
	Q	797	858	809	870	819	884	839	813
West Germany	P	257.50	155.80	241.92	165.48	234.10	172.40	237.00	167.80
	Q	847	794	835	784	814	765	841	768
Benelux	P	263.50	159.80	247.92	169.48	238.10	176.40	241.00	171.80
	Q	322	363	318	360	315	355	332	351
United Kingdom and Ireland	P	214.50	128.80	198.92	135.48	195.10	143.40	197.00	139.80
	Q	398	469	405	478	402	474	364	564
Scandinavia	P	213.50	126.80	200.92	136.48	193.10	141.40	195.00	137.80
	Q	225	233	226	234	229	238	243	212
Switz.-Aus.-Yugo	P	211.50	123.80	198.92	133.48	191.10	138.40	199.00	135.80
	Q	203	199	205	200	207	203	205	197
Eastern Europe	P	193.50	114.80	181.92	123.48	175.10	128.40	183.00	125.80
	Q	179	205	181	207	183	209	180	204

* Assumes 1970 Tariff II, as defined on page 27.
† Used throughout analysis in text.
‡ For specific estimates by country, see table 7.
¶ P = price in dollars per metric ton; Q = quantity in 1,000 metric tons.

TABLE C–4

GAINS AND LOSSES TO INDIVIDUAL COUNTRIES AND TRADE AREAS SHOULD THE EEC AS A BLOC REDUCE ITS TARIFFS ON WINTER ORANGES TO ZERO, OTHER COUNTRIES MAINTAINING THEIR PRESENT TARIFFS

(Based on 1970 Low Production-High Consumption Projections)*

Country	Prices		Consumption		Gains (+) and losses (−) from removal of ECC tariffs			
	1970–Tariff II	1970–Tariff III	1970–Tariff II	1970–Tariff III	Producers	Consumers	Due to tariff collections	Net gain (+) or loss (−)
	dollars per metric ton		*1,000 metric tons*		*million dollars*			
Italy	216.92	180.90	717	829	−37.21	27.85	...	− 9.36
France	227.92	205.90	809	877	...	18.67	−34.29	−15.62
West Germany	241.92	207.90	835	943	...	30.00	−45.65	−15.65
Benelux	247.92	204.90	318	370	...	14.77	− 0.13	14.64
TOTAL EEC	...	...	2,679	3,019	−37.21	91.29	−80.07	−25.99
United Kingdom and Ireland	198.92	224.90	405	367	...	−10.07	0.17	− 9.90
Scandinavia	200.92	222.90	226	209	...	− 4.80	0.11	− 4.69
Switz.-Aus.-Yugo	198.92	220.90	205	188	...	− 4.31	0.09	− 4.22
Eastern Europe	181.92	201.90	181	166	...	− 3.48	...	− 3.48
TOTAL non-EEC consuming countries	...	...	1,017	930	...	−22.66	0.37	−22.29
Spain and Portugal	163.92	183.90	838	765	40.24	−15.86	...	24.38
Algeria	147.92	167.90	264	239	10.99	− 5.03	...	5.96
Morocco	147.92	167.90	178	161	13.79	− 3.40	...	10.39
Tunisia	147.92	167.90	34	31	3.00	− 0.65	...	2.35
Greece	158.92	178.90	264	240	6.73	− 5.03	...	1.70
Near East	136.92	156.90	1,077	966	31.51	−20.40	...	11.11
TOTAL non-EEC producing countries	...	...	2,655	2,402	106.26	−50.37	...	55.89
TOTAL ALL COUNTRIES	...	...	6,351	6,351	69.05	18.26	−79.70	7.61

* See page 27.

TABLE C-5

GAINS AND LOSSES TO INDIVIDUAL COUNTRIES AND TRADE AREAS SHOULD THE EEC AS A BLOC REDUCE ITS TARIFFS ON WINTER ORANGES TO ZERO, OTHER COUNTRIES MAINTAINING THEIR PRESENT TARIFFS

(Based on 1970 High Production-Low Consumption Projections)*

Country	Prices		Consumption		Gains (+) and losses (−) from removal of ECC tariffs			
	1970-Tariff II	1970-Tariff III	1970-Tariff II	1970-Tariff III	Producers	Consumers	Due to tariff collections	Net gain (+) or loss (−)
	dollars per metric ton		*1,000 metric tons*		*million dollars*			
Italy	138.48	114.20	863	1,007	−27.02	22.74	...	− 4.28
France	155.48	139.20	870	951	...	14.79	−25.16	−10.37
West Germany	165.48	141.20	784	890	...	20.32	−21.50	− 1.18
Benelux	169.48	138.20	360	423	...	12.11	−13.95	− 1.84
TOTAL EEC	...	...	...	...	−27.02	69.96	−60.61	−17.67
United Kingdom	135.48	151.20	478	438	...	− 7.16	0.12	− 7.04
Scandinavia	136.48	149.20	234	218	...	− 2.87	0.06	− 2.81
Switz.-Aus.-Yugo	133.48	146.20	200	186	...	− 2.46	0.05	− 2.41
Eastern Europe	123.48	135.20	207	192	...	− 2.34	...	− 2.34
TOTAL non-EEC consuming countries	...	...	...	...	...	−14.83	0.23	−14.60
Spain and Portugal	104.48	117.20	890	811	29.70	−10.82	...	18.88
Algeria	89.48	101.20	331	300	7.03	− 3.68	...	3.35
Morocco	89.48	101.20	223	202	8.85	− 2.48	...	6.37
Tunisia	89.48	101.20	42	38	2.11	− .46	...	1.65
Greece	99.48	112.20	291	264	4.83	− 3.52	...	1.31
Near East	78.48	90.20	1,398	1,251	21.19	−15.59	...	5.60
TOTAL non-EEC producing countries	...	...	...	...	73.71	−36.55	...	37.16
TOTAL ALL COUNTRIES	...	...	7,171	7,171	46.69	18.58	−60.38	4.89

* See page 27.

TABLE C–6

GAINS AND LOSSES TO INDIVIDUAL COUNTRIES AND TRADE AREAS SHOULD THE EEC AS A BLOC REDUCE ITS TARIFFS ON SUMMER ORANGES TO ZERO, OTHER COUNTRIES MAINTAINING THIER PRESENT TARIFFS

(Based on 1970 High Production-Low Consumption Projections)*

Country	Prices		Consumption		Gains (+) and losses (−) from removal of ECC tariffs			
	1970–Tariff II	1970–Tariff III	1970–Tariff II	1970–Tariff III	Producers	Consumers	Due to tariff collections	Net gain (+) or loss (−)
	dollars per metric ton		*1,000 metric tons*		*million dollars*			
France	164.90	140.80	144	163	...	3.67	− 3.56	0.11
West Germany	179.90	146.80	136	160	...	4.88	− 4.65	0.23
Benelux	176.90	139.80	61	74	...	2.49	− 2.34	0.15
TOTAL EEC	...	...	341	397	...	11.04	−10.55	0.49
United Kingdom	138.90	139.80	76	76	...	− 0.08	...	− 0.08
Scandinavia	150.90	151.80	38	37	...	− 0.04	− 0.01	− 0.05
Switz.-Aus.-Yugo	161.90	162.80	32	32	...	− 0.03	0.00	− 0.03
Eastern Europe	149.90	150.80	32	32	...	− 0.03	...	− 0.03
TOTAL non-EEC consuming countries	...	...	178	177	...	− 0.18	− 0.01	− 0.19
North America	152.90	152.80	467	468	− 0.03	0.00	0.02	− 0.01
South America	71.90	72.80	5,024	4,971	4.72	− 3.84	...	0.88
South Africa	69.90	70.80	269	266	0.69	− 0.24	...	0.45
TOTAL non-EEC producing countries	...	...	5,760	5,705	5.38	− 4.08	0.02	1.32
TOTAL ALL COUNTRIES	...	...	6,279	6,279	5.38	6.78	−10.54	1.62

* See page 27.

TABLE C-7

CHANGES IN PRICE AND CONSUMPTION OF WINTER ORANGES FROM ALTERNATIVE COMPOSITIONS OF THE EEC UNDER PROJECTED 1970 TARIFF CONDITIONS

Country	P and Q*	Alternative composition or free access to EEC				
		Present EEC	Spain and Portugal included	Greece and Near East included	North Africa included	United Kingdom and Ireland included
Italy	P	185.72	172.50	173.20	173.00	184.90
	Q	812	861	858	859	814
France	P	199.72	197.50	188.20	188.00	197.90
	Q	899	907	942	943	905
West Germany	P	211.72	199.50	200.20	200.00	210.90
	Q	929	966	963	964	924
Benelux	P	216.72	202.50	193.20	196.00	215.90
	Q	354	373	388	383	354
United Kingdom and Ireland	P	173.72	174.50	166.20	186.00	196.90
	Q	452	450	468	428	408
Scandinavia	P	174.72	172.50	164.20	184.00	172.90
	Q	253	256	266	243	255
Switz.-Aus.-Yugo.	P	172.72	170.50	174.20	174.00	170.90
	Q	229	232	228	228	231
Eastern Europe	P	158.72	156.20	163.20	163.00	156.90
	Q	201	204	197	197	203
Spain and Portugal	P	140.72	175.50	131.20	131.00	138.90
	Q	947	794	1,002	1,003	957
Algeria	P	124.72	122.50	115.20	159.00	122.90
	Q	303	307	323	249	306
Morocco	P	124.72	122.50	115.20	159.00	122.90
	Q	204	207	218	168	207
Tunisia	P	124.72	122.50	115.20	159.00	122.90
	Q	39	40	42	32	39
Greece	P	135.72	132.50	171.20	139.00	133.90
	Q	300	305	249	294	303
Near East	P	113.72	111.50	145.20	122.00	111.90
	Q	1,249	1,269	1,027	1,180	1,265

* P = price in dollars per metric ton; Q = quantity in 1,000 metric tons.

TABLE C-8

GAINS AND LOSSES TO VARIOUS COUNTRIES FROM ALTERNATIVE CHANGES IN THE COMPOSITION OF THE EEC (WINTER ORANGES, PROJECTED 1970 TARIFF CONDITIONS) UNDER THE EXTREME SETS OF 1970 PRODUCTION CONSUMPTION-PROJECTIONS

Country	Net gains (+) and losses (−) from addition of the following countries to EEC					
	Spain and Portugal		Greece and Near East		United Kingdom and Ireland	
	Low prod.-high cons.	High prod.-low cons.	Low prod.-high cons.	High prod.-low cons.	Low prod.-high cons.	High prod.-low cons.
	dollars					
Italy	− 4.56	− 2.08	− 4.34	− 2.30	− 0.21	− 0.20
France	−13.91	−16.59	10.16	8.53	1.51	1.18
West Germany	−33.52	−14.26	−28.08	− 6.07	0.92	2.97
Benelux	5.49	−10.24	8.37	− 6.09	0.45	− 2.16
TOTAL EEC	−46.50	−43.17	−13.89	− 5.93	2.67	1.79
United Kingdom and Ireland	− 1.53	− 0.49	3.02	3.20	− 1.70	− 2.13
Scandinavia	0.70	0.70	2.03	2.35	0.39	0.30
Switz.-Aus.-Yugo	0.62	0.59	− 0.08	− 0.40	0.34	0.43
Eastern Europe	0.41	0.44	− 0.58	− 1.07	0.29	0.24
TOTAL non-EEC consuming countries	0.20	1.24	4.99	4.08	− 0.68	− 1.16
Spain and Portugal	49.64	42.63	−12.42	−11.25	− 1.97	− 1.66
Algeria	− 0.64	− 0.53	− 3.02	− 2.25	− 0.52	− 0.29
Morocco	− 1.14	− 1.08	− 5.46	− 4.62	− 0.90	− 0.61
Tunisia	− 0.26	− 0.28	− 1.24	− 1.21	− 0.20	− 0.16
Greece	− 0.25	− 0.21	4.01	3.16	− 0.12	− 0.10
Near East	− 1.02	− 0.78	22.40	12.02	− 0.78	− 0.53
TOTAL non-EEC producing countries	46.33	39.75	4.27	− 4.15	− 4.49	− 3.35
TOTAL ALL COUNTRIES	0.03	− 2.18	− 4.63	− 6.00	− 2.50	− 2.72

ACKNOWLEDGMENTS

This study was initiated while the authors were in residence at the Center for Advanced Training in Agricultural Economics, University of Naples, Italy. Appreciation is expressed to the Center, to the Ford Foundation, and to the Fulbright Commission for support on this project.

The authors are particularly indebted to Jurgen Wolf, Chief of the Tobacco, Fruit, and Vegetables Section, FAO, for his excellent cooperation throughout this study, including a thorough discussion of various aspects of the problem, the offer of unpublished data without which the study would have been impossible, and a review of an earlier draft of the report.

James Boles, Associate Professor of Agricultural Economics, Berkeley, was extremely helpful in working out the methodology of the transportation analysis, and in developing computer programs for efficient solutions of the problems. A. J. Finch and Quirino Paris, Graduate Students at the Department, helped carry out many of the detailed computations of the analysis.

Finally, the authors wish to thank R. G. Bressler, Jr., Professor of Agricultural Economics, Berkeley; S. H. Sosnick, Associate Professor of Agricul-

tural Economics, Davis, and T. D. Wallace, Professor of Agricultural Economics, North Carolina State University, for their thorough and constructive reviews of an earlier draft. In particular, Professor Sosnick's penetrating comments and suggestions have substantially improved the sections on welfare economics.

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