BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

Division of International Finance

REVIEW OF FOREIGN DEVELOPMENTS

February 15, 1965

Prices and Export Performance
   of Industrial Countries, 1953-63   32   pages

Helen B. Junz
Board of Governors of the
  Federal Reserve System

     and

Rudolf R. Rhomberg
Chief, Special Studies Division
Research and Statistics Department
International Monetary Fund

Prices and Export Performance
of Industrial Countries, 1953-63

I. Introduction

This paper is an interim report on a study of the influence of price factors on exports of manufactures of major industrial countries during the period from 1953 to 1963.

The responsiveness of trade flows to relative price changes is an important element in the determination of certain policy measures aimed at the correction of international payments imbalances. For example, the imposition of import surcharges and the decision to rebate turnover taxes on exports in the United Kingdom late last year, the devaluation of the Canadian currency in 1962, and the revaluation of the German mark and the Dutch guilder in 1961 all were policy decisions in which account had to be taken of the effect of price changes on exports and imports.

More generally, for many countries the choice of alternative domestic economic policy measures is influenced by the effects they are thought to have, either directly or through their impact on incomes and price levels, on the external payments position. It becomes important, therefore, to ascertain the nature and magnitude of these effects. But changes in economic activity, shifts in demand, and price movements are to some extent interrelated and it is exceedingly difficult to assess the separate effect of any one factor.[1] It is, however, possible to design statistical

---

[1] For a review of the literature on the technical problems encountered in the statistical estimation of these price and income effects see S. J. Prais, "Econometric Research in International Trade: A Review," Kyklos, Vol. XV (1962), Fasc. 3, pp. 560-79, and D. J. Morgan and W. J. Corlett, "The Influence of Price in International Trade: A Study in Method," Journal of the Royal Statistical Society (A), Vol. 114 (1951), pp. 307-52.

experiments in such a way as to minimize the difficulties, which arise particularly in time series analysis, of separating effects of price changes from influences of changes in economic activity on international trade. The present paper is an attempt in this direction.[1] Despite a number of technical and theoretical limitations, the results indicate fairly clearly that price competitiveness plays an identifiable, though not dominant, role in export performance.

II. Description of the Project

The study is concerned with exports of manufactures by 11 major industrial countries[2] to selected market areas. In some of the computations the Common Market countries were combined into one exporting area. The markets are those of the 11 exporting countries themselves and Switzerland.[3] In addition, some of the computations refer to five composite markets, namely, (1) all major industrial countries, i.e., the 11 exporting countries of the study plus Switzerland, (2) the European Economic Community (E.E.C.), (3) the industrial countries excluding the E.E.C., (4) the "rest of the world", that is, all countries excluding the 11 exporting countries of the study and Switzerland, and (5) the world market as a whole.

The principal objective was to identify competitive price effects on exports of each of the 11 industrial countries to the various markets, relative to the exports of its rivals to these markets. Demand for foreign manufactured products into each of the markets in the sample is taken as given. The study is not concerned with the manner in which this demand is influenced by economic activity in a particular market, by the prices of imports relative to the prices of domestic import-competing products, or by a number of other factors which affect the level of imports. Attention is focussed, instead, upon changes in the distribution of imports--taking their total amount as given--among

---

[1] Prominent among a number of studies employing a cross-section approach, or a combination of time series and cross-section methods, are G. D. A. MacDougall, "British and American Exports: A Study Suggested by the Theory of Comparative Costs," Economic Journal, Vol. LXI (December 1951), pp. 697-724, and Vol. LXII (September 1952), pp. 487-521; J. M. Fleming and S. C. Tsiang, "Changes in Competitive Strength and Export Shares of Major Industrial Countries," Staff Papers, Vol. V, (August 1956); and R. M. Stern, "British and American Productivity and Comparative Costs in International Trade, Oxford Economic Papers, Vol. 14, No. 3 (October 1962), pp. 275-96.

[2] The 11 exporting countries are Austria, Belgium-Luxemburg, (herein-after referred to as Belgium), Canada, France, Germany, Italy, Japan, Netherlands, Sweden, United Kingdom, and United States. These countries accounted for 72 per cent of world exports of manufactures in 1962.

[3] Switzerland was excluded from the group of exporting countries because of lack of certain data, but it was included as a market.

competing supplier countries and upon the effect on this distribution
of differential movements of prices or costs in the various supplier
countries. Specifically, the study attempts to estimate the effect
of changes in relative prices or costs on the shares of exporters in
particular markets.[1]

Three sets of statistical computations were made: (a) elasticities
of substitution, in each separate market, of the exports of each
supplying country for the exports of all other suppliers of the
sample;[2] (b) the responsiveness of export shares of all exporters
in all markets to changes in relative prices; and (c) the relation
between relative prices and the deviations of actual exports from
those which would have occurred if exporting countries had maintained
their previous shares in every market.

The variables and the data[3]

The study is based on annual data for exports and prices over a
period of 11 years, from 1953 to 1963. Data for exports of manufactures
consist of Standard International Trade Classification (SITC) sections
5, 6, 7, and 8 of the revised United Nations code. Three alternative
price (or cost) variables are considered: (a) unit values of exports of
manufactures, (b) the manufacturing component of the wholesale price
index in the exporting country, and (c) wage costs per unit of output
in the manufacturing sector of the exporting country. All three
indicators are adjusted for changes in exchange rates so as to reflect
prices or costs in U.S. dollars.

---

[1] Recent studies making use of market-share analysis as a measure of
changes in particular countries' trade positions include Bela Balassa,
"Recent Developments in the Competitiveness of American Industry and
Prospects for the Future" in Factors Affecting the United States
Balance of Payments, U.S. Congress, Joint Economic Committee (Washington,
1962), pp. 29-54; Richard N. Cooper, "The Competitive position of the
United States", The Dollar in Crisis, Seymour E. Harris, ed. (Harcourt,
Brace and World, Inc., 1961), pp. 137-64; R. L. Major, "World Trade in
Manufactures", National Institute Economic Review, (London), July 1960,
pp. 18-27; Anne Romanis, "Relative Growth of Exports of Manufactures of
United States and Other Industrial Countries", Staff Papers, Vol. VIII
(1961), pp. 241-73; U.S. Department of Commerce, Bureau of International
Commerce, U.S. Share of World Markets for Manufactured Products, Analysis
of Changes from 1954 through 1961, (Washington, 1964); and National
Economic Development Council, Export Trends, (London, H. M. S. O., 1963).

[2] The elasticity of substitution (in demand) is defined as the
proportionate change in the ratio of the quantities of two goods purchased,
divided by the proportionate change in the ratio of their prices.

[3] The data and data sources are further described in the Appendix.

Unit values of exports were chosen in the absence of constant-weight export price indices for most countries; wholesale prices, because they give, at least in one respect, a better indication of changes in general price competitiveness of a country, since they measure price changes not only for goods actually moving in international trade, but also for goods which during the period under study are eliminated from, or enter into, a country's export commodity bundle. Unit labor costs were used in order to test the hypothesis that, whereas prices of internationally traded goods must always move in close correspondence, costs (and therefore profits) may diverge and thus provide differential incentives to export or to sell in the home market, which in turn influence export performance.

Chart 1 shows a comparison of movements in these price and cost indices and in the index of productivity per man hour for four major industrial countries. The relation between changes in the three price or cost indices varies considerably from country to country. For instance, in the United States export unit values increased much more between 1953 and 1963 than either wholesale prices or unit labor costs; Germany, on the other hand, experienced increases in labor costs far in excess of the rise in wholesale prices, which in turn advanced more than export unit values. A notable divergence of price and cost trends occurred in Japan, where the unit labor cost index rose by 14 per cent over the eleven-year period, while wholesale prices remained roughly constant and export prices declined by 13 per cent. Equally remarkable is the fact that, while unit labor costs in the United States increased less than those of any other industrial country of the study between 1953 and 1963, the rise in the U.S. export unit value index exceeded that of any of these countries.

As a result of the divergent movements in these indices, the size, or indeed the direction, of calculated changes in a country's price competitiveness depends upon the choice of the price or cost index on which the measure of price competitiveness is based. Since there appears to be a closer correspondence between shorter-run movements in the three indices than between their long-run trends, measures of short-run changes in countries' competitive positions, such as deviations from trend or year-to-year percentage changes, are less affected by that choice.

Indices of price competitiveness

To measure the degree of a country's price competitiveness, its prices must be brought into relation to the prices of other exporting countries. Corresponding to the three price variables used, three sets of indices of price competitiveness were constructed for each exporting country. Each set consists of one index for each market, obtained by dividing the exporters' price index by the weighted average of the corresponding price indices of the other exporting countries; the weights are their exports of the preceding year (in 1953 dollars) to the particular market. For each of the three price variables used, there are

CHART 1. MOVEMENTS IN PRICE, COST, AND PRODUCTIVITY INDICES IN MANUFACTURING: SELECTED COUNTRIES, 1953-1963

(1953 = 100)
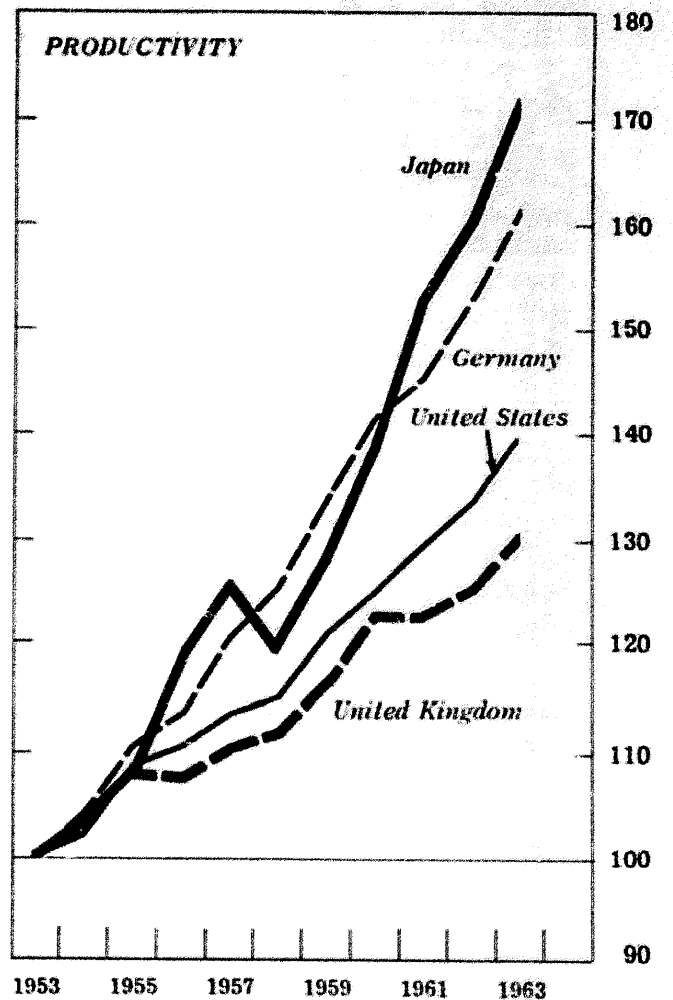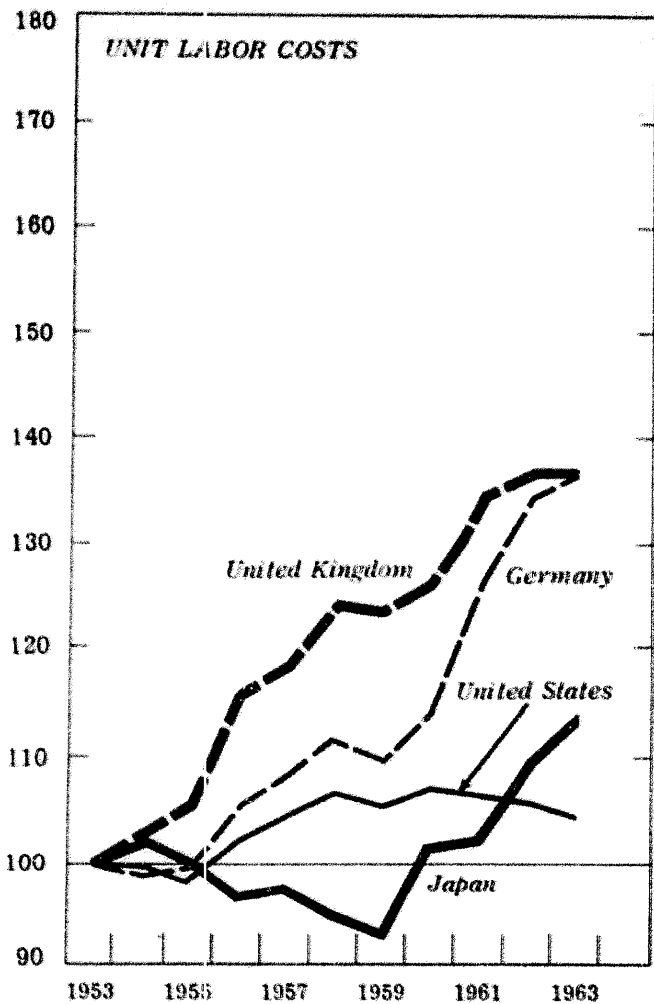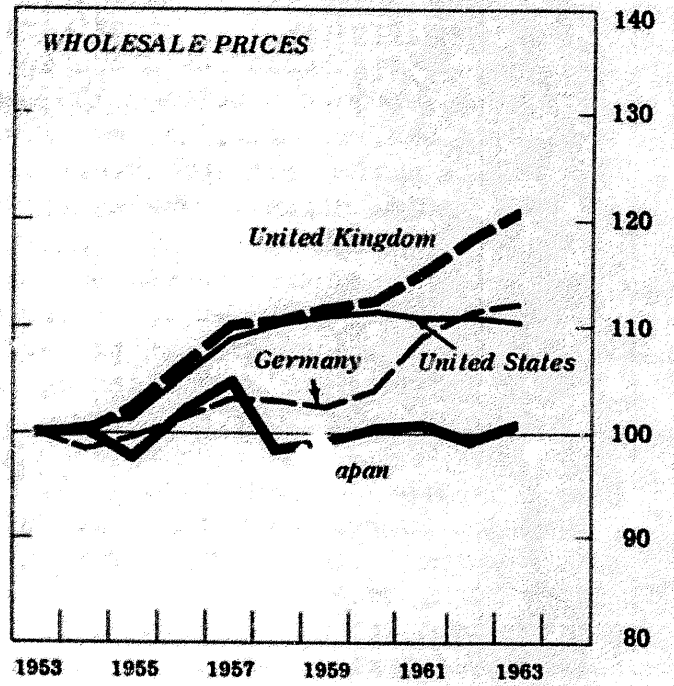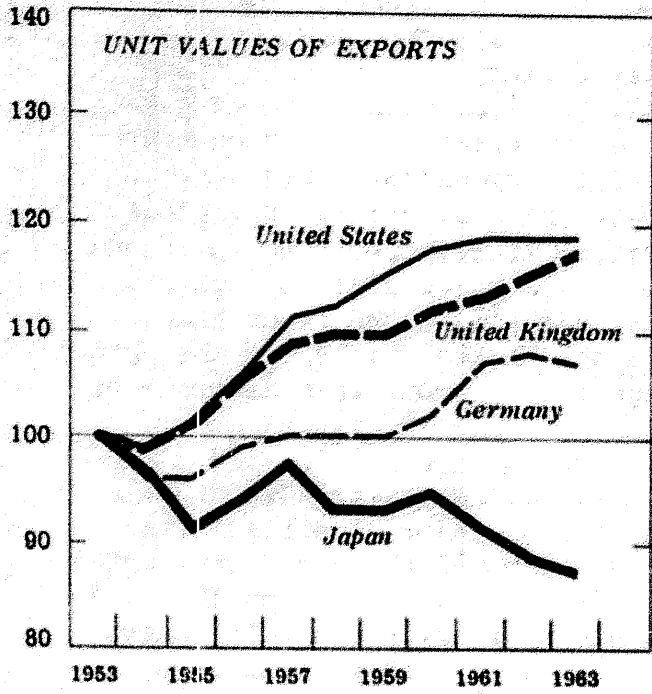
thus for each exporter, 16 indices of price competitiveness, one for each of the markets.[1] A particular country's index of price competitiveness varies from market to market in accordance with the varying shares of its competitors.[2] These variations may be quite large. For example, as shown in Table 1, Germany's unit value index rose by 7 per cent between 1953 and 1963, but its index of price competitiveness deteriorated (i.e., rose) by more than 11 per cent in the U.S. market and improved (i.e., declined) by almost 8 per cent in the Canadian market. The deterioration in the U.S. market is explained by the fact that Germany's chief competitors there, according to volume market shares, are Canada and Japan whose unit value indices declined over the period 1953-63. In the Canadian market, on the other hand, Germany faces competition primarily from the United States and the United Kingdom whose unit value indices rose appreciably more than did that of Germany.

As may be seen from Table 1 and Chart 2, there were considerable changes in relative price trends in a number of major countries after 1959. Most continental European countries improved their relative price position, based on export unit values, fairly steadily between 1953 and 1959, but between 1959 and 1963 their indices of price competitiveness either deteriorated, as in Germany, France, and the Netherlands, or improved at a slower rate, as in Italy. This shift in relative price trends is explained, in part, by differential trends in prices in individual countries, but to a large extent also by changes in exchange rates (devaluation of the French franc in 1957 and 1958, revaluation of the German mark and the Dutch guilder in 1961, and depreciation of the Canadian dollar between 1959 and 1962). Greater price stability in the United States than in many other countries during the period 1959-63 led to an improvement in U.S. price competitiveness in some of the markets and to a slowing in its rate of decline in others. These price developments in the United States, which has a large share in many markets, also contributed substantially to the rise (i.e., worsening) of the competitiveness indices of most European countries.

There were only two countries which showed a fairly consistent price behavior throughout the entire period: Japan's index of export price competitiveness in the world market improved almost consistently at an annual rate of nearly 2 per cent, while the price position of the United Kingdom deteriorated at an annual rate of almost 1.5 per cent. Between 1953 and 1959, only Italy showed a greater relative price improvement than did Japan, and only the United States experienced a

---

[1] Since 11 of the 17 markets considered are those of the exporting countries themselves, each exporter sells only to 16 markets.

[2] In the absence of separate export unit values by area of destination, variation in rivals' market shares provides the only differentiation of a country's competitiveness among markets.

Table 1. Selected Industrial Countries: Changes in Export Unit Values and in Indices of Price
Competitiveness Based on Export Unit Values in Selected Markets, 1953-63 and 1959-63 1/

(Per cent)

	Export Unit Value	World	Indices of Price Competitiveness by Market									
			Industrial Countries		Germany	France	Italy	United Kingdom	Canada	United States	Japan
			E.E.C.	Non-E.E.C.							
1953-63											
E.E.C.	-0.7	-9.9	--	-8.1	-11.9	-14.8	-13.7	-8.4	-15.4	-1.4	-15.8
Germany	+7.0	+2.6	+4.7	+3.0	--	+5.7	-1.2	+4.4	-7.9	+11.1	-6.
France	--	-5.1	-3.8	-4.6	-0.5	--	-8.7	-3.5	-13.8	+2.4	-11.
Italy	-19.0	-24.3	-23.6	-23.9	-22.7	-24.7	--	-23.4	-30.4	-18.4	-29.
United Kingdom	+17.6	+14.5	+15.5	+14.0	+19.1	+15.7	+10.5	--	+1.8	+22.9	+4.
Canada	-1.0	-5.8	-4.3	-6.0	-1.4	-4.2	-8.3	-4.9	--	+1.7	-12.
United States	+19.1	+17.2	+17.5	+18.5	+21.4	+17.9	+12.3	+19.8	+12.0	--	+12
Japan	-13.0	-18.4	-16.1	-18.4	-13.6	-15.9	-19.6	-16.4	-25.7	-14.0	--
1959-63											
E.E.C.	+4.0	+3.3	--	+5.7	+0.9	-0.1	+0.3	+5.6	+1.2	+10.7	+1.
Germany	+7.0	+7.1	+6.3	+9.0	--	+8.2	+4.8	+7.9	+4.5	+12.3	+5.
France	+6.5	+5.6	+4.5	+6.8	+7.6	--	+2.1	+6.2	+3.9	+10.6	+4.
Italy	+1.0	-1.1	-2.4	+0.4	-0.9	-2.8	--	-0.3	-1.7	+3.9	-2.
United Kingdom	+7.0	+6.4	+5.1	+7.7	+7.1	+5.8	+3.3	--	+5.1	+11.3	+5.
Canada	-7.8	-9.4	-10.0	-8.9	-8.4	-9.5	-11.4	-10.1	--	-7.3	-10.
United States	+2.8	+1.2	+0.5	+2.9	+2.7	+0.5	-1.6	+3.0	+0.4	--	-1.
Japan	-6.1	-8.1	-8.2	-7.0	-6.4	-7.7	-9.8	-7.1	-8.9	-4.8	--

1/ Export unit value indices are based on data in U.S. dollars.

CHART 2. INDICES OF PRICE COMPETITIVENESS AND CHANGES IN MARKET SHARES: EXPORTS OF MANUFACTURES TO THE INDUSTRIAL COUNTRIES' MARKET, 1953-1963 [1]/
(Index numbers, 1953 = 100 and percent)
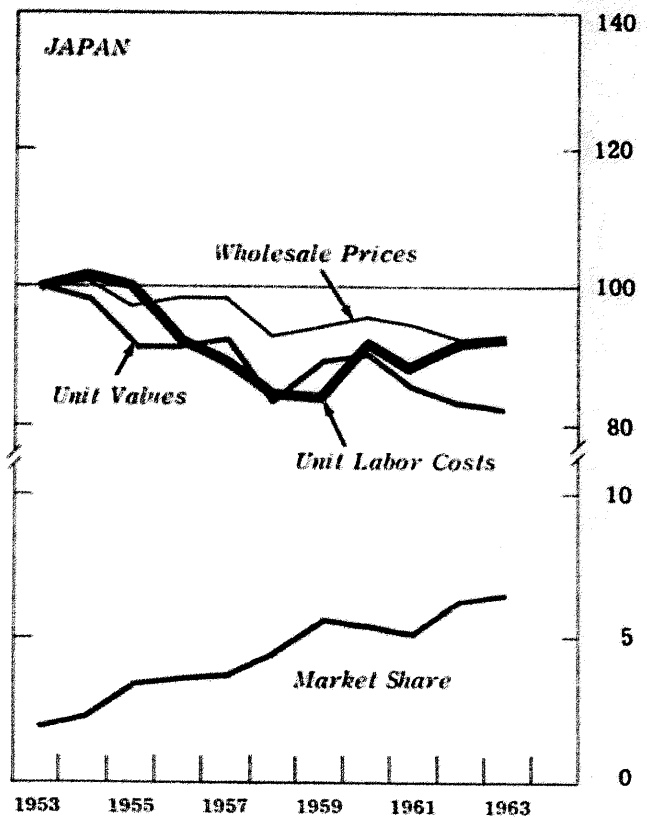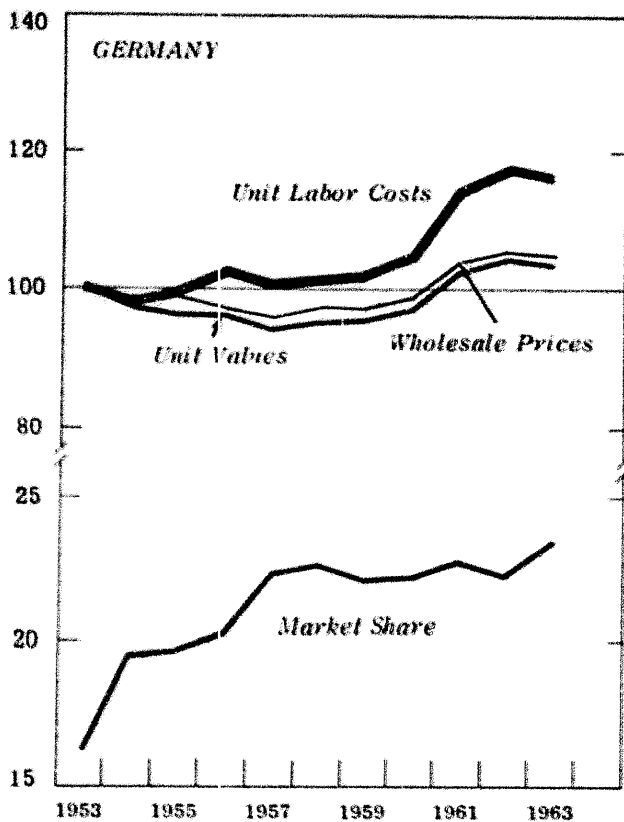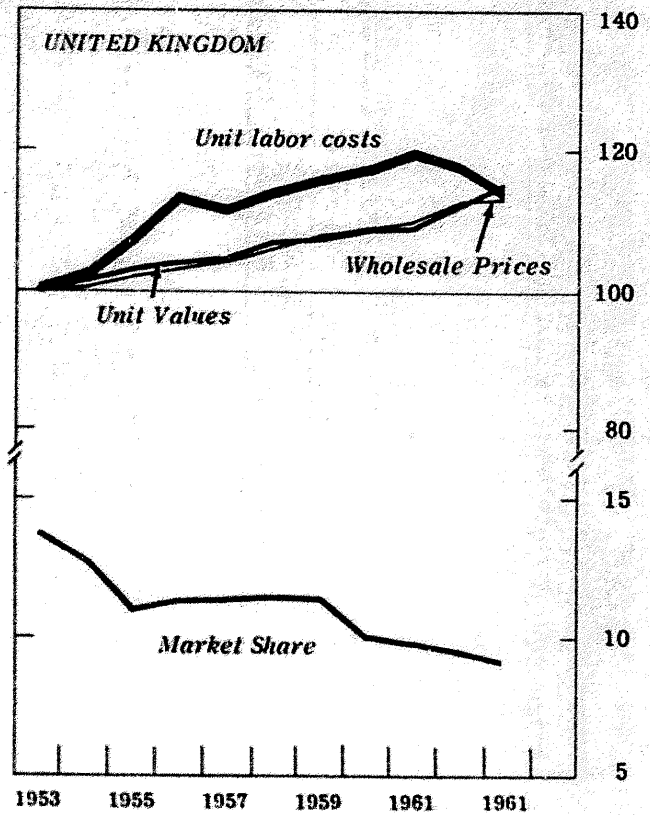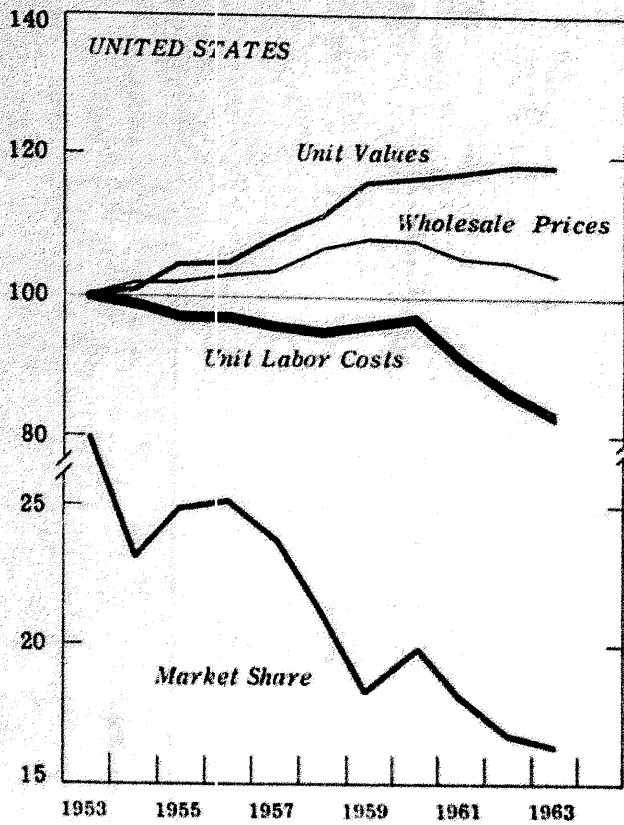
1/ The industrial countries are: Austria, Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, United Kingdom, and United States. Indices of price competitiveness are ratios of prices (or costs) of the exporting country to the weighted average of prices (or costs) of its competitors.

greater deterioration in its relative price position than did the
United Kingdom. Between 1959 and 1963, however, Japan's improvement
in price competitiveness was exceeded only by Canada, as a result of
the depreciation of the Canadian exchange rate, and the decline in the
United Kingdom's price competitiveness was exceeded only by that of
Germany, mainly as a consequence of the revaluation of the German mark.

Although inspection of Chart 2 seemed to indicate a closer
correspondence between movements in market shares and relative export
unit values than between the former and one of the other two indices,
the question of which of the three price or cost series constitutes the
most appropriate base for a measure of price competitiveness was not
prejudged on this evidence. The three alternative indicators, were,
therefore, used in turn in the statistical computations relating
variations in export performance to changes in price competitiveness.

III. Statistical Results

Elasticities of substitution by exporter and market

In the first set of computations, intended to be exploratory, time
series data were used to derive, separately for each market, elasticities
of substitution of the exports of each supplier for those of the other
exporting countries of the sample. Since there are 12 supplying areas
(11 industrial countries and the E.E.C.) each of which exports to 16
markets, 192 elasticities of substitution were computed for each of the
three competitiveness indices. The relation is cast in logarithmic form
and includes a linear trend term:

$$\log \bar{x}_{ijt} = a_{ij} + b_{ij} \log \bar{p}_{ijt} + c_{ij} t + u_{ijt} \quad (1)$$

$$(t = 1, \ldots, 11)$$

where $\bar{x}_{ijt}$ is the ratio of exports, deflated by the unit value index, of
country i to market j in year (t + 1952) to the deflated exports of all
exporting countries of the study--excluding country i (and country j, if
it is one of the exporting countries)--to market j in the same year;
$\bar{p}_{ijt}$ is one of the three indices of price competitiveness in year
(t + 1952), for instance, the ratio of the export unit value of country
i to the weighted average of its competitors' export unit values, the
weights being their deflated exports of the preceding year to market j;
a, b, and c are constants estimated by ordinary least-squares regression;
u_{ijt} is the unexplained residual. The coefficients b_{ij} are estimates of
the proportionate changes in the export volume ratios, x_{ijt}, associated
with proportionate changes in the price competitiveness variables; b_{ij} is
thus the elasticity of substitution of exports of country i to market j for

the exports of all of its competitors to that market.[1] The inclusion of a linear trend term in equation (1) assures that the estimated relation between export ratios and price ratios is not influenced by longer-run trends in the two variables, but reflects instead their association net of any (linear) trend factors that may be operative.

The 192 elasticities estimated on the basis of export unit values are presented in Table 2. As shown in the summary in Table 3, the majority, 142 (or 74 per cent), show the expected negative sign. Of these, 52 (or 27 per cent of all estimated coefficients) are significantly different from zero at the 5 per cent level.

In spite of the unevenness in the results of this set of computations, it is possible to draw some tentative conclusions. There appears to be considerable variation in the sensitivity of exports to price changes among exporting countries and markets. These differences may in part be the result of varying influences of nonprice factors for which no allowance is made in the computations. The estimated elasticities of substitution of the exports of individual countries in individual markets are, on the whole, somewhat higher in absolute value than those relating to the composite exporting area (the E.E.C.) or to one of the five composite market areas.[2] The 27 significant negative coefficients relating to individual exporters in individual markets have an average value of -5, while the 25 significant coefficients relating to composite markets have an average value of about -2.

Corresponding computations with the alternative indices of competitiveness, based on wholesale prices and unit labor costs, tended to corroborate the results obtained with export unit values but were, on the whole, even less reliable.

---

[1] In general, the elasticity of substitution between two goods, x_1 and x_2, whose prices are p_1 and p_2, is defined as

$$\frac{d\,(x_1/x_2)}{d\,(p_1/p_2)} \frac{p_1/p_2}{x_1/x_2} = \frac{d\,\log(x_1/x_2)}{d\,\log(p_1/p_2)}.$$

In equation (1), b_{ij} is an estimate of $(d \log \bar{x}_{ij})/(d \log \bar{p}_{ij})$, and thus of the elasticity of substitution between the exports in the numerator and those in the denominator of the ratio $\bar{x}_{ij}$.

[2] The results obtained for composite markets are biased in a number of ways, particularly where the exporting country is itself a member of the composite market area. A country's export share in the composite market may decline (or increase) merely because its own import demand increases more rapidly (or more slowly) than that of the other members of the market area. Such apparent changes in market shares are, of course, not changes in export performance as defined in this study.

Table 2. Estimated Elasticities of Substitution of Industrial Countries' Exports of Manufactures in Various Markets with Respect to Changes in Relative Export Unit Values.1/

Market	Belgium	Netherlands	Germany	France	Italy	Five Common Market Countries	United Kingdom	Sweden	Austria	Canada	United States	Japan
Belgium	---	-4.0	-2.6	-2.1	+	-1.6	-3.0	+	+	+	-1.9	-4.2
Netherlands	+	---	-2.7	-3.2	+	-1.1	-2.9	-6.9	-0.8	+	-0.1	-4.3
Germany	+	-0.8	---	-1.8	-1.9	+	+	-3.5	-1.9	+	-0.1	+
France	+	+	-3.6	---	+	-4.4	-4.3	-6.0	-4.1	+	-2.2	-0.5
Italy	-5.1	-7.6	-2.1	-2.1	---	-0.7	-4.6	-3.6	-2.6	+	-0.7	-4.8
Five Common Market Countries	-0.3	-3.4	-1.7	-2.8	-1.2	---	-2.4	-3.9	-1.7	+	-1.0	-2.9
United Kingdom	+	+	-3.5	-0.2	-2.2	-1.8	---	-0.9	+	+	-0.8	-1.7
Sweden	-1.9	-3.5	-4.2	-2.5	-0.8	-2.8	-5.7	---	+	+	+	+
Austria	-7.4	-1.8	-3.7	-0.6	-1.4	-0.2	-4.6	-8.7	---	+	+	+
Canada	-0.8	-1.0	-5.3	-5.2	-1.9	-4.3	-7.7	+	-1.6	---	-7.4	-11.9
United States	-1.7	+	-3.1	-5.1	-1.4	-2.6	-4.5	-3.7	-0.6	-3.9	---	-4.5
Japan	-0.2	+	-0.2	+	+	+	+	+	+	+	+	---
Switzerland	-3.2	-1.8	-2.6	-0.4	-0.6	-1.7	+	-12.2	-2.7	+	-2.2	+
Seven Non-EEC Industrial Countries	-1.8	+	-2.4	-2.4	-0.9	-1.6	-3.0	+	+	-2.1	-3.1	-3.7
All Industrial Countries	-0.9	-0.3	-2.0	-2.1	-0.8	-0.5	-0.8	-0.7	-1.4	-0.9	-1.3	-3.0
"Rest of the World"	-0.4	-0.2	-2.8	-2.7	-0.6	-2.9	+	+	-1.1	-1.6	-2.7	-1.9
World Market	-0.3	-0 2/	-2.2	-2.3	-0.7	-1.3	+	+	-1.2	-1.1	-1.9	-2.0

1/ This table lists the regression coefficients, b_{ij}, in equation (1). They represent elasticities of substitution of the exports of countries in the heading to markets in the stub for the exports of the other exporting countries of the sample to that market. Coefficients which are significant at the 5 per cent level are underlined; coefficients which had a positive sign are indicated by a plus sign.

2/ Less than 0.1 in absolute value.

Table 3. Size Distribution of Estimated Elasticities of Substitution from Time Series, Annual Data 1953-63 1/

(Number of Cases)

	Significant at 0.05 Level			Not Significant at 0.05 Level			All Cases		
	Indivi-dual Ex-porters and Markets	Groups of Ex-porters and Markets	Total	Indivi-dual Ex-porters and Markets	Groups of Ex-porters and Markets	Total	Indivi-dual Ex-porters and Markets	Groups of Ex-porters and Markets	Total
Less than -10.5	2	-	2	-	-	-	2	-	2
-9.5 to -10.5	-	-	-	-	-	-	-	-	-
-8.5 to -9.5	1	-	1	-	-	-	1	-	1
-7.5 to -8.5	2	-	2	-	-	-	2	-	2
-6.5 to -7.5	3	-	3	-	-	-	3	-	3
-5.5 to -6.5	-	-	-	2	-	2	2	-	2
-4.5 to -5.5	6	-	6	3	-	3	9	-	9
-3.5 to -4.5	3	3	6	8	1	9	11	4	15
-2.5 to -3.5	7	6	13	7	6	13	14	12	26
-1.5 to -2.5	3	10	13	14	9	23	17	19	36
-0.5 to -1.5	-	6	6	14	13	27	14	19	33
0 to -0.5	-	-	-	6	7	13	6	7	13
Total negative	27	25	52	54	36	90	81	61	142
Positive	5	-	5	35	10	45	40	10	50
Total	32	25	57	89	46	135	121	71	192

Source: Table 2.

1/ Elasticities of substitution of exports of one country or group of countries for exports of other industrial countries. The price indicator used is the export unit value index.

The fact that one-fourth of the coefficients had the positive sign, and the high proportion of estimates which are statistically not significant, indicate that, in many cases, imperfections of the data and the influence of nonprice factors prevent reliable estimation of substitution elasticities, country by country and market by market. The influence of these factors, which disturb or modify the normal relation between export volumes and prices, is particularly evident in a statistical analysis based on a very small number of observations. In an attempt to overcome this latter difficulty, an approach combining cross-section and time series analysis was chosen in the continuation of the project.

Market shares and relative prices: Combined cross-section and time series results

The second set of computations relates year-to-year percentage charges in the shares of the 11 exporting countries in each of the single-country markets to percentage changes in the corresponding indices of competitiveness. Unit values of manufacturing exports, wholesale prices, and unit labor costs were again used as alternative price variables. The typical equation is of the form

$$\frac{x^*_{ijt} - x^*_{ij,t-1}}{x^*_{ij,t-1}} = a + b \; \frac{\bar{p}_{ijt} - \bar{p}_{ij,t-1}}{\bar{p}_{ij,t-1}} + u_{ijt} \quad (2)$$

$$(i = 1, \ldots, 11; \; j = 1, \ldots, i-1, i+1, \ldots, 12; \; t = 1, \ldots, 10)$$

where x^*_{ijt} is the market share of country i in market j in year $(t + 1953)$, $\bar{p}_{ijt}$ is the index of price competitiveness as defined in connection with equation (1), u_{ijt} is the unexplained residual, and a and b are constants. The coefficient b is a measure of the responsiveness (elasticity) of export shares to changes in the index of competitiveness.[1] This equation was computed for the percentage changes in the shares of all exporters in all markets during all years of the sample period. The total number of observations is 1210. The same equation was also calculated for subsets of observations, namely, (1) for each exporting country, (2) for each market, and (3) for each year.

---

[1] Elasticities of market shares will tend to be somewhat lower, and in cases of large market shares considerably lower, than elasticities of substitution; in estimating the latter, the dependent variable is the ratio of the country's exports to those of its competitors, in the former it is the ratio of its exports to those of all exporters including itself.

The extent to which percentage changes in the price variables explain percentage changes in market shares is rather small. The values of the coefficients of determination corrected for the number of degrees of freedom ($\bar{r}^2$) range from zero to 0.25, but are in the majority of cases less than 0.10. (See Table 4.) Nevertheless, the t-ratios indicate that many of the regression coefficients, even where $\bar{r}^2$ is low, are significantly different from zero, so that the effect of changes in relative prices, though in many cases dwarfed by the influence of other factors not accounted for in the regression equations, is nevertheless clearly noticeable.[1]

The apparent elasticity of market shares with respect to changes in relative unit values for the whole sample of 1210 observations is -1.7; this coefficient exceeds its standard error 7 1/2 fold. The 33 corresponding values for individual exporting countries, markets, and years are all negative; of these, 15 are significant at the 5 per cent level and range from -1.6 to -3.6. The outcome of the regression equations with relative wholesale prices indicates that in many cases changes in this indicator of price competitiveness are less closely associated with changes in market shares than are changes in relative unit values.[2] The latter also proved superior as an explanatory variable of changes in market shares to relative wage costs per unit of output.

Relative prices and over-all export performance

In the last, and possibly most useful, set of calculations it was attempted to determine the relationship between price competitiveness and deviations in countries' exports from those that would have occurred if they had maintained their previous market shares in each of the industrial countries.[3] Three alternative "constant-shares" norms were

---

[1] In interpreting the coefficients of determination, it must be remembered that the variables are in the form of percentage changes of ratios. Relatively small values for $\bar{r}^2$, compared to values of $\bar{r}^2$ usually found in time series analysis, were thus to be expected.

[2] However, where the elasticity coefficients based on relative wholesale prices are significant, they are often larger in absolute value than the corresponding coefficients based on unit values.

[3] Aggregating deviations from constant-shares exports to single markets eliminates some of the problems that arise in using market-share analysis in composite markets. For example, it is theoretically possible for a country to have declining market shares in every single market, but at the same time to increase its share in the composite market. This could occur if demand for imports increased more rapidly than the composite market average in those markets in which the exporting country had large shares and increased more slowly (or declined) in those markets in which its shares are small.

Table 4. Regression Equations: Percentage Changes in Market Shares (Dependent Variable) and Percentage Changes in Alternative Indicators of Price Competitiveness (Independent Variable)[1]

| | Indicators of Price Competitiveness Based on: | | | | | | | | | Number of Observations |
| | Unit Values | | | Wholesale Prices | | | Labor Costs | | | |
	Regr. Coeff.	t-Ratio	$\bar{r}^2$	Regr. Coeff.	t-Ratio	$\bar{r}^2$	Regr. Coeff.	t-Ratio	$\bar{r}^2$	
I. All Observations	-1.74	7.6	0.04	-0.71	2.5	0	0.02	0.1	0	1210
II. Exporting Country										
Belgium	-1.60	2.5	0.04	-0.50	0.9*	0	-0.38	1.1*	0	110
Netherlands	-1.29	1.7*	0.02	0.57	0.8*	0	-0.21	0.6*	0	110
Germany	-1.75	4.5	0.15	-2.00	4.4	0.14	-1.00	3.2	0.08	110
France	-2.12	5.8	0.23	-1.96	5.6	0.22	-0.89	3.0	0.07	110
Italy	-1.74	3.1	0.08	-2.86	2.1	0.03	-0.72	1.3*	0.01	110
United Kingdom	-1.74	2.5	0.05	-0.08	0.1*	0	-0.67	2.0	0.03	110
Sweden	-3.38	3.2	0.08	-2.15	2.1	0.03	-0.58	1.2*	0	110
Austria	-0.69	1.1*	0	-0.04	0*	0	-0.30	0.6*	0	110
Canada	-0.01	0*	0	2.27	1.9*	0.02	1.59	2.6	0.05	110
United States	-0.51	0.6*	0	0.09	0.1*	0	1.48	2.8	0.06	110
Japan	-0.07	0*	0	1.45	0.8*	0	0.52	0.6*	0	110
III. Market										
Belgium	-2.00	2.0	0.03	-0.32	0.3*	0	0.76	1.1*	0	100
Netherlands	-2.15	2.3	0.04	-1.24	1.0*	0	-0.10	0.2*	0	100
Germany	-1.93	2.5	0.05	0.15	0.1*	0	0.21	0.4*	0	100
France	-0.91	1.3*	0.01	0.19	0.2*	0	-0.47	1.0*	0	100
Italy	-2.73	2.7	0.06	-0.48	0.4*	0	0.85	1.3	0.01	100
United Kingdom	-1.03	1.7*	0.02	-0.57	0.7*	0	0.70	1.6*	0.02	100
Sweden	-0.62	0.8*	0	-1.06	1.2*	0	-0.05	0.1*	0	100
Austria	-0.91	1.0*	0	0.24	0.2*	0	-0.07	0.1*	0	100
Canada	-3.47	5.0	0.20	-3.85	4.7	0.18	-1.36	2.8	0.06	100
United States	-1.95	5.1	0.20	-1.99	4.3	0.15	-0.43	1.5*	0.01	100
Japan	-2.15	1.8*	0.02	1.25	0.8*	0	-0.31	0.4*	0	100
Switzerland	-0.47	1.0*	0	0.11	0.2*	0	0.08	0.2*	0	110
IV. Year										
1953-54	-1.41	1.2*	0	-0.76	0.4*	0	0.35	0.5*	0	121
1954-55	-2.40	3.4	0.08	-4.80	4.6	0.14	-1.30	2.2	0.03	121
1955-56	-2.40	3.6	0.09	-0.29	0.2*	0	-1.59	2.9	0.06	121
1956-57	-2.19	1.8*	0.02	1.84	1.6*	0.01	1.03	2.2	0.03	121
1957-58	-0.72	0.8*	0	-0.17	0.2*	0	-0.27	0.4*	0	121
1958-59	-3.62	6.5	0.25	-3.76	4.7	0.15	-3.02	4.0	0.11	121
1959-60	-0.51	0.6*	0	-0.66	0.6*	0	0.63	1.4*	0.01	121
1960-61	-0.54	1.4*	0.01	0.98	2.0	0.03	0.34	1.2*	0.01	121
1961-62	-1.22	1.8*	0.02	-0.27	0.5*	0	1.16	3.6	0.09	121
1962-63	-0.26	0.4*	0	0.99	1.3*	0.01	0.44	1.3*	0.01	121

* The t-ratio indicates that the regression coefficient is not significantly different from zero at the 5 per cent level.

[1] Dependent variable: percentage change from preceding year in exporting countries' shares (I) for all exporters, all markets, and all years, (II) for each exporter in all markets and all years, (III) for all exporters in each market and all years, and (IV) for all exporters in all markets in each year. Independent variable: percentage change from preceding year in the ratio of the price (or cost) index of the exporting country to the price (or cost) index of other exporters weighted by their exports of manufactures to individual markets.

taken: (1) the shares observed in the preceding year, (2) the average of shares in the two preceding years, and (3) the average of shares in the three preceding years.[1] Deviations of actual exports from any one of these norms were expressed as percentages of exports in the preceding period to which that norm refers. This measure was related to percentage changes in exporting countries' indices of price competitiveness from the preceding year, or from the average of the two or three preceding years, respectively.[2] The two latter norms are introduced in order to overcome the difficulty which arises from the fact that, with a norm based on shares of the preceding year, large deviations from the norm in one year will automatically result in large deviations of the opposite sign in the following year. For example, an unusual increase in a country's exports in a particular year will produce a large positive deviation from the norm based on shares of the preceding year, while in the following year, though exports return merely to a more normal level, a correspondingly large negative deviation will be registered. The typical equation is of the form

$$\frac{(X_{it} - X_{i,t-\theta}) - \sum_{j} \left[x^*_{ij,t-\theta} (M_{jt} - M_{j,t-\theta}) \right]}{X_{i,t-\theta}} = a + b \frac{\bar{p}^W_{it} - \bar{p}^W_{i,t-\theta}}{\bar{p}^W_{i,t-\theta}} + u_{it} \quad (3)$$

$$(i = 1, \ldots, 11; \ t = 1, \ldots, 8)$$

where X_i is total exports of manufactures of country i to all other industrial countries, M_j is total exports of manufactures to country j from all other industrial countries, x^*_j is the market share of country i in country j, $\bar{p}^W_i$ is the weighted competitiveness index of country i in the markets of all industrial countries (weighted by the exports of country i to each market), and u is the unexplained residual; θ represents an average lag and indicates that the respective values are those of the preceding year ($\theta = 1$), or the average of two or three preceding years ($\theta = 1.5$ or $\theta = 2$). This computation is carried out with all exporting countries ($i = 1, \ldots, 11$) and over all years from 1956 to 1963 ($t = 1, \ldots, 8$).

---

[1] The "constant-shares" concept was used in a number of recent studies, for instance: J. M. Fleming and T. S. Tsiang, op. cit.; National Institute of Economic and Social Research, "Fast and Slow-Growing Products in World Trade", National Institute Economic Review, (August 1963), pp. 22-39; Anne Romanis, unpublished note, subsequently incorporated in the Annual Report 1964 of the International Monetary Fund, pp. 123-30; U.S. Department of Commerce, Bureau of International Commerce, U.S. Share of World Markets for Manufactured Products, op. cit.; and P. J. Verdoorn and F. J. M. Meyer zu Schlochtern, "Trade Creation and Trade Diversion in the Common Market," Central Planning Bureau Reprint Series No. 93, (The Hague, 1964).

[2] For these computations, exporting countries' competitiveness indices in individual markets were combined by weighting them by the importance of each market in their total exports.

Table 5 presents the results of these regression equations. The equations using percentage changes from the average of the preceding three years give the best results. For the total period with 88 observations (11 exporting countries and 8 years) the percentage shortfall of actual from previous-shares exports is 2.8 times the percentage increase in the weighted relative unit value index. This coefficient is 8 times its standard error and the coefficient of determination for this regression equation is 0.43. This relationship is shown in Chart 3.

The corresponding coefficient resulting from the computation with wholesale prices in lieu of export unit values is -1.7 and that with wage costs per unit of output is -0.6. Though statistically significant, these two coefficients are less reliable than that obtained in the computation with unit values, and the equations explain a much smaller portion of the total variation in the dependent variable. The results are roughly comparable for two sub-periods, 1956-59 and 1960-63 (each with 44 observations), but they tend to be more reliable for the first than for the second of these sub-periods.

IV. Evaluation

While there is a clear association of movements in relative prices and export performance, it is apparent that nonprice factors play an important role in the determination of a country's exports. The most prominent of these, the rate of growth of overall demand in the exporting country's principal markets, was taken as given in this study; all computations were arranged in such a way as to show relationships between price movements and changes in relative export performance as measured by changes in market shares or in the ratios of a country's exports to those of its competitors. Other nonprice determinants of exports, some of which are discussed below, were not taken into account. The degree to which changes in the price indices used in the study fall short of "explaining" the observed variation in relative export performance is an indication of both imperfections in these indices and the influence of nonprice factors.

Some nonprice influences make themselves felt gradually and over a longer period of time. As a result, market shares often exhibit rising or falling trends over the sample period. In many instances, relative prices or costs also show longer-run tendencies. The computations were designed to avoid uncritical ascription of trends in market shares to trends in relative prices. The influence of trends was either formally eliminated (in the first set of computations) or reduced by the use of percentage changes from the preceding year or from the average of a recent period (in the second and third sets, respectively).

Table 5. Regression Equations: Percentage Deviations from Constant-Shares Exports (Dependent Variable) and Percentage Changes in Ratios of Exporters' Prices or Costs to Prices or Costs of Other Exporting Countries (Independent Variable), 11 Industrial Countries[1]

	A. Changes from Preceding Year			B. Changes from Average of Preceding Two Years			C. Changes from Average of Preceding Three Years		
	Regr. Coeff.	t-Ratio	$\bar{r}^2$	Coeff.	t-Ratio	$\bar{r}^2$	Coeff.	t-Ratio	$\bar{r}^2$
1956-63 (88 observations)									
Unit values	-1.94	6.9	0.35	-2.36	7.7	0.40	-2.80	8.1	0.43
Wholesale prices	-1.35	3.6	0.12	-1.49	3.6	0.12	-1.74	3.6	0.12
Wage cost per unit	-0.30	1.3*	0.01	-0.45	1.8	0.03	-0.62	2.2	0.04
1956-59 (44 observations)									
Unit Values	-2.52	6.5	0.49	-2.83	6.7	0.51	-3.22	6.9	0.52
Wholesale prices	-2.17	4.0	0.26	-2.24	3.8	0.24	-2.59	3.8	0.24
Wage cost per unit	-0.89	2.3	0.09	-0.94	2.3	0.09	-1.12	2.5	0.11
1960-63 (44 observations)									
Unit values	-1.14	2.9	0.15	-1.71	3.8	0.24	-2.22	4.3	0.29
Wholesale prices	-0.26	0.5*	0	-0.47	0.8	0	-0.66	1.0*	0
Wage cost per unit	0.24	1.0*	0	0	0	0	-0.11	0.3*	0

* The t-ratio indicates that the regression coefficient is not significantly different from zero at the 5 per cent level.

[1] Dependent variable: Percentage changes in actual exports of manufactures minus percentage changes in exports computed on the assumption that exporters maintain their previous shares in the market of each of the other industrial countries; previous shares are those observed (A) in the preceding year, or (B) on average in the preceding two years, or (C) on average in the preceding three years. Independent variable: Percentage changes in the weighted averages of exporting countries' indices of price competitiveness in industrial markets (weighted by exports to each of these markets); three alternative competitiveness indices are used, namely those based on unit values of exports of manufactures, domestic wholesale prices of manufactures, and wage costs per unit of output in manufacturing, all expressed in U.S. dollars. All percentage changes under (A), (B), and (C) are taken, respectively, from the preceding year or from the average of the two, or three, preceding years.

Chart 3

PERCENTAGE DEVIATIONS OF ACTUAL FROM "CONSTANT-SHARES" EXPORTS OF MANUFACTURES OF
INDUSTRIAL COUNTRIES TO INDUSTRIAL MARKETS AND PERCENTAGE CHANGES IN
RELATIVE UNIT VALUES OF EXPORTS, 1956-63

Legend:

⊠	BELGIUM
⊡	NETHERLANDS
■	GERMANY
□	FRANCE
⊞	ITALY
●	UNITED KINGDOM
○	SWEDEN
⊕	AUSTRIA
△	CANADA
▲	UNITED STATES
✳	JAPAN

Percentage Change
in Relative Unit Value (P)

Percentage Deviations of Actual from "Constant-Shares" Exports. (X)

Regression Equation:
X = 3.6 − 2.8 P
($\bar{r}^2 = 0.43$)
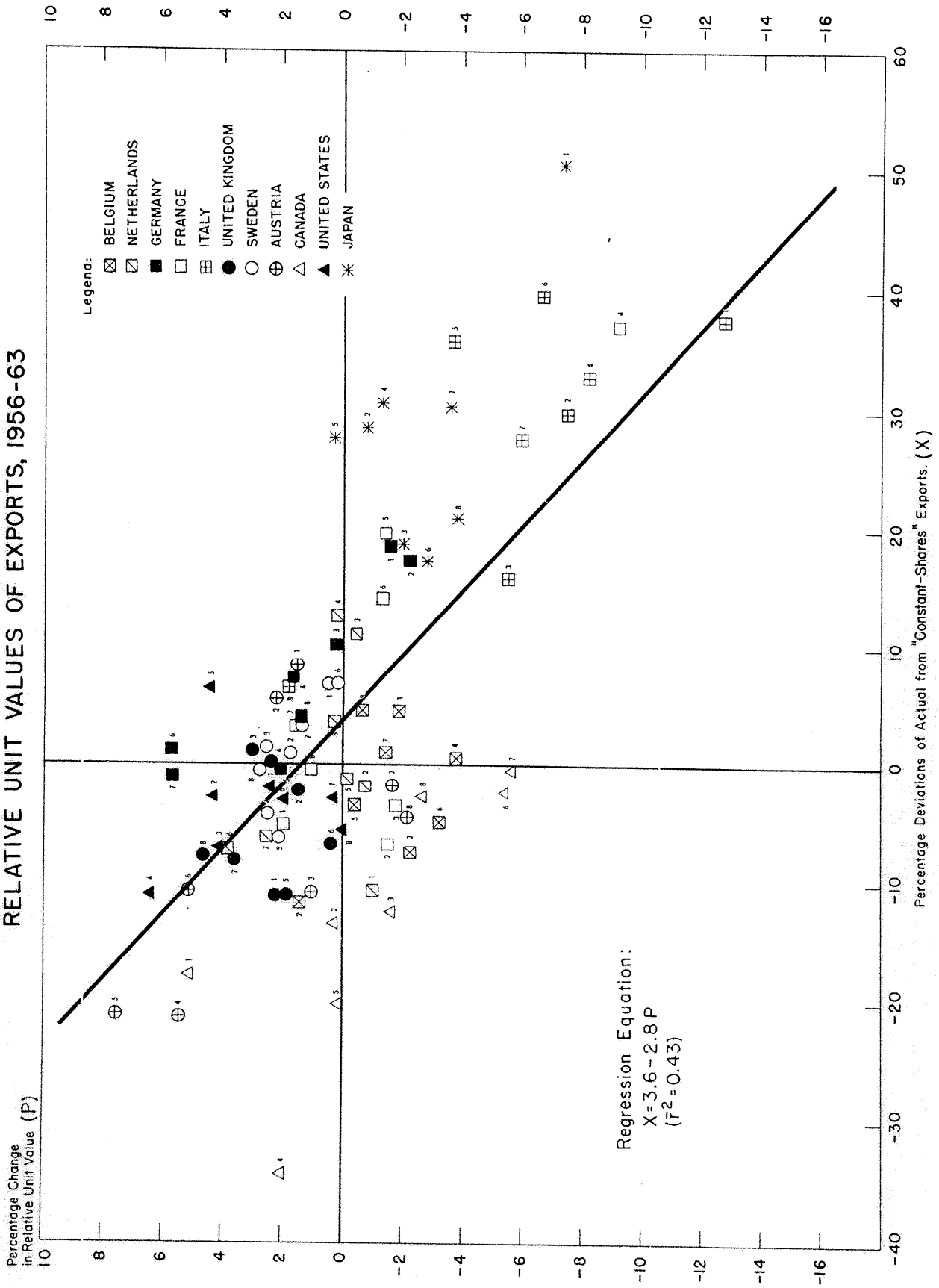
NOTE: NUMBERS ATTACHED TO COUNTRY SYMBOLS INDICATE YEARS
(1 = CHANGE TO 1956, 2 = CHANGE TO 1957, ETC.).

Some evidence of the effect of relative prices on export performance emerges from the elasticities of substitution estimated by exporter and market (Tables 1 and 2). Though the results are somewhat uneven and there is need for a careful study of each individual relationship, the results indicate that, on the whole, relative export prices play a significant role in the determination of exports of manufactured products and that elasticities of substitution may be somewhat larger than is customarily assumed.

The estimated relations between price changes and changes in market shares for all exporters, markets, and years (Table 4) contribute further evidence in support of the tentative conclusions drawn from time-series equations. These computations are not subject to the limitations imposed by a small number of observations, but this advantage is bought at a price: they are based on the assumption that the sensitivity of market shares to price changes is uniform among exporting countries or markets, or both. While such estimates can indicate an average range for the measure of the importance of price changes in the explanation of export market shares of all countries and in all markets considered, they cannot be taken to establish the price sensitivity of exports of a particular country or of those of several countries in a particular market. Even the average range of market-share elasticities implied by these computations is probably understated as a result of statistical aggregation bias.

The results of the third set of equations, shown in Table 5 and illustrated in Chart 3, are subject to the same limitations as the second set with regard to the assumption of uniform price sensitivity among exporting countries and markets. They constitute, nevertheless, the most persuasive confirmation of the importance of price changes for the determination of export performance of industrial countries. More than two-fifths of the variation in industrial countries' overall export performance, measured against a norm implying maintenance of previous market shares, can be attributed to changes in relative export unit values. It appears that, on average, a deterioration in price competitiveness by one per cent may, other things being equal, result in a reduction of exports by almost three per cent.

The relation shown in Chart 3 becomes even clearer if one considers only observations representing relatively large changes in price competitiveness (2 per cent or more) and relatively large deviations from the export norm (5 per cent or more). Among the 31 observations satisfying both criteria, there is only one instance of an improvement in price competitiveness accompanied by a loss of exports relative to the norm, and there are two instances in which a deterioration in price competitiveness is associated with gains in exports relative to the norm. For the remaining 28 cases, or 91 per cent of all observations, improvement in competitiveness is associated with export gains compared to the previous-shares norm (14 observations), and deterioration in competitiveness with export losses (14 observations).

Usefulness and limitations of the three indicators

On the basis of the statistical tests described in Section III it appears that, on the whole, unit value indices are the most useful indicators currently available for the measurement of price competitiveness in exports of manufactures. For most exporting countries and markets relative unit values exhibit a closer association with export performance than do wholesale prices or unit labor costs.

However, there are some serious technical objections to the use of unit value indices for the measurement of export price competitiveness, either for a single country over time or for comparisons between countries. As already mentioned, unit value indices reflect only the prices of goods which are actually exported. Moreover, export unit values, which generally refer to a country's total f.o.b. exports, cannot take into account differential regional pricing and differential changes in transportation costs.

Results based on relative wholesale prices as indicators of competitiveness corroborate those based on unit value indices, but wholesale prices proved to be somewhat less closely associated with export performance. This may in part be due to technical inadequacies in the series. The main objection relates, however, to differences in coverage (an objection which applies equally to the unit labor cost and productivity series discussed below): the manufacturing sector as defined by the Standard International Trade Classification, on which the export series and export unit value indices are based, differs considerably from that defined under the International Standard Industrial Classification, on which the wholesale price indices and the series underlying the unit labor cost and productivity indices are generally based.

Another objection to the use of wholesale prices of manufactured goods as a measure of export price competitiveness arises from the inclusion of prices of imported goods in the national wholesale price indices. To the extent that these goods re-enter international trade-- either as component parts or as re-exports--this inclusion of their prices in a measure of export price competitiveness is quite appropriate; but to the extent that they are destined for domestic use, this inclusion tends to make wholesale prices less useful as indicators of external price competitiveness, particularly for countries in which imports account for a large portion of domestic expenditure.[1] Nevertheless,

---

1/ Inclusion of imported manufactured goods in the commodity samples on which wholesale price indices are based will tend to reduce variations of these indices among industrial countries. It may be for this reason that estimated elasticities, where they were significant, were found often to be higher in the computations based on wholesale prices than in those with unit values. (See Table 3.)

since home produced goods compete, in many instances, directly with imports, movements of their prices cannot for long diverge to any large extent from those of the imported substitutes. The inclusion of imports does not, therefore, invalidate the use of wholesale price indices, at least as supporting evidence, in the explanation of changes in export performance by price factors.

Differences in coverage and method of construction of the basic data series used to obtain unit labor cost indices were found to present considerable difficulties. Remaining inadequacies in the technical measurement of movements in labor costs are, however, likely to be outweighed by other considerations which would tend to make labor cost changes a questionable explanatory factor of export performance. For example, overall labor costs do not necessarily move parallel with labor costs in export industries. Also, changes in labor costs do not necessarily indicate changes in total costs, nor do the latter indicate changes in profits. It is, therefore, not surprising that little support was found for the hypothesis that unit labor costs, presumed to be (inversely) indicative of profits, are a useful basis for measuring export competitiveness.

Movements of labor costs cannot be expected to be very closely associated with movements in either wholesale or export prices, in part because of time lags and in part because the price series reflect not only movements in labor costs, but also in material and capital costs and in profit margins. But comparison of the movements of the two price series shows that their relationship, too, is a tenuous one (see Table 6 and Chart 2). For example, some countries were found to have a better than average export performance, although they experienced a large relative deterioration in both unit labor costs and wholesale prices. In some of these instances relative export unit values rose less than the other two indicators of price competitiveness, or even declined. This may indicate that in some countries pricing policies for export markets differ from those for the domestic market. A further possible explanation of the divergence in movements between the various price indicators could be that, at times, increases in investment and technological advances may be greater in export industries than in the manufacturing sector in general. This explanation is supported by the data shown in Table 6, from which it appears that the countries which had larger than average increases in productivity could sustain larger than average increases in over-all unit labor costs or wholesale prices without suffering a decline in their market shares.[1]

---

[1] Further evidence supporting this explanation of a divergence of movements of export prices and domestic prices or costs is contained in the following studies: Balassa, op. cit.; Cooper, op. cit.; H. S. Cheng "Relative Movements in the Prices of Exports of Manufactures", Staff Papers, Vol. IX (1962), pp. 80-106; E. Benoit, Europe at Sixes and Sevens, (New York, Columbia University Press, 1961), pp. 137 ff., Sir Donald MacDougall, The Dollar Problem: A Reappraisal, Essays in International Finance, (Princeton, N. J., Princeton University Press, 1960).

Table 6. Selected Exporting Areas: Changes in Indices of Price Competitiveness and in Export Volume Shares in Various Markets, 1953-1963 [1]

(Percentage changes and percentage points)

Exporting Country	World Market					E.E.C. Market					Non-E.E.C. Industrial Market				
	Unit values	Whole- sale prices	Labor costs	Produc- tivity	Market share	Unit values	Whole- sale prices	Labor costs	Produc- tivity	Market share	Unit values	Whole- sale prices	Labor costs	Produc- tivity	Market share
E.E.C.															
1953-59	-12.8	-10.1	-4.8	+12.0	+10.3	-13.5	-10.7	-5.7	+11.7	+10.1	-13.0	-10.0	-4.6	+13.2	+11.4
1959-63	+3.3	+5.8	+13.4	+3.4	+2.4	+0.4	+3.7	+12.5	+4.8	+2.1	+5.7	+8.3	+17.0	+3.8	+1.2
Germany															
1953-59	-4.2	-2.4	+1.9	+8.0	+6.3	-1.6	-1.0	+2.7	+5.1	+2.5	-5.5	-3.6	+1.2	+10.1	+7.4
1959-63	+7.1	+6.6	+12.9	+1.6	+0.2	+6.3	+6.0	+10.7	+1.3	+0.2	+9.0	+8.8	+16.4	+2.0	+1.1
France															
1953-59	-10.1	-19.8	-17.7	+16.7	+1.0	-7.9	-18.8	-17.4	+13.7	+3.0	-10.7	-19.9	-17.7	+17.9	+2.0
1959-63	+5.6	+6.4	+5.9	-0.5	-0.5	+4.5	+5.2	+3.3	-0.4	+0.1	+6.8	+7.9	+8.2	-0.1	-0.4
Italy															
1953-59	-23.4	-7.1	+5.5	-5.7	+2.5	-21.7	-6.0	+6.1	-8.3	+3.9	-24.2	-7.9	+4.9	-4.2	+2.4
1959-63	-1.1	+3.2	+0.5	+13.1	+2.2	-2.4	+2.4	-1.6	+13.1	+2.6	+0.4	+4.9	+2.9	+13.5	+1.5
United Kingdom															
1953-59	+7.6	+8.4	+16.9	-8.8	-5.1	+9.9	+9.4	+16.4	-10.9	-5.5	+5.8	+6.7	+14.9	-6.7	-0.7
1959-63	+6.4	+4.0	-2.3	-7.0	-2.9	+5.1	+3.0	-4.0	-6.9	-1.7	+7.7	+5.7	+0.6	-6.3	-2.6
Canada															
1953-59	+4.0	+4.1	+10.0	-13.1	-1.7	+6.4	+5.4	+10.3	-15.0	-0.1	+3.2	+3.5	+10.4	-12.9	-6.0
1959-63	-9.4	-10.9	-18.8	-9.4	-0.3	-10.0	-11.3	-19.8	-8.9	-0.3	-8.9	-10.3	-18.3	-9.9	-0.3
United States															
1953-59	+15.8	+8.1	-3.6	-4.8	-7.7	+16.9	+8.7	-2.7	-7.0	-4.8	+15.2	+7.3	-4.5	-3.2	-10.6
1959-63	+1.2	-5.3	-14.3	-3.8	-1.5	+0.5	-5.5	-15.3	-3.8	+0.1	+2.9	-3.7	-12.3	-3.5	-1.2
Japan															
1953-59	-11.2	-5.9	-15.5	+2.1	+3.7	-8.6	-4.4	-14.3	-0.6	+0.3	-12.2	-6.8	-16.0	+3.7	+5.8
1959-63	-8.1	-2.4	+9.5	+13.9	+2.0	-8.2	-2.8	+7.0	+12.7	+0.6	-7.0	-0.9	+12.0	+14.7	+2.5

[1] Indicators of competitiveness are expressed relative to those of other suppliers; e.g., Germany's indicator of competitiveness based on unit values is the ratio of Germany's export unit value index to the average of unit value indices of all other suppliers weighted by the relative importance of their exports in the specified market area; the same procedure is followed with respect to the indicators based on wholesale prices, labor costs per unit of output, and productivity. Entries in the table show percentage changes in these indicators. Changes in market shares are differences in absolute market shares based on export volume figures. Basic price and cost data are in terms of U.S. dollars. Changes in price indicators are percentage changes; changes in market shares are given in percentage points.

A serious limitation encountered in the use of all available price or cost indicators for the explanation of changes in export performance is that they do not account for discriminatory changes in tariffs, a factor which has gained in importance since 1959, and for which explicit allowance should be made in further work in this area.

General limitations of explanation by price factors

The extent to which the isolation of price influences can be expected to be successful depends upon the appropriateness of the assumption that influences other than relative supply prices of exports are not systematically related to changes in these relative prices, but exercise their influence on market shares in a random manner. However, there is little doubt that this assumption is not fully warranted. One must expect, for instance, that an economy operating at or near full capacity would experience difficulties in increasing its exports in line with the growth of world trade; at the same time, its export prices may also tend to rise. In a system of perfectly flexible prices, capacity limitations should be fully reflected in export prices. If prices are not perfectly flexible, however, their changes may be much smaller than those which would clear the market, with the result that order books and delivery periods will be lengthened when over-all demand presses against capacity, and shortened in periods of slackening aggregate demand. If the entire joint effect of somewhat higher prices and a lessened ability or willingness to supply commodities on customary delivery terms is ascribed to the price increases alone, the elasticity of substitution of the country's exports for those of its competitors would tend to be overestimated.

A further difficulty arises with regard to shifts in commodity composition in the demand for imports into particular markets. If changes in economic activity are associated with differential changes in imports of various commodity classes, the over-all change in import demand would favor those exporters which supply the commodities for which demand increases most. An exporting country whose major exports are particularly favored by a shift in the pattern of demand in a certain market will, if anything, be enabled to increase its prices while it at the same time gains a larger share in that market. One would thus find an observation of the "wrong sign". This difficulty will be less important, the more uniform are the income elasticities of demand for the goods supplied by competing exporting countries to each market.[1]

1/ See J. J. Polak, "Note on the Measurement of Elasticity of Substitution in International Trade," Review of Economics and Statistics, Vol. XXXII (February 1950), pp. 16-20, where it is shown that the standard formula for the elasticity of substitution, on the assumption of unchanged income, does not yield the true elasticity of substitution if income is in fact changing, unless the income elasticities of demand for the two substitutes are equal.

Since this study is concerned only with exports of manufactures, and not with all exports, its findings are probably not as much subject to bias as a result of different income elasticities of demand as they would be if a more heterogeneous group of export commodities were considered.

There are other disturbances of what is here assumed to be the normal association between relative prices and countries' market shares, such as discriminatory changes in restrictive practices. Further, changes in credit terms, though they influence final costs to buyers, are not reflected in any of the price series. Turnover tax rebates on exports or other export subsidies affect incentives to export without necessarily being fully reflected in reduced export prices. Export promotion drives may, to the extent that they are successful, increase market shares without corresponding reductions in export prices.

For the reasons given in the preceding paragraphs, one cannot expect price changes of one exporting country relative to those of its competitors to be very closely associated with changes in its market shares. They would also explain to some degree the apparent weakening of responsiveness of market shares to price changes in the period since 1959 as compared with earlier years: discriminatory tariff changes and a growing flexibility in differential pricing by markets may be two factors which operated more strongly in recent years than in the earlier period. In addition, the steady losses in market shares of the United States and the United Kingdom in the period 1953-1959, which were paralleled by a steady deterioration in their relative price positions, are often, at least in part, explained by the re-emergence of the ability of war-damaged industrial nations to supply world and home markets with industrial products which immediately after the war could only be obtained from a few countries, chiefly the United States and the United Kingdom. Thus, elasticity estimates for the early period may actually indicate a somewhat stronger sensitivity to price changes than those for more recent years because of these parallel movements in other factors for which no allowance is made in the equations.

V. Broader Aspects of Competitiveness

This study is confined to the investigation of one specific aspect of competitiveness in world markets, namely that of the influence of prices on export market shares.

Maintenance of specific market shares is not, of course, by itself of intrinsic merit. If external payments equilibrium can be achieved in some other way, for example through a reduction in import requirements or through improvements in the terms of trade or in the balance on capital account, declining export shares can well be sustained without necessarily indicating a loss of what may be loosely termed "competitiveness".

There are many other aspects of competitiveness which were deliberately excluded from consideration in this study. Since domestic suppliers compete with foreign suppliers in their home markets, changes in the proportion of the home market supplied from abroad should be considered in assessing the competitiveness of countries' industrial output in international markets. If competitiveness is defined broadly as forcefulness of domestic producers in seeking out profit opportunities at home and abroad, export losses replaced by direct production in foreign markets, which raise investment income from abroad, may not represent a net loss of competitiveness. On the other hand, lack of investment opportunities at home, stimulating investment abroad, could be considered a loss of competitiveness in a wider sense. In its broadest aspect, consideration of competitiveness would include all factors which determine the utilization and allocation of a country's resources and shape its cost and price structure.

APPENDIX

Data Definitions and Sources

The basic data used were:

(1) value of exports
(2) unit value of exports
(3) wholesale prices
(4) hourly wage costs
(5) exchange rates
(6) industrial production
(7) employment
(8) average hours worked

All data were defined to refer to manufactured goods or to the manufacturing sector of the economies of the countries included in the study.

(1) Export values

Exports of manufactures were defined as exports comprised under the United Nations' Standard International Trade Classification (SITC) 5-8, revised. For the United States and Germany "special category" exports were excluded.

> Sources: United Nations Commodity Trade Statistics, Series D; Organisation for Economic Co-operation and Development (OECD), Statistical Bulletins, Foreign Trade Series B; Organisation for European Economic Co-operation (OEEC), Statistical Bulletins, Foreign Trade Series IV.

(2) Unit values of exports of manufactured goods

Unit value indices of exports of manufactures (SITC 5-8) are published by the United Nations for all countries included in this study, except Austria. Unpublished material to carry the available series back to 1953 was made available by the Statistical Office of the United Nations. For Austria, a unit value index of exports of manufactures was constructed on the basis of individual SITC section quantity and value indices for the periods 1953-1960 and 1961-1963; the two series were linked at the breakpoint (1960-61) on the basis of the Austrian wholesale price index.

> Sources: United Nations, Monthly Bulletin of Statistics; OEEC, Statistical Bulletins, Foreign Trade Series IV; OECD, Statistical Bulletins, Foreign Trade Series B; national sources.

(3) Wholesale prices

The wholesale price indices used were chosen to conform as closely as possible to the coverage of the trade data. They relate generally to manufactured goods.

Sources: National sources.

(4) Hourly wage costs

Hourly wage costs were defined as total labor expenditure per hour paid in the manufacturing sector, where labor expenditure consists of wage and other direct payments plus legally required and voluntary supplements paid either to the employee or into special employee benefit funds. However, it was not possible to obtain full labor payments in all cases, nor was the coverage the same for all countries. Adjustments were made wherever possible to make the various national series as consistent as possible.

Sources: OECD, General Statistics; International Labour Office (ILO), International Labour Review; John H. Chandler and Patrick C. Jackman, Unit Labor Costs in Manufacturing: Trends in Eight Countries, U.S. Department of Labor, Bureau of Labor Statistics, unpublished manuscript; national sources.

(5) Exchange rates

Exchange rates were defined as market rates.

Sources: Board of Governors of the Federal Reserve System, Federal Reserve Bulletin and unpublished data; International Monetary Fund, International Financial Statistics.

(6) Industrial production

Industrial production was defined as the output of the manufacturing sector according to the United Nations' Standard Industrial Classification.

Sources: OECD, General Statistics; national sources.

(7) Employment

Employment was defined as employment of wage-earners in the manufacturing sector in order to have the series as consistent as possible with the wage cost series. It was not possible, however, to obtain such employment series for countries other than Italy; data for all other countries refer to employment of wage earners and salaried employees combined.

Sources: OECD, General Statistics; ILO, International Labour Review; national sources.

(8) Hours worked

Hours worked were defined as hours actually worked or paid per week in manufacturing industries and refer to wage-earners only.

Sources: OECD, General Statistics; ILO, International Labour Review; national sources.

Table 7. Industrial Countries: Price and Cost Data in U.S. Dollars, 1953-63

(1953 = 100)

E. E. C.

	Export Unit Values	Whole-sale Prices	Labor Cost Per Unit of Output	Produc-tivity
1953	100.0	100.0	100.0	100.0
1954	96.5	98.3	100.0	105.5
1955	96.6	99.6	99.9	112.0
1956	98.7	101.9	104.2	117.1
1957	100.2	103.3	107.6	122.4
1958	98.6	100.7	109.4	126.3
1959	95.6	98.4	105.2	133.7
1960	97.7	99.8	106.1	142.6
1961	99.3	102.8	114.2	147.2
1962	98.7	103.7	121.4	154.1
1963	99.3	106.1	126.8	161.8

Netherlands

	Export Unit Values	Whole-sale Prices	Labor Cost Per Unit of Output	Produc-tivity
1953	100.0	100.0	100.0	100.0
1954	96.0	102.2	108.3	104.5
1955	98.0	103.6	108.1	110.3
1956	100.0	103.2	113.4	112.2
1957	102.0	106.4	124.3	114.5
1958	101.0	105.3	127.8	115.9
1959	100.0	105.6	121.2	124.8
1960	101.0	105.7	121.1	136.8
1961	106.1	109.8	134.9	140.5
1962	105.0	111.7	145.4	145.4
1963	104.0	113.8	150.7	150.4

Belgium

	Export Unit Values	Whole-sale Prices	Labor Cost Per Unit of Output	Produc-tivity
1953	100.0	100.0	100.0	100.0
1954	94.1	97.3	96.5	106.6
1955	96.1	100.2	92.0	114.6
1956	98.0	104.7	90.2	126.6
1957	102.0	108.6	95.2	130.7
1958	98.0	103.4	100.4	131.8
1959	95.1	101.6	95.7	141.1
1960	95.1	102.1	95.7	147.7
1961	95.1	100.0	98.3	150.9
1962	94.1	99.2	103.6	154.0
1963	94.1	101.5	108.7	161.3

Germany

	Export Unit Values	Whole-sale Prices	Labor Cost Per Unit of Output	Produc-tivity
1953	100.0	100.0	100.0	100.0
1954	96.0	98.4	98.9	104.1
1955	96.0	99.8	99.5	110.2
1956	99.0	101.3	105.7	113.4
1957	100.0	103.2	108.6	120.4
1958	100.0	103.0	111.2	125.0
1959	100.0	102.6	109.9	133.4
1960	102.0	104.0	113.4	141.1
1961	107.0	109.6	126.0	145.2
1962	108.0	111.3	133.9	152.7
1963	107.0	112.3	136.2	161.4

Table 7 (continued).   Industrial Countries: Price   and Cost Data in U.S. Dollars, 1953-63

(1953 = 100)

France

	Export Unit Values	Whole-sale Prices	Labor Cost Per Unit of Output	Produc-tivity
1953	100.0	100.0	100.0	100.0
1954	99.0	96.9	101.8	107.2
1955	99.0	97.5	102.8	114.7
1956	104.1	101.3	109.4	122.0
1957	104.1	98.8	104.2	133.8
1958	102.1	92.7	99.7	140.5
1959	93.9	85.5	90.5	144.4
1960	99.0	88.4	91.6	153.1
1961	99.0	91.0	95.9	159.7
1962	99.0	91.7	101.7	165.2
1963	100.0	94.3	107.7	171.4

United Kingdom

	Export Unit Values	Whole-sale Prices	Labor Cost Per Unit of Output	Produc-tivity
1953	100.0	100.0	100.0	100.0
1954	98.9	99.9	103.0	103.7
1955	101.1	102.3	106.1	107.9
1956	105.5	106.4	115.5	107.7
1957	103.8	110.2	118.3	110.2
1958	109.9	110.9	123.7	111.5
1959	109.9	111.9	123.0	116.2
1960	112.1	112.8	125.9	122.3
1961	113.2	115.5	134.4	122.1
1962	115.4	118.8	137.0	124.9
1963	117.6	120.5	135.7	130.3

Italy

	Export Unit Values	Whole-sale Prices	Labor Cost Per Unit of Output	Produc-tivity
1953	100.0	100.0	100.0	100.0
1954	96.6	99.0	97.0	107.0
1955	92.2	99.0	100.3	110.3
1956	87.1	100.0	103.8	113.7
1957	89.7	102.0	112.9	109.6
1958	86.2	99.1	116.2	113.0
1959	80.2	97.6	113.9	118.5
1960	82.8	98.6	107.5	131.8
1961	79.3	98.6	109.3	138.8
1962	76.7	99.7	117.1	149.6
1963	81.0	104.6	128.7	158.9

Sweden

	Export Unit Values	Whole-sale Prices	Labor Cost Per Unit of Output	Produc-tivity
1953	100.0	100.0	100.0	100.0
1954	98.9	98.1	103.9	100.2
1955	100.0	101.1	109.1	102.8
1956	103.2	105.1	111.8	107.4
1957	107.5	109.1	116.2	110.3
1958	107.5	109.1	116.3	116.2
1959	107.5	109.0	114.0	122.8
1960	109.7	112.2	115.6	129.1
1961	110.8	115.2	123.5	131.4
1962	110.8	118.5	130.2	134.2
1963	112.9	121.6	136.5	138.1

Table 7 (concluded). Industrial Countries: Price and Cost Data in U.S. Dollars, 1953-63

(1953 = 100)

Austria

	Export Unit Values	Wholesale Prices	Labor Cost Per Unit of Output	Productivity
1953	100.0	100.0	100.0	100.0
1954	91.9	97.9	90.4	107.2
1955	93.4	100.7	86.0	118.1
1956	99.4	102.5	92.2	116.3
1957	101.7	106.1	93.2	122.8
1958	100.5	103.3	95.4	123.9
1959	104.5	106.4	94.5	134.3
1960	109.8	105.0	93.7	143.8
1961	111.8	106.8	103.0	145.2
1962	106.9	113.0	109.3	149.6
1963	106.9	112.1	109.5	159.6

United States

	Export Unit Values	Wholesale Prices	Labor Cost Per Unit of Output	Productivity
1953	100.0	100.0	100.0	100.0
1954	98.9	100.7	99.9	102.2
1955	101.2	101.8	98.0	108.8
1956	105.7	105.8	102.1	110.4
1957	111.3	109.1	104.6	113.1
1958	112.4	110.3	106.6	114.7
1959	115.8	111.2	105.2	120.6
1960	118.0	111.4	107.1	124.2
1961	119.1	111.0	106.3	129.1
1962	119.1	111.1	105.8	133.6
1963	119.1	110.9	104.1	139.5

Canada

	Export Unit Values	Wholesale Prices	Labor Cost Per Unit of Output	Productivity
1953	100.0	100.0	100.0	100.0
1954	100.0	99.1	102.3	102.5
1955	102.1	97.8	98.4	107.3
1956	107.4	101.0	100.2	111.4
1957	108.5	106.7	113.4	107.0
1958	105.3	105.5	115.3	107.5
1959	107.4	108.8	118.5	109.8
1960	107.4	107.6	118.0	112.8
1961	102.1	103.9	116.8	111.9
1962	99.0	100.3	110.1	115.7
1963	99.0	101.2	109.6	119.4

Japan

	Export Unit Values	Wholesale Prices	Labor Cost Per Unit of Output	Productivity
1953	100.0	100.0	100.0	100.0
1954	96.3	100.1	102.4	104.4
1955	90.7	97.5	100.0	108.2
1956	93.5	101.8	95.4	119.3
1957	97.2	104.9	97.0	125.7
1958	92.6	98.0	94.3	119.5
1959	92.6	98.9	92.5	127.7
1960	94.5	100.1	101.4	138.1
1961	90.7	100.8	102.3	152.0
1962	88.0	99.1	109.7	160.4
1963	87.0	100.7	113.6	171.9