Chapter Title: Measures of Prices and Price Competitiveness in International Trade in Manufactured Goods

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5 Measures of Prices and Price Competitiveness in International Trade in Manufactured Goods

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5.1 Introduction

Our purpose in this paper is to explain the construction of a set of price indexes relating to international trade in manufactured goods. The indexes are intended to be free of some of the defects of existing measures and more suitable for the calculation of changes in quantities traded and for the analysis of the relationship between prices and quantities.

Measures of the prices of manufactured goods are a weak link in empirical studies of international trade. While most authors have accepted the existing indexes for primary products as reasonably accurate and representative, quite a few have been skeptical about the data for manufactured-goods prices. Their deficiencies affect studies of competitiveness, of real exchange rates, of income elasticities of demand, of price and substitution elasticities, of the terms of trade, and of the supply of exports.

The list of defects is a long one. For many countries, no price data are collected for exports and imports, and many studies of trade rely on indexes of export and import unit values, despite a long history of adverse appraisals of their accuracy, particularly for manufactured goods.[1] Not only are the unit

1. E.g., see NBER Price Statistics Review Committee (1961), Kravis and Lipsey (1971, 1974), and Murphy (1972).

values inaccurate as measures of the prices of individual products, but in each country they are combined with different weights and using different index-number formulas.

In the case of primary goods, quality changes were thought to be relatively small, and where they were not, prices based on narrow specifications were often available as a check on the data based on unit values. The introduction of new products was not thought to be a major problem. While there have been many large shifts in sources of supply for primary products, most scholars have been willing to accept that, for these goods at least, the "law of one price" worked well enough that a missing price observation could be safely filled in using the price of the same product from another country.

None of these reassurances can be applied to the prices of manufactured goods. It is possible that there is serious underrepresentation of new commodities, at least for part of their history. There have been suggestions that price indexes for manufactured goods suffered from upward bias due to the neglect of quality change. Export prices for automobiles, for example, might not take into account changes such as gains in horsepower, the shift to power brakes and steering, and antipollution devices. More important, perhaps, is the omission of many products from most countries' price indexes. Computers and computer accessories may be excluded completely, although they have become a major part of manufactured-goods trade. The fact that manufactured products from different countries are less substitutable for each other than primary products from different sources means that the omission of one country's prices for some manufactured products is much more likely to bias an index than the omission of one country's primary product prices.

An alternative to the unit-value indexes is the use of wholesale or producer-price indexes. These are collected with a much higher degree of quality control than is applied to the unit-value indexes, at least in some countries. However, the prices do not purport to apply to external trade. The difference in movement between domestic and export prices can be significant.[2] The producer-price indexes share a characteristic of the unit-value indexes: they are computed with different weighting, coverage, and index-number formulas in different countries. The methods of computation of both types of indexes differ greatly from one country to another because the indexes are computed by national statistical agencies for their own purposes, for which they may be quite satisfactory.

A further consequence of the dependence on price collection by individual countries is that it builds in an assumption about price behavior. The assumption is that prices of goods not covered by a country's price collection process

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2. As is pointed out in the sources mentioned above, and in Kalter (1978), Kravis and Lipsey (1977a and 1977b, where these differences are interpreted as reflecting changes in export profit margins), Baldwin (1988), Dornbusch (1987), Krugman (1987), Mann (1986), Marston (1989), and Ohno (1989). The profit-margin interpretation and the literature on the related "pass-through" issue are reviewed in Mann (1986).

move identically with prices of covered commodities in the same general class or, if the whole class is uncovered, with the prices of commodities in general. It is implicitly assumed that price movements of the same product in other countries convey no information at all about the likely change in the missing prices. That is an odd choice of assumptions for a profession that often assumes the operation of purchasing power parity or the "law of one price." The practical implication can be imagined in the case of a comparison between a country that covers computer prices in its price index and a country that omits them and assumes they follow prices of other products.

In this paper, we construct a set of international price indexes for manufactured goods from 1953 to 1988.[3] Our indexes address these issues in several ways.

1. Weighting. We construct two types of indexes of manufactured goods prices. One is intended mainly for studies of competition in international trade. It is calculated for the United States and for the aggregate of many of its major competitors, using the export weights of the United States and weighting at a fine level of commodity detail, such as the 4-digit SITC. A similar calculation is performed for Germany and its competitors, using German export weights, and for Japan and its competitors, using Japanese export weights. Indexes of domestic prices with own-country export weights are also calculated for each of the three countries, to examine the possibility of divergences between export and domestic price movements and the implications for changing margins of profitability of export and domestic sales.

A second type of index, used, for example, in studying world trends in terms of trade, is a "world" index of manufactured-goods prices, using as weights aggregate developed-country exports or developed-country exports to developing countries. We also construct indexes for individual countries based on these two sets of weights.

For all of these types of indexes, we carry out the calculations using weights from a relatively early date, 1963, and from a later date, 1975.

2. Missing prices. In place of the assumption that prices for products not covered move in the same way as those covered in the same country, we use, in the aggregate indexes for all developed countries, a method that incorporates both country and commodity effects in estimating missing prices. The method is an adaptation of one developed by Summers (1973) for the estimation of country price levels. It involves fitting an equation to each block of country and commodity price change observations for a given year. The block is defined by the full list of commodities and countries in, say, a 2-digit SITC class. The equation contains dummy variables for both country and commod-

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3. We define manufactures here as divisions 5 through 8 of the SITC Revision 1. The most serious omission for comparison with domestic industrial data is of manufactured foods, although there are also other minor omissions, some of which were rectified in Revision 2 of the SITC. We did not adopt them here because the indexes could not be recalculated to match the later classification without a major effort.

ity and therefore permits the data to determine the degree to which each influences the estimate of the missing price. The list of variables could be expanded to include, for example, a dummy variable for the use of a hedonic price index or a variable to represent the movement of the price in the preceding year.

3. *Quality corrections.* One reason for doubts as to the accuracy of price indexes for manufactured products is the suspicion that they do not take adequate account of changes in the quality of these goods and are biased upward on that account. There have been no studies that examine changes in quality specific to exports and imports, but there have been a fair number of studies of quality change, and of the correction of prices for quality change, by the use of hedonic price measures. We show the effect on the U.S. export price indexes of introducing the quality-adjusted price measures that have been calculated for a few commodities in the United States. We then also show the effect on world price indexes of introducing these quality adjustments, under several possible assumptions about the relation between quality change in the U.S. and quality change in other countries.

5.2   Methods and Sources

5.2.1.   Sources of Detailed Price Data

The indexes are based on disaggregated export price data for countries for which they are available, with gaps filled by producer and wholesale price indexes and hedonic price indexes, where possible.

There are several basic ingredients for our indexes. The first are the international price indexes for metals, metal products, machinery, and transport equipment, for the United States, the United Kingdom, Germany, and Japan, covering 1953–1964, from Kravis and Lipsey (1971), with interpolations based on the other types of data, as explained for the case of Germany in Kravis and Lipsey (1972). The second are the official export price indexes produced by the United States, Germany, and Japan, the latter two fairly comprehensive, the first starting with the same coverage as the Kravis-Lipsey indexes and gradually increasing in coverage over time until they are now quite complete. The third element of our indexes is more fragmentary export price data published by the United Kingdom, Sweden, and the Netherlands, the last gradually increasing in scope over the years. The fourth type of data is producer price indexes or wholesale price indexes, or both, for each country mentioned above and also for France and Canada. The fifth type is hedonic price indexes for a few types of machinery and transport equipment in the United States. These are used in two ways. The first is in the data from Kravis and Lipsey (1971) mentioned above. The second is as a substitute for conventional price series, in a very rough attempt at adjustment for quality change, where we consider it appropriate and important.

The various sources of data, of course, overlap extensively in commodity coverage. It is therefore necessary to assign price series to the index by systems of priorities, determined by our view as to the appropriateness of each type of data as measures of export prices. In the world price series or those for developed-country exports to developing countries, the highest priority is given to series representing prices in international trade, first the Kravis-Lipsey series and then official export price series. The second priority is for producer or wholesale prices, and the third for the hedonic price indexes. Although we consider the hedonic price series more appropriate for our purposes than the conventional series, we have not given them priority because we wished to produce indexes from something close to conventional data. However, we have also calculated an alternative index in which hedonic price series are given priority, and we consider that to be the best estimate we can make of the movement of prices of manufactured goods.

In the export price indexes based on each country's own export weights, only export prices themselves are used in each own-country index. The indexes for competing countries give export prices the first priority, and producer or wholesale prices the second, but no hedonic price indexes are used because the hedonic price data are confined to the U.S. The results would depend too heavily on whether hedonic indexes were applied only to the U.S. or are assumed to reflect similar changes in quality in other countries' exports.

The domestic price indexes based on export weights use no export prices and are based entirely on producer or wholesale prices.

The precise sources of the price data are given in appendix A.

5.2.2   Weighting Schemes and Missing Price Observations

As was suggested in Kravis and Lipsey (1984), the selection of systems of weighting is second only to the selection of basic price data in determining the characteristics of the resulting price indexes. Several different methods have been used, implying different assumptions not only about the importance to be given to commodities but also, usually inadvertently, about the behavior of prices for which data are unavailable.

We can think of a set of worldwide weights representing the values of exports of each commodity (defined here as a 4-digit SITC subgroup) from each country (ω_{ij}), to be used in weighting price relatives showing changes over time in individual prices (P_{ij}). Table 5.1 shows the weights in the form of a country-by-commodity matrix.

The most common method for constructing price indexes for aggregates of countries, such as those used in models that call for "world" or "rest-of-world" prices of export goods or traded goods, is to use the published country-aggregate price indexes and to weight them together by some set of weights representing the importance of each country in world trade. The importance of each country might be measured by the value of trade or, in some cases, by

Table 5.1   **Commodity by Country Matrix of Weights**

Commodity	Country 1	2	3	. . . . m	Σ Countries
1	ω_{11}	ω_{12}	ω_{13}	. . . . ω_{1m}	ω_{1T}
2	ω_{21}	ω_{22}	ω_{23}	. . . . ω_{2m}	ω_{2T}
3	ω_{31}	ω_{32}	ω_{33}	. . . . ω_{3m}	ω_{3T}
.	.	.	.	. . . . .	.
n	ω_{n1}	ω_{n2}	ω_{n3}	. . . . ω_{nm}	ω_{nT}
Σ Commodities	ω_{T1}	ω_{T2}	ω_{T3}	. . . . ω_{Tm}	ω

$\omega_{11} + \omega_{12} . . . . . + \omega_{33} .. + \omega_{nm} = \omega = 1.00$

weights derived from a model. In terms of the matrix above, these aggregate indexes are of the type

$$(1) \qquad p = \sum_{j=1}^{m} \omega_{Tj} \sum_{i=1}^{n} \frac{\omega_{ij}}{\omega_{Tj}} p_{ij}$$

It is usually uncertain in these calculations, since they do not go behind published aggregates, what commodities are included with what commodity weights, and with what base years. It is likely that many of the country in- dexes lack proper representation of complex manufactured products. Given all these characteristics, it is not surprising if elasticities of substitution or price elasticities of demand are found to be low or if no significant relation- ships can be found.

In an effort to overcome some of these problems, we have at times calcu- lated indexes for various countries in which the same set of commodity weights at the 4-digit SITC level was applied to each country's prices.[4] The differences between one country's aggregate price change and those of rival countries were then more clearly attributable to differences in price changes for the same products rather than to some mixture of these with differences in the coverage or weighting of products. In terms of the matrix above, these price indexes were of the form

$$(2) \qquad p = \sum_{j=1}^{m} \omega_{Tj} \sum_{i=1}^{n} \omega_{iT} \, p_{ij}$$

Both of these types of indexes involve the same assumptions about the na- ture of the commodities priced at the most detailed level and about price rela- tionships, since each involves filling in missing price observations using only data for the same country. The justification for starting with the calculation of

4. Kravis and Lipsey (1972, 1977a, 1977b, and 1982) and Bushe, Kravis, and Lipsey (1986).

country indexes is the assumption that missing prices tend to behave in a similar manner to the average of other prices in the same country for commodities in the same 3-digit, 2-digit, or 1-digit commodity class. These methods, therefore, ignore the behavior of other countries' prices for the same commodity; this is a difficult assumption to accept for anyone who believes price movements in different countries are correlated at all.

An alternative method of calculating world or other price indexes aggregated over countries would be

$$(3) \qquad p = \sum_{i=1}^{n} \omega_{iT} \sum_{j=1}^{m} \frac{\omega_{ij}}{\omega_{iT}} p_{ij}$$

in which a world price index for each commodity would be calculated first, and all these would then be aggregated across commodities using worldwide commodity trade weights. This procedure would come closer to acceptance of the law of one price than those outlined above, since it assumes that one country's price for a commodity tends to move with the average of other countries' prices for the same commodity. However, it therefore assumes that there is no country-specific effect on a price change. Thus, a currency revaluation is presumed to have no effect on the export price of the revaluing country in comparison to that of others. In our studies of international price behavior we have found this proposition to be contradicted frequently (e.g., Kravis and Lipsey, 1978).

A preliminary test of the two extreme assumptions, reported in Kravis and Lipsey (1984), was to compare the variance of price movements among countries at the 1-digit SITC level with the variance among 4-digit commodities within 1-digit commodity divisions within countries, using year-to-year price movements for the United States, Germany, and Japan. The variance among countries within 1-digit classes was larger than the variance among 4-digit commodities within a class within countries. The conclusion there was that "if either country alone or commodity alone had to be used as the criterion for assigning missing price observations, country would be a better choice." However, considerable further tests would be needed to make a definitive judgment on this issue.

5.2.3   Estimating Missing Prices by the Country-Product Dummy Method

Despite the range of sources from which we collected price data, it was not possible to collect prices for every item for every country for every year. In the earlier studies by Kravis and Lipsey, a procedure was adopted that is almost universal: setting some minimum level of coverage for a group of commodities and, if that level is achieved, using the average price change for covered commodities as an estimate of that for the whole group, assuming in effect that the prices of uncovered items move, on average, identically to those of covered items. We continue to use this method for the individual country price indexes based on own-country weights (appendix C).

Common though this procedure for estimating missing prices is, it discards some information about the missing category that is probably pertinent: the price change for the corresponding product in other countries. We have therefore used a different method for the developed-country price indexes. This method, referred to as the country-product dummy method, was developed by Robert Summers (1973) for use in estimating missing price levels for inter-country price comparisons in the United Nations International Comparison Project. Its purpose was to use information on both country influences and product influences on the price of a product to estimate each missing price. In its original version by Summers, it involved regressions for commodity groups using natural logs of the price levels as the dependent variable, and country and product dummies as the independent variables. There was a product dummy variable for every product in the group and a country dummy variable for every country but one, which was designated the base country. The coefficient of a country dummy term for country j in one of these equations represents the natural log of the ratio of the price level in this commodity group in country j to the price level in the base country. If we translate the equation into natural numbers, the price level for country j appears as an exponent in the equation.

We wished to estimate not only commodity-group price changes but also the price changes for each missing item. We created as dense a price matrix as possible at the 4-digit level as a first step, thereby permitting weighting and reweighting as our needs changed. We estimate the missing prices by using the commodity dummy coefficients in conjunction with the country dummy coefficients. Because there is no dummy for the base country, the commodity dummy coefficients are estimates of the prices for those commodities in the base country. To estimate a price missing in the base country's data, therefore, we used the exponent of the appropriate commodity dummy. For any other country, we multiplied the exponent of the coefficient for the product by that for the country, and we adjusted the "base" price for a commodity for the group price difference between the base country and the dummy country.

In running the regressions, we had two procedural problems to resolve. The first was to define the commodity groups within which we would run regressions. A group should be defined narrowly to make it as homogeneous as possible while still retaining sufficient degrees of freedom for a regression. The 2-digit SITC categories were the starting points, but some groups had too few SITC subdivisions and others had too few available observations. Therefore, in cases where the regression for a 2-digit group would have had less than 10 degrees of freedom, we pooled it with other small 2-digit groups in the same 1-digit division. The second problem was that data were so scarce for certain countries in various years and groups that we felt that the estimates for these countries would be statistically meaningless. Therefore, in any one regression, we included only countries for which we had price data for 3 or more commodities within the group, as well as those for which even a smaller

number of items accounted for 30 percent of the group weight. The weights for commodities and groups were based on 1963 OECD exports. These procedures were applied on a yearly basis, so that while two groups may have been combined in an early year because neither one included a sufficient number of observations, they may have been treated separately in a later year if the number of available prices increased. Similarly, a country excluded in one year might be included in another if the coverage of its price data improved.

5.2.4   Aggregation of Detailed Price Indexes

Once we had run regressions for every 2-digit group and year for which it was feasible and the resulting price estimates were used to fill in any holes at the 4-digit level, the 4-digit price indexes were weighted up to the 3-digit level. Not every 3-digit group price index could be estimated by aggregation. If the price index for a 3-digit group was "missing" because there were not enough data at the 4-digit level, the index at the 3-digit level was estimated by the same regression procedure, where possible. After the 3-digit estimates were added, and the data were weighted up to the 2-digit level, regressions were run to estimate any missing 2-digit groups. In both cases, the weights used were 1963 OECD exports to the world.

After filling in as much data as needed, we created a master price file for each country that contained all the necessary data at every level. These are the files we used, weighted together using various weights, to create the various price indexes for total developed-country exports and developed-country exports to developing countries reported here.

5.3   Indexes of "World" Export Prices for Manufactures

5.3.1   Weighting and Country Coverage

We have calculated two aggregate price indexes for exports of manufactured goods by developed countries, differing in their weighting but not in the price series used. One is an index weighted by the value of all exports of manufactures by developed countries, including their exports to each other. The other is an index weighted by the value of exports by developed countries to developing countries. The former is relevant to issues such as the terms of trade between manufactures and primary products, and the latter is more relevant to discussions of the terms of trade between developed and developing countries.

Both of these indexes were constructed with two sets of weights: 1963 exports by all OECD countries and 1975 exports by the same countries. The developed market economies, a class almost equivalent to the OECD, accounted for 82 percent of the world's exports of manufactures in 1965, 84 percent in 1975, and 78 percent in 1985. Of the manufactured exports by developed market economies in 1985, those countries covered by our indexes

(although not necessarily covered for all commodities) accounted for 77 percent or, in other words, about 60 percent of world exports of manufactures.[5]

5.3.2   Effects of Differences in Time Period Used for Weighting

Two time periods, 1963 and 1975, have been used to weight the price indexes for all developed-country exports and exports from developed countries to developing countries. If we compared the price movements between 1963 and 1975 derived from the two measures, it would be equivalent to the familiar comparison of Laspeyres and Paasche price indexes, with the index on the 1963 weight base the Laspeyres price index (or the one based on earlier weights) and the index on the 1975 weight base the Paasche price index. An increase in the 1963-based index relative to the 1975-based index would imply a negative covariance between prices and quantities, while a relative increase in the 1975-based index would imply a positive covariance. We could associate the negative covariance with a situation in which events were dominated by changes in supply, with demand relatively stable. The positive covariance implies a situation dominated by changes in demand, with supply relatively stable.[6]

The differences in the trend of prices produced by the shift in weight base from 1963 to 1975 are shown on Table 5.2. In every case, the index with a later weight base rose less than the one with an earlier base, implying the dominance of changes in supply and substitution in favor of products for which price increases were relatively small. The difference was larger in the index for all countries than in any of those for individual countries. That fact implies that in addition to substitution among commodities, there was also substitution among countries in favor of those with relatively declining prices, presumably those in which productivity and export supply were increasing most rapidly.

Despite the fact that there were wide divergences among the countries in the size of the increase in prices over the period as a whole, the effects on the price indexes of changing weights were fairly small, ranging only from 3 per-

5. Within the developed market economy groups, there were $217 billion of manufactures exports in 1985 by countries we did not cover. The largest omitted country was Italy, with $68 billion in exports, followed by Belgium/Luxembourg with $40 billion, and Switzerland with $32 billion. Other European countries, for which at least some detailed domestic producer or wholesale price data could probably be obtained with sufficient effort, were the sources of another $67 billion. Thus, Europe as a whole accounted for 95 percent of the manufactured exports of developed market economies that we did not cover.

Of the $265 billion in manufactures exports by other than developed market economies countries in 1985, 22 percent of the world total, over 60 percent were exports by developing countries, and the rest were from centrally planned economies. The $167 billion from developing countries were concentrated in Southeast Asian countries. More than 40 percent were from Hong Kong, South Korea, and Singapore. The concentration in Asia would be even higher if the figures included Taiwan, which was omitted from U.N. tabulations.

6. For a detailed discussion of the relationship to the covariances, see Lipsey (1963, pp. 85–90).

Table 5.2   Export Price Index for All Manufactures, 1988 (1953 = 100)

	OECD Export Weights of		1963/1975
	1963	1975	
All Developed Countries	430.3	409.9	105.0
United States	369.1	359.3	102.7
Germany	572.7	556.9	102.8
Japan	370.8	354.1	104.7

Source: Appendix tables 5B.1,5B.2, 5B.5, 5B.6, 5B.9, 5B.10, 5B.13, 5B.14.

Table 5.3   Export Price Indexes for 1-Digit SITC Classes, 1988 (1953 = 100)

	Index on 1963 Weights/Index on 1975 Weights:			
	SITC 5	SITC 6	SITC 7	SITC 8
All Countries	1.046	.993	1.109	1.031
United States	1.073	.980	1.034	1.037
Germany	1.072	1.003	1.045	1.049
Japan	1.044	1.031	1.024	1.040

Source: See note to table 5.2.

cent for the United States to 5 percent for Japan. That narrow range reflects the fact that the same weights are used for all the countries' indexes. In the case of the export price indexes based on own-country weights, shown in Appendix C, the differences are considerably larger, ranging from 3 percent for Germany to 9 percent for Japan and 11 percent for the United States. All the indexes show a larger price increase for the series using the earlier weight base, implying dominance by supply changes and substitution toward products falling in price, and there was apparently more substitution, or a wider range of price changes, within U.S. and Japanese exports than within German exports or those of all developed countries as a group.

The relationship between indexes based on the two sets of weights varied somewhat among commodity divisions. In most cases, the later weight base was associated with a smaller price increase, but there were some exceptions, as can be seen in table 5.3. The cases in which the earlier set of weights led to lower price index changes were in SITC 6, which consists mainly of semi-manufactures. In that group, for the United States, changes in prices and in quantities were positively correlated, implying the likelihood that the price changes were dominated by changes on the demand side rather than the supply side.

5.3.3   Export Prices to the World and to Developing Countries

Since the composition of exports to developing countries might be different from that of exports to other countries, it is conceivable that developing coun-

tries faced larger or smaller price increases than other buyers. That possibility is examined in table 5.4 for manufactured goods as a whole and for the four major categories of manufactures.

In most cases, exports to the world (and therefore exports to the developed world to a greater degree) increased more rapidly in price over the three and a half decades than exports to developing countries. That was the case for manufactured products as whole, for SITC divisions 6 and 8, and for the machinery indexes on 1963 weights. The largest differences, about 10 percent, were in SITC 8, a category in which the developing countries were themselves substantial exporters.

An earlier version of the price indexes for exports to developing countries was compared in Kravis and Lipsey (1984), to the U.N. unit-value index for manufactures that is customarily used for calculations of manufactured-goods prices and terms of trade. The conclusion was that prices of manufactured goods exported by developed countries to developing countries had risen much less than had been suggested by the unit-value indexes—something in the neighborhood of 75 percent over the period from 1953 to 1976, as compared with 140 percent for the unit-value index. About half of the difference stemmed from the corrections for quality change and the other half from some mixture of differences in the type of price data used (prices vs. unit values), in index-number formulas, and in country coverage. The different price measure for manufactured goods also implied, of course, a larger decline in the terms of trade of manufactured goods relative to primary products than had been shown by the unit-value indexes.

5.3.4   Adjustments for Quality Change

The proper treatment in a price index of changes in the quality of goods has been a controversial issue for many years. A considerable amount of work has been done, particularly by the application of hedonic methods, to adjust domestic price indexes for changes in quality that are supposedly not adequately accounted for, even in price indexes gathered with considerable attention to quality specifications. Most of this research has been directed to consumer

Table 5.4   **Export Price Index, 1988 (1953 = 100)**

	Exports to (1963 weights):		Exports to (1975 weights):	
	All Countries	Developing Countries	All Countries	Developing Countries
All Manufactures	430	415	410	400
SITC 5	349	368	334	344
SITC 6	421	408	424	415
SITC 7	459	443	414	421
SITC 8	426	387	413	377

Source: Appendix tables 5B.1–5B.4.

and producer capital goods, almost all of which are included in SITC 7 of our product range.

Almost no empirical attention has been given to the same issue in connection with prices in international trade, although speculations on the effects of omitting quality change have played a role in discussions of the long-run trends in the terms of trade (Haberler 1959, Viner 1953, p. 114). The only direct applications of hedonic methods to international trade prices that we are aware of, mainly for deriving price level comparisons, are in Kravis and Lipsey (1971). In a study of the terms of trade between manufactures and primary products, Kravis and Lipsey (1984) used hedonic indexes constructed for domestic prices to adjust indexes of export prices of manufactured goods; we follow similar procedures here.

There are many possible ways of using these domestic price adjustments for quality to correct international price indexes. Since these calculations have been performed only for domestic prices, it is necessary to assume that any adjustments in domestic prices are equally applicable to U.S. export prices. The hedonic price indexes are available only for the United States, and even for the United States, only for a few commodity groups. Therefore, the adjustments we make in the U.S. indexes are probably minimal, and those for the world can be considered to be no more than rough approximations that give some notion of the direction and range of conceivable quality corrections.

One possibility would be to assume that the adjustments apply only to the United States. If the quality-adjusted U.S. indexes are combined with conventional indexes for other countries, the result is a very conservative estimate of the effect of such adjustments on world or developed-country export price movements. That estimate of the quality change omitted from conventional measures, provided by the series described below as "adjusted for U.S. only," is conservative in several respects, all but one of which apply also to the series described as "adjusted for all countries." One is that it assumes that the upward bias in price indexes from this source affects only the U.S. data; this is an unlikely possibility. Another is that most of the hedonic price indexes end with 1983, and no adjustment can be made for later years in even those groups for which it was performed earlier. A third reason is that a number of price indexes that should be corrected for quality change were not, because appropriate indexes were not available. Finally, a fourth reason is that some quality adjustments are already incorporated into the "conventional" indexes for 1953–64 derived from Kravis and Lipsey (1971).

The procedure of correcting only U.S. prices is likely to leave an upward bias in a world price index. Ideally, we would like to have similar hedonic price measures for all countries. Failing that, we believe it is more appropriate to assume that any quality adjustment applied to, for example, U.S. computer and parts prices is equally applicable to the corresponding prices of other countries than it is to assume that the unmeasured quality change is confined

to the United States. Also, on this assumption, if an otherwise empty cell for computer prices is filled in one country by a hedonic price index, it should be filled in the other countries by the same type of index. The assumption implied by that procedure is that the law of one price in time-to-time form, poor as we have found its predictions to be (Kravis and Lipsey 1978), still provides a better guess for these products than the assumption that, for example, computer prices in countries other than the U.S. move with all other prices in those countries. The indexes based on the assumption of identical price movements in all countries for products for which hedonic price indexes were used are described below as "adjusted for all countries."

This procedure of assuming identical price changes for a product in different countries is at variance with the method implied by our earlier conclusion that country influences, rather than commodity influences, were dominant in determining price changes. However, that conclusion reflected mainly the impact of exchange-rate changes and differences in inflation rates on price movements. The application of identical quality adjustments to a commodity in different countries reflects our judgment that radical changes in technology in an industry such as computers probably outweigh the country influences on price changes. That judgment is influenced partly by the fact that a substantial part of exports of machinery from countries outside the United States, especially in the computer industry, originates in subsidiaries of U.S. firms, and therefore embodies U.S. technological developments.

The effect of the quality adjustment applied to a few groups in SITC 7 (machinery and transport equipment) can be seen from the comparison in table 5.5. If the adjustment is performed only for the United States, the effect on the world export price index for manufactures is fairly small, only about .15 percent per year for manufactures as a whole and about .25 percent per year for SITC 7. If the corresponding quality adjustments are spread to other countries, the effect is multiplied. For manufactures as a whole, it is almost .5 percent per year, and for SITC 7 it reaches almost 1 percent per year.

The quality adjustments for manufactures as a whole would be larger for an

Table 5.5   **Ratio of 1988 to 1953 World Export Price of Manufactures, with and without Quality Adjustments (1975 weights)**

All Manufactures, OECD Export Weights	
Unadjusted	423.3
Adjusted for United States only	406.7
Adjusted for all countries	361.1
SITC 7, OECD Export Weights	
Unadjusted	427.7
Adjusted for United States only	389.0
Adjusted for all countries	310.9

Source: Appendix tables 5B.2 and 5B.19.

index based on U.S., or especially Japanese, export weights, because SITC 7 is more important in the exports of those countries than in those of developed countries as a group.

These adjustments are too gradual and not large enough to produce a different picture from the standard one of short-term fluctuations in the terms of trade between manufactures and primary products, or the terms of trade of individual countries. They are large enough, and sufficiently constant in direction, to give a very different story about long-term *trends* in prices and terms of trade.

5.4   Indexes of Export Prices, Export Price Competitiveness, and Corresponding Domestic Prices

The price indexes in appendix B for all developed-country exports of manufactures and for exports by developed countries to developing countries are constructed from indexes for individual countries that are all based on the same set of weights. However, these are weights that reflect the importance of products in world trade as a whole rather than in the trade of each country. To explain the exports of a single country, such as the United States, we consider an index based on that country's export weights more relevant. For this purpose, we have constructed price indexes for each country's exports that are based on the weight of each product in the country's exports. We have then constructed price indexes for competitors based on the same set of weights. Thus, for the United States, we have an export price index and a competitors' price index, both based on U.S. export weights. All of these are shown in appendix C.

For the individual country, the price index is a conventional export price measure. Unlike the indexes in appendix B, which use domestic prices where export prices are unavailable, these price indexes include only export price data. The index of competitors' prices is, in the case of the United States, weighted by the same U.S. export weights as the U.S. export price but includes both export price data and, where they are not available, domestic price data, as in the indexes of Appendix B. That procedure produces manufactured-goods price indexes for Germany, Japan, and other countries with U.S. export weights. To explain the exports of the United States itself, or its share vis-à-vis the rest of the world, we combine these competitors' price indexes on U.S. weights into a single rest-of-world price index. The weight for a competitor country in this index is the sum of the total manufactured exports of the country to destinations other than the United States (to represent the competition in world markets outside the competitor country and the United States) and total U.S. exports to the competitor country (to represent competition with U.S. exports in that country's home market).

The same procedure is followed to produce individual country and rest-of-world indexes for the exports of Germany and Japan.

One way to use these indexes is to ask what they show about the export price movements for each country relative to those of competitors. For example, if we separate the period into that preceding the Smithsonian agreements of 1971 and that from 1971 to the low point in the exchange value of the U.S. dollar in 1980, we find the estimates of changes in prices and relative prices shown in table 5.6.

Both U.S. and German export prices rose from 1953 to 1971 relative to those of other countries that sold the same export products. Japan's prices fell enormously relative to those of its competitors during the same period, with a decline of 25 percent in relative prices. From 1971 to 1980, the United States gained greatly on its competitors, with a fall of more than a third in relative prices. Japanese relative prices also fell during this period, although not as much as those of the United States, while German relative prices continued to increase.

The corresponding changes for the period of the rapidly rising exchange value of the dollar, which we can mark out as 1980 to 1985 in these annual average data, and the subsequent period of the declining dollar, are shown in table 5.7. The indexes show a large increase in relative U.S. prices during the five-year rise of the dollar and a sharp decrease during the next three years, with the net result being some increase over the eight years. The movements for Germany were the reverse of those for the United States, but involved a

Table 5.6   **Changes in Own and Competitors' Export Price Indexes, 1953–71 and 1971–80 (ratio × 100)**

	1971/1953			1980/1971		
	United States	Germany[a]	Japan	United States	Germany	Japan
Export Price Index	146.5	147.9	93.0	176.4	306.2	231.1
Competitors' Price Index	123.7	118.5	123.9	272.9	249.6	252.6
Ratio: Own/Competitors'	118.4	124.8	75.1	64.6	122.7	91.5

Source: Appendix tables 5C.4–5C.6.
[a]1971/1954.

Table 5.7   **Changes in Own and Competitors' Export Price Indexes, 1980–85 and 1985–88 (ratio × 100)**

	1985/1980			1988/1985		
	United States	Germany	Japan	United States	Germany	Japan
Export Price Index	125.5	74.2	94.9	110.1	172.3	150.2
Competitors' Price Index	82.1	94.6	87.8	160.5	140.3	146.6
Ratio: Own/Competitors'	152.9	78.4	108.1	68.6	122.8	102.5

Source: Appendix tables 5C.4–5C.6.

small overall decrease in relative prices. The changes for Japan were a relative price increase in 1980 to 1985, despite the rise in value of the U.S. dollar and an additional increase after that, quite small considering the sharp increase in the exchange value of the yen.

Perhaps the most surprising feature of these price measures is the apparent relative increase in German prices after 1985 without a corresponding reflection in German export shares. One possible reason for this seeming absence of response to price changes is that German exports gained from the growth and enlargement of the EEC. Another is that the omission of Italian and Belgian prices from our measures, along with poor coverage of French prices, particularly of machinery in the earlier years, may have caused these indexes for German competitors' prices to be biased upwards.

These relative price indexes are. similar to those we have referred to elsewhere as indexes of price competitiveness (Kravis and Lipsey 1971), although the price competitiveness measures were based on OECD weights for the individual countries, as are those for individual countries in Appendix B. The relation between these measures and broader concepts of competitiveness, including "nonprice" aspects, was discussed in the earlier work. The "price competitiveness" measures were not intended to encompass all the economic influences on that broader concept, although the price measures must reflect some of the broad movements in relative productivity and costs that are part of changes in a country's competitiveness. We think of relative price changes, as we have measured them, as useful for reduced form trade equations. In more structural trade models, the export price changes become endogenous variables in supply equations.[7]

Even if these indexes have a more logical basis than the ones usually used to analyze trade, an obvious question is whether they produce any more reliable estimates of elasticities or better explanations of the flow of trade. An authoritative answer to that question could only come from attempts to use these measures in various types of trade equations and models of trade. We can report on a few experiments along these lines with earlier versions of the indexes[8]

In one of these experiments (Kravis and Lipsey 1974), we estimated elasticities of substitution between U.S. and German exports of metals, machinery, and transport equipment to third-country markets using, as alternative price measures, indexes of the type constructed here from export price data and indexes based entirely on domestic prices. We considered the test to be more favorable to the domestic price indexes than a comparison based on the usual published indexes because we reweighted the domestic prices by international trade weights to match the export price indexes.

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7. Goldstein and Khan (1985). For an example using our price data, see Kravis, Lipsey, and Bushe (1980).

8. For some tests of U.S. import price data, comparing results based on BLS price data with those based on unit values, see Shiells (1987).

The results of the comparison were that the degree of explanation was be-
tween twice and three times as great in equations using the export price in-
dexes and that the elasticity estimates were much higher. Furthermore, the
response of relative exports was almost the same for a change in U.S. prices
as for a change in German prices, while in the equation based on domestic
prices, the elasticities were quite different.

A later version of these indexes covering machinery and transport equip-
ment was used in Bushe, Kravis, and Lipsey (1986) to explain changes in
U.S., German, and Japanese exports. It is difficult to compare the results with
those of other studies because of differences in commodity coverage and time
periods, but one conclusion was that the differences among countries in price
elasticities were smaller than had been estimated using other price data. How-
ever, we could not be sure whether our use of more accurate price data or our
confining the comparison to the same range of commodities was the explana-
tion for the greater similarity of elasticity coefficients. Another conclusion
was that lags in price effects on U.S. exports were much longer, extending out
to four years, than those in most previously estimated export equations, so
that "the United States might have to wait a long time for any relief from the
effects of the high value of the dollar in the mid-1980s."

5.4.1 Margins on Export and Domestic Sales

We have also calculated domestic price indexes for exported manufactured
goods for the United States, Germany, and Japan, using each country's export
price weights (Appendix C). These data can be used to examine changes in
the ratio of export to domestic prices for each country. If costs for domesti-
cally sold and exported goods changed identically, that ratio reflects the direc-
tion of change in gross profit margins in export sales as compared with do-
mestic sales, and also, if domestic price movements are a good proxy for cost
changes, the direction of change in export margins themselves. With the ex-
treme volatility of exchange rates that has characterized the 1980s, and the
observation that prices of Japanese goods in the United States have not risen
in line with the depreciation of the dollar since 1985, there has been a renewal
of interest in this issue with several studies of changes in the export/domestic
price margin or "pricing to market" (Krugman 1987, Marston 1989, Mann
1986). However, as noted below, the phenomenon of pricing to market was
evident to some degree in earlier periods, although not as dramatically as in
the years since 1985.

On the whole, we would expect relative declines in export margins in peri-
ods when the exchange value of the currency is increasing or, more generally,
when domestic prices are rising more rapidly than those of competitors. We
would expect rising margins in periods of falling currency values or falling
relative domestic prices.

The results for the United States from 1953 to 1980 do not give much sup-
port to these expectations. U.S. export prices hardly changed relative to do-

mestic prices from 1953 to 1971, when U.S. prices were rising relatively, and they declined relative to export prices in 1971 to 1980 as U.S. prices fell with the depreciation of the dollar (see table 5.8).

The export/domestic price ratios for Germany and Japan did move in the expected direction during the period of mostly fixed exchange rates from 1953 to 1971. In the first period of changing exchange rates, 1971 to 1980, the German ratio was stable even as German relative prices increased, and the Japanese ratio fell even while Japanese prices were declining relative to those of competitors. That was a period in which Japan was under great pressure to expand exports to offset the rise in petroleum import costs.

The 1980 to 1985 period of great exchange-rate turbulence and rising exchange value of the dollar saw somewhat surprising changes in export/domestic price ratios. U.S. export prices rose relative to domestic prices despite a large increase in U.S. export prices relative to competitors. German export prices fell relative to domestic prices although German export prices were falling relative to those of other countries. And Japanese export prices hardly changed in comparison to domestic prices, while they were rising relative to foreign countries' prices.

The dollar depreciation in the following period was accompanied by a rise, as expected, in the export/domestic price ratio in the United States, but it was a small one. There were also the expected declines in export/domestic price ratios in both Germany and Japan, the German one quite small (see table 5.9).

Table 5.8   Changes in Export and Domestic Prices of Export Goods, 1953–71 and 1971–80 (ratio × 100)

	1971/1953			1980/1971		
	United States	Germany	Japan	United States	Germany	Japan
Export Price Index	146.5	147.9	93.0	176.4	306.2	231.1
Domestic Price Index	145.8	165.0	88.2	210.9	306.3	243.0
Ratio: Export/Domestic	100.5	89.6	105.4	83.6	100.0	95.1

Source: Appendix tables 5C.4–5C.6.

Table 5.9   Changes in Export and Domestic Prices of Export Goods, 1980–85 and 1985–88 (ratio × 100)

	1985/1980			1988/1985		
	United States	Germany	Japan	United States	Germany	Japan
Export Price Index	125.5	74.2	94.9	110.1	172.3	150.2
Domestic Price Index	120.2	79.5	95.5	107.7	174.3	175.2
Ratio: Export/Domestic	104.4	93.3	99.4	102.2	98.9	85.7

Source: Appendix tables 5C.4–5C.6.

The 14 percent fall in the export/domestic price ratio for Japan between 1985 and 1988 suggests that there must have been a very large decline in relative margins on exports.

A similar set of identically weighted export and domestic price indexes was used in Kravis and Lipsey (1977a, 1977b) to study separately the impact of exchange-rate changes and of differences in inflation rates between countries on ratios of export to domestic prices from the early 1950s through the mid-1970s. We interpreted changes in those ratios, as we do here, as evidence of changes in margins on export sales relative to those on domestic sales. U.S. export margins appeared to be sensitive to changes in the U.S. exchange rate with the deutsche mark and the yen and also to changes in relative inflation rates between the United States and the United Kingdom. German export margins were less well explained but responded to differences in inflation rates between Germany and the United States, the United Kingdom, Japan, and France. Japanese export margins, in the period of more stable exchange rates, responded more to European and U.S. business-cycle movements than to exchange rates, but in the 1970s began to respond to exchange-rate changes as well. The reactions to exchange rates and inflation rates could be summarized as a consistent response to changes in real exchange rates, over the whole period for the United States and Germany, and in the 1970s for Japan as well. The estimates covering all Japanese manufactures for what Marston (1989) refers to as PTM elasticities, are somewhat lower than his for individual products in the 1980s, but suggest that the phenomenon is not a new one.

5.4.2. Concluding Remarks

Aside from the indexes for 1953–64, which were drawn at least partially from our own data collection, all the indexes shown here were calculated from official, publicly available data. Therefore, aside from possible additions to the country coverage, further updating of the weighting, and a shift to a quarterly basis in place of the annual indexes presented here, most major improvements in the data would require action by the official agencies producing the data. An exception, open to outside scholars, might be an extension of the hedonic price calculations to countries other than the United States.

Among the improvements in the official data that would be useful would be extension of the coverage of price series in countries for which there are major gaps in the data. French data are among the poorest in this respect among the countries we cover. In addition, the calculation of export and import price indexes based on price data, rather than on unit-value data, is still confined to a small group of countries, although the recent attention to "pricing-to-market" and pass-through issues suggests that there is a great deal to be learned by having separate domestic and international price data.

There are, in addition, two other types of issues involving the quality of official price data that have not been extensively addressed, although both were discussed in Kravis and Lipsey (1971). One is the treatment of intracom-

pany trade which, with the increase in the internationalization of firms and the increasing share in trade of the kinds of products in which international transactions tend to be internal to firms, is now a very large part of developed countries' trade. It is not clear to what degree the prices reported for such trade are artificial and to what degree they therefore distort export and import price measures. The principle suggested in Kravis and Lipsey (1971) was to use the price in the first arm's length sale in a country in preference to intracompany prices, where that is possible; we still believe that is the appropriate practice. For a U.S. export, for example, it would be the price at which the U.S. wholesale or retail trade affiliate in a country sold the product, rather than the price at which a U.S. manufacturer sold to its overseas subsidiary. And for a U.S. import it would be, for example, the price at which a Japanese car was sold to an unaffiliated buyer in the U.S., rather than the price at which the Japanese manufacturer "sold" it to its U.S. sales affiliate.

Another type of question is raised by the very small extent to which U.S. firms admit selling at different prices at home and abroad, in contrast to the large differences reported by foreign firms. While it is conceivable that the trading policies of U.S. companies are very different in this respect from those of companies based in other countries, it is also possible that since the export and domestic prices are collected by the same agency in rather similar ways, companies tend to report the same prices. For this reason, as well as others that have at times been suggested to price collection agencies, even for domestic price collection, it would be wise to collect prices not only from sellers, but also from purchasers.

Appendix A
Sources of Price Data

Export Prices

Aside from the data described in Kravis and Lipsey (1971 and 1974), the following sources were used. The German price data for earlier years appeared in Statistisches Bundesamt, *Preise, Löhne, Wirtschaftsrechnungen*, Reihe 1, Preise und Preisindizes für Aussenhandelsgüter. For later years, the source is *Preise*, Reihe 8, Preise und Preisindizes für die Ein- und Ausfuhr. A brief description is given in Angermann (1980) and in articles in *Wirtschaft und Statistik*, such as Rostin (1974). The Japanese export price data are published in the *Price Indexes Annual* (earlier the *Export and Import Price Indexes Annual*) of the Bank of Japan. The U.S. export price data are from releases of the U.S. Bureau of Labor Statistics entitled *U.S. Import and Export Price Indexes*. A brief description of these is given in *Comparisons of U.S., German, and Japanese Export Price Indexes*, BLS Bulletin no. 2046 (1980).

Export price data for other countries were more fragmentary. Two publications of the Central Bureau of Statistics of the Netherlands, *Maandstatistiek van de Binnenlandse Handel* and *Bijvoegsel Maandstatistiek van de Prijzen*, provided export price data with incomplete but increasing coverage.

For the United Kingdom, there are virtually no export price data outside the period covered by Kravis and Lipsey (1971). The exception is a set of export price indexes for products in SITC 7 for 1976 through 1979, part of an experimental program that was later discontinued.

Swedish export prices are reported in various issues of publications of the Central Bureau of Statistics, the most recent of which was "Prisindex i producent-och importled 1988" (1989). Some of the indexes are based on unit-value data, and we tried to avoid using these as far as possible, preferring the data on domestic prices mentioned below.

Domestic Prices

For Canada, wholesale price indexes are from tapes provided by Statistics Canada.

Domestic price data for the United States were price series at the most detailed level from a BLS wholesale price index tape. For the United Kingdom, some individual series were collected from publications of the Board of Trade and the Department of Trade and Industry. However, the United Kingdom did not publish individual series for most machinery or "engineering" groups for many years. For these, we used a set of indexes at the 2-digit SITC level calculated for us by the Board of Trade from detailed price data using OECD weights we supplied. For later years, we could not obtain these series and were obliged to use a similar set of 2-digit indexes calculated by the Department of Trade and Industry, based on U.K. export weights. For more recent periods, beginning in the 1970s, fairly detailed price indexes for machinery have been published in annual price articles such as "Wholesale Price Indices in 1981," in *British Business* (7 May 1982) and "Wholesale Prices in 1982," in *British Business* (6 May 1983).

The German domestic price indexes are individual series published in Statistisches Bundesamt, *Preise, Löhne, Wirtschaftsrechnungen*, Reihe 3, Preise und Preisindizes für industrielle Produkte, Index der Erzeugerpreise, and Reihe 8, Index der Grosshandelsverkaufspreise for earlier years; and in *Preise*, Reihe 2, Preise und Preisindizes für gewerbliche Produkte (Erzeugerpreise), and Reihe 6 for later years. The Japanese domestic price indexes are also individual series from the *Price Indexes Annual* and the *Wholesale Price Indexes Annual*, published by the Bank of Japan.

Swedish domestic producers price indexes are from the source listed above for export price indexes, but many more detailed indexes are available for domestic prices.

French prices through 1977 for a large number of products were kindly supplied on tape by Dr. Liliane Crouhy-Veyrac of the Department Economie,

Centre d'Enseignement Supérior des Affaires. These data were the basis for Crouhy-Veyrac, Crouhy, and Mélitz (1980). These data were supplemented by information from the *Bulletin Mensuel de Statistique de la France*, and the *Annuaire Statistique de la France*, all published by the Institut National de la Statistique et des Études Économiques (INSEE).

The other main set of data are the hedonic price indexes substituted for conventional price series in our calculation of the quality-adjusted price index. These indexes are originally from a number of sources, but most of them were collected in Gordon (1990). The exceptions are the price indexes for computers, from Cartwright (1986) and Cartwright and Smith (1988), and those for semiconductors, from Norsworthy and Jang (1990).

Appendix B

Indexes Based on Weights of OECD Exports to the World or to Developing Countries

Table 5B.1   **Price Indexes For Manufactured Exports by Developed Countries: All Manufactures (SITC 5–8) and SITC Divisions, U.S. Dollars, 1963 Weights (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	47.8	57.0	47.6	45.8	49.5
1954	47.4	57.4	46.5	45.7	49.1
1955	48.2	56.2	48.1	46.3	49.2
1956	49.5	55.5	50.1	47.9	49.8
1957	50.7	56.2	50.8	49.5	50.3
1958	50.3	55.8	48.7	50.0	50.4
1959	50.1	54.6	49.1	50.0	50.2
1960	50.3	54.4	49.5	50.0	50.7
1961	50.8	54.6	49.4	50.9	51.7
1962	50.4	53.0	48.3	51.0	52.3
1963	50.6	52.7	48.4	51.3	52.8
1964	51.4	52.4	50.0	51.9	53.6
1965	52.3	52.5	50.8	52.9	54.5
1966	53.4	52.7	52.2	54.1	56.0
1967	53.5	52.5	51.7	54.7	56.9
1968	53.0	50.9	51.6	54.1	56.8
1969	54.6	50.6	53.6	55.7	58.4
1970	58.0	52.7	57.3	59.6	61.4
1971	61.4	54.8	59.2	64.4	65.0
1972	66.7	58.3	64.6	70.0	71.3
1973	76.0	65.2	77.0	77.9	81.0
1974	89.6	86.3	94.4	87.2	90.9
1975	100.0	100.0	100.0	100.0	100.0
1976	102.3	100.2	103.9	102.3	101.3
1977	110.7	106.3	111.3	111.8	110.3
1978	125.7	117.6	124.9	128.7	126.6
1979	143.8	142.0	144.0	145.3	141.3
1980	161.5	165.2	161.8	162.3	157.9
1981	155.4	158.7	154.0	156.6	153.0
1982	151.4	152.9	146.8	155.2	148.6
1983	142.3	146.3	140.9	152.4	146.5
1984	142.4	141.6	136.8	147.0	141.4
1985	143.3	142.6	136.0	148.8	143.1
1986	171.6	166.4	159.5	180.1	178.6
1987	194.9	186.8	181.3	204.8	203.4
1988	212.6	207.0	205.8	218.1	216.6

Table 5B.2   **Price Indexes For Manufactured Exports by Developed Countries:
All Manufactures (SITC 5–8) and SITC Divisions, U.S. Dollars, 1975
Weights (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	49.4	58.9	46.8	49.5	49.2
1954	48.9	59.2	45.5	49.1	48.8
1955	49.3	57.6	46.9	49.4	48.8
1956	50.6	56.7	49.3	51.0	49.2
1957	51.8	57.1	50.1	52.8	49.7
1958	51.1	56.3	47.9	52.8	49.7
1959	50.8	54.9	48.1	52.4	49.5
1960	50.8	54.6	48.4	52.2	50.0
1961	51.2	54.6	48.4	52.8	51.1
1962	50.7	52.5	47.2	52.6	51.7
1963	50.6	52.0	47.1	52.5	52.1
1964	51.2	51.6	48.5	53.0	52.9
1965	51.9	51.6	49.1	53.8	53.9
1966	52.9	51.5	50.1	55.0	55.4
1967	53.1	51.2	49.8	55.6	56.3
1968	52.8	49.6	49.6	55.5	56.1
1969	54.2	49.2	51.6	57.1	57.7
1970	57.6	51.1	55.7	60.6	60.7
1971	61.0	53.1	57.6	65.2	64.4
1972	66.4	56.9	63.1	70.9	71.0
1973	76.2	64.9	76.1	79.2	81.1
1974	90.0	87.9	94.6	88.5	90.7
1975	100.0	100.0	100.0	100.0	100.0
1976	102.4	99.7	103.2	102.7	101.2
1977	110.3	105.3	110.4	111.1	110.4
1978	125.9	117.0	126.2	127.7	127.0
1979	142.7	142.9	144.6	141.3	141.8
1980	158.5	164.7	161.6	155.3	158.3
1981	152.5	155.4	152.7	151.6	150.4
1982	148.3	148.2	145.8	149.4	145.3
1983	144.6	141.7	139.2	147.7	142.2
1984	139.8	136.2	134.7	143.1	136.5
1985	140.4	136.6	133.8	144.4	138.0
1986	170.4	161.5	160.0	176.3	174.1
1987	193.1	183.6	181.4	199.3	199.1
1988	209.1	202.6	204.3	211.7	211.4

Table 5B.3   **Price Indexes For Manufactured Exports by Developed Countries: All Manufactures (SITC 5–8) and SITC Divisions, U.S. Dollars, 1963 Weights (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	50.6	57.9	50.1	48.1	55.6
1954	50.3	58.5	48.9	48.0	55.3
1955	50.9	57.3	50.2	48.6	55.4
1956	52.5	56.5	52.8	50.7	56.1
1957	54.0	57.6	53.7	52.7	56.6
1958	53.7	57.4	51.3	53.2	56.4
1959	53.6	56.2	51.7	53.4	56.2
1960	53.6	56.1	52.1	53.3	56.7
1961	53.9	56.2	51.9	54.0	57.3
1962	53.4	55.1	50.6	53.9	57.8
1963	53.4	54.9	50.6	54.1	58.1
1964	54.1	54.7	51.9	54.7	58.6
1965	54.9	55.2	52.5	55.6	59.5
1966	56.0	55.4	53.6	56.9	61.1
1967	56.2	55.3	53.3	57.6	61.9
1968	55.7	53.7	53.0	56.9	61.7
1969	57.1	53.4	54.9	58.5	63.4
1970	60.0	55.1	58.0	62.0	65.7
1971	63.3	57.3	60.0	66.4	68.5
1972	68.3	60.7	65.7	71.5	74.5
1973	76.2	67.0	77.1	78.0	82.5
1974	89.3	85.2	94.3	87.5	91.4
1975	100.0	100.0	100.0	100.0	100.0
1976	102.3	100.4	103.7	102.6	101.7
1977	110.8	106.8	111.8	111.8	110.2
1978	126.4	119.5	127.2	128.5	125.9
1979	143.0	141.5	143.5	144.3	140.1
1980	161.1	164.3	161.6	162.2	157.6
1981	159.7	162.3	158.7	161.1	157.5
1982	156.0	157.6	151.3	160.2	152.1
1983	152.4	151.6	145.7	158.1	150.3
1984	148.7	147.1	143.0	154.0	146.5
1985	150.4	149.4	142.8	156.4	149.3
1986	176.6	173.2	166.2	184.1	182.5
1987	196.8	191.9	184.9	205.4	204.8
1988	213.8	211.4	206.9	219.1	218.1

Table 5B.4 **Price Indexes For Manufactured Exports by Developed Countries to Developing Countries: All Manufactures (SITC 5–8) and SITC Divisions, U.S. Dollars, 1975 Weights (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	51.9	58.7	49.6	50.1	53.4
1954	51.3	59.1	47.6	49.9	52.9
1955	51.4	57.4	48.9	50.1	52.8
1956	53.5	56.2	53.5	52.1	53.1
1957	55.2	56.6	54.8	54.2	53.2
1958	53.8	55.3	50.4	54.1	53.0
1959	53.5	53.9	51.2	53.9	53.2
1960	53.5	53.8	51.3	53.7	53.8
1961	53.5	53.7	50.9	54.1	54.5
1962	52.7	51.8	49.2	53.8	54.9
1963	52.5	51.2	49.1	53.8	55.3
1964	53.0	51.3	50.0	54.1	55.9
1965	53.5	51.4	50.2	54.9	56.6
1966	54.3	51.2	50.9	56.1	57.8
1967	54.6	51.0	51.1	56.8	58.8
1968	54.9	50.1	51.2	57.5	59.8
1969	56.3	49.6	53.2	59.1	61.5
1970	59.0	50.7	56.7	62.3	63.9
1971	61.6	51.9	58.2	66.1	66.5
1972	66.8	55.2	63.9	71.6	72.7
1973	77.1	63.6	77.7	80.1	83.0
1974	91.4	85.5	97.9	89.4	92.9
1975	100.0	100.0	100.0	100.0	100.0
1976	103.2	100.3	105.0	103.8	102.7
1977	110.5	104.9	111.7	112.0	110.6
1978	127.2	115.8	130.6	127.8	126.9
1979	139.7	137.7	144.7	139.8	135.7
1980	151.8	156.4	159.0	151.3	147.0
1981	152.9	154.9	158.7	151.3	148.6
1982	149.0	148.4	151.8	149.2	144.0
1983	145.8	143.9	144.2	148.0	142.8
1984	142.5	140.0	141.9	144.4	139.5
1985	143.4	140.2	141.0	146.2	141.4
1986	169.9	159.8	160.9	176.9	173.0
1987	190.4	180.5	178.5	198.9	192.9
1988	208.9	199.9	207.4	212.8	205.2

Table 5B.5 **Price Indexes For Manufactured Exports by Germany, U.S. Dollars, 1963 Weights of OECD Exports to World (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	36.2	43.9	37.7	34.7	32.5
1954	35.4	43.4	36.6	33.9	32.1
1955	36.0	42.4	38.3	34.4	32.3
1956	36.4	41.6	38.8	34.9	32.6
1957	37.0	41.8	39.3	35.5	33.3
1958	37.1	42.4	38.9	35.7	33.5
1959	36.5	41.7	38.6	35.0	33.1
1960	36.7	41.0	39.3	35.1	33.5
1961	38.6	42.6	40.9	37.2	35.9
1962	39.3	42.1	41.0	38.3	37.3
1963	39.6	42.7	41.2	38.6	37.8
1964	40.2	42.3	42.7	38.8	38.6
1965	41.3	42.3	43.8	40.0	39.9
1966	42.1	42.5	44.7	40.9	41.2
1967	41.9	42.3	43.5	41.1	41.8
1968	41.6	41.1	43.3	40.9	41.7
1969	43.4	41.1	45.1	43.3	43.5
1970	49.1	45.7	51.2	49.0	48.8
1971	53.6	48.9	53.7	55.1	54.2
1972	60.2	53.8	59.5	62.4	62.5
1973	76.9	68.2	78.4	78.3	79.1
1974	90.8	92.4	96.1	87.6	89.0
1975	100.0	100.0	100.0	100.0	100.0
1976	101.3	98.6	101.8	101.8	101.0
1977	111.8	107.6	109.3	114.6	112.6
1978	130.7	123.5	127.0	135.0	132.7
1979	152.3	142.9	150.0	157.0	150.0
1980	164.0	158.0	162.6	166.9	162.8
1981	138.4	136.1	136.1	141.2	136.6
1982	134.8	129.2	132.8	138.2	132.9
1983	130.4	123.1	126.9	134.9	129.7
1984	120.8	114.2	118.7	124.4	119.1
1985	120.1	114.2	117.4	124.0	118.1
1986	162.0	151.1	151.0	172.5	163.7
1987	195.7	177.6	177.6	213.1	201.2
1988	207.7	185.4	195.2	222.2	209.5

Table 5B.6   **Price Indexes For Manufactured Exports by Germany, U.S. Dollars, 1975 Weights of OECD Exports to the World (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	36.7	46.0	37.1	35.6	33.4
1954	35.9	45.4	36.0	34.8	33.0
1955	36.4	44.4	37.4	35.3	33.0
1956	36.8	43.5	37.9	35.8	33.2
1957	37.3	43.6	38.5	36.3	34.0
1958	37.4	44.0	38.4	36.5	34.1
1959	36.8	43.2	38.0	35.7	33.7
1960	36.9	42.4	38.5	35.7	34.1
1961	38.7	43.8	40.0	37.7	36.4
1962	39.5	43.2	40.3	38.8	37.7
1963	39.7	43.5	40.4	39.0	38.2
1964	40.1	42.9	41.6	39.1	39.0
1965	41.0	42.8	42.5	40.3	40.3
1966	41.7	42.8	43.1	41.1	41.6
1967	41.6	42.6	42.0	41.3	42.1
1968	41.3	41.3	41.8	41.1	42.0
1969	43.1	41.1	43.7	43.3	43.8
1970	48.7	45.8	50.0	49.1	49.1
1971	53.5	48.8	52.7	55.3	54.5
1972	59.9	53.5	58.1	62.4	62.8
1973	76.2	67.8	76.5	78.2	79.4
1974	90.3	93.2	95.0	87.6	89.4
1975	100.0	100.0	100.0	100.0	100.0
1976	100.7	98.3	100.3	101.5	100.9
1977	110.9	106.7	106.7	113.8	112.5
1978	129.9	122.0	125.4	133.9	132.2
1979	151.4	142.4	147.5	156.3	149.2
1980	162.6	156.8	159.3	166.1	161.3
1981	137.4	134.2	134.4	140.4	135.0
1982	134.0	127.2	132.4	137.3	130.9
1983	129.4	121.2	125.6	134.0	127.5
1984	119.8	112.6	117.3	123.7	117.1
1985	119.2	112.4	116.3	123.3	116.3
1986	161.1	146.8	150.2	170.9	161.0
1987	194.1	172.8	175.5	209.9	197.3
1988	204.8	180.7	191.6	218.3	205.2

Table 5B.7   **Price Indexes For Manufactured Exports by Germany, U.S. Dollars, 1963 Weights of OECD Exports to Developing Countries (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	35.2	40.6	36.8	33.6	32.6
1954	34.4	40.3	35.7	32.8	32.2
1955	34.9	39.4	37.1	33.2	32.4
1956	35.4	38.6	37.5	33.9	32.9
1957	36.1	39.4	38.3	34.5	33.8
1958	36.4	40.7	38.3	34.8	33.9
1959	35.9	40.0	37.8	34.4	33.5
1960	36.1	39.3	38.5	34.6	33.9
1961	38.1	41.1	40.2	36.7	36.3
1962	38.9	41.3	40.6	37.7	37.7
1963	39.3	42.3	40.7	38.0	38.1
1964	39.7	42.1	41.7	38.3	38.8
1965	40.8	42.3	42.6	39.6	40.1
1966	41.5	42.6	43.3	40.4	41.4
1967	41.4	42.7	42.3	40.6	41.9
1968	41.0	41.7	41.9	40.4	41.8
1969	42.8	41.7	43.4	42.7	43.6
1970	48.5	46.4	49.5	48.6	49.1
1971	53.3	50.0	52.7	54.6	54.4
1972	60.0	55.5	58.5	61.9	62.8
1973	76.4	70.3	76.3	78.0	79.3
1974	89.7	90.7	93.3	87.4	89.0
1975	100.0	100.0	100.0	100.0	100.0
1976	100.8	98.7	100.0	101.9	101.0
1977	111.7	108.0	107.7	115.1	112.5
1978	130.9	124.9	125.7	135.8	132.5
1979	151.6	142.2	145.7	158.6	150.0
1980	162.5	155.7	155.9	168.9	163.1
1981	137.8	135.1	131.9	142.7	136.8
1982	134.6	128.1	130.3	139.8	133.1
1983	129.6	121.2	122.9	136.6	129.8
1984	119.9	111.3	114.5	126.0	119.7
1985	119.3	111.5	113.5	125.5	119.2
1986	162.2	148.6	148.1	174.8	165.3
1987	195.9	174.3	173.6	216.2	203.0
1988	206.3	181.6	187.1	225.7	211.1

Table 5B.8   **Price Indexes For Manufactured Exports by Germany, U.S. Dollars, 1963 Weights of OECD Exports to Developing Countries (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	35.7	44.0	36.3	34.3	32.5
1954	34.9	43.7	35.2	33.5	32.2
1955	35.4	42.8	36.5	34.0	32.4
1956	35.9	42.0	37.1	34.6	32.6
1957	36.5	42.3	37.9	35.2	33.2
1958	36.9	43.2	38.1	35.6	33.3
1959	36.3	42.5	37.6	35.0	32.9
1960	36.5	41.9	38.0	35.2	33.3
1961	38.4	43.5	39.5	37.2	35.7
1962	39.1	43.1	40.1	38.2	37.2
1963	39.4	43.7	40.1	38.4	37.7
1964	39.7	43.3	40.8	38.8	38.4
1965	40.7	43.3	41.6	39.9	39.8
1966	41.3	43.3	42.0	40.8	41.0
1967	41.2	43.2	40.8	41.0	41.6
1968	40.7	41.9	40.5	40.7	41.5
1969	42.6	41.8	42.5	43.0	43.2
1970	48.5	46.6	49.0	49.0	48.7
1971	53.3	50.1	51.9	54.9	54.2
1972	59.7	55.3	57.3	62.0	62.4
1973	75.9	69.5	75.4	77.8	78.9
1974	89.6	92.0	93.7	87.4	89.3
1975	100.0	100.0	100.0	100.0	100.0
1976	100.7	99.0	99.4	101.6	100.7
1977	111.1	108.0	104.7	114.6	111.8
1978	130.5	124.6	124.2	134.5	131.6
1979	153.0	143.2	144.2	159.7	148.9
1980	163.7	157.7	153.2	169.9	162.0
1981	138.6	135.8	130.2	143.6	134.6
1982	136.1	129.0	131.6	140.2	131.1
1983	130.3	123.2	120.7	136.6	128.2
1984	120.9	115.1	112.9	126.3	118.2
1985	120.4	114.2	112.9	125.6	117.6
1986	161.7	147.0	143.0	174.8	163.6
1987	195.0	173.3	164.9	216.2	200.9
1988	207.9	180.8	184.7	226.3	209.4

Table 5B.9   **Price Indexes For Manufactured Exports by Japan, U.S. Dollars, 1963 Weights of OECD Exports to the World (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	61.0	61.5	54.9	68.4	56.6
1954	58.6	61.5	50.7	66.9	55.1
1955	57.5	57.8	51.2	64.7	54.3
1956	60.3	57.3	56.9	67.1	53.9
1957	61.4	56.5	56.8	69.9	53.6
1958	56.6	52.5	49.2	66.2	52.9
1959	56.6	50.4	50.8	64.8	54.3
1960	56.4	50.3	50.9	63.7	56.1
1961	55.3	48.3	50.2	62.5	55.5
1962	54.0	45.7	48.2	61.7	56.0
1963	53.6	44.8	48.6	60.5	56.9
1964	54.2	45.9	49.5	60.4	58.0
1965	54.2	45.7	49.3	60.7	57.9
1966	54.2	43.4	49.9	61.1	57.4
1967	54.6	42.4	50.8	61.4	57.8
1968	55.2	42.8	51.4	62.1	58.6
1969	56.5	43.4	53.6	62.9	59.9
1970	58.1	43.0	56.1	64.3	62.2
1971	59.7	43.5	56.7	66.8	65.0
1972	65.7	47.0	63.4	73.1	72.3
1973	80.7	60.8	83.6	84.3	86.7
1974	99.0	92.3	106.3	96.5	97.6
1975	100.0	100.0	100.0	100.0	100.0
1976	103.2	100.8	107.1	101.1	102.9
1977	111.8	105.3	116.1	110.0	113.2
1978	135.8	120.0	142.1	135.1	138.0
1979	141.9	145.2	153.8	133.6	136.5
1980	151.3	167.1	171.3	136.0	141.2
1981	157.2	169.8	172.3	145.1	147.3
1982	143.8	149.8	156.3	134.8	134.6
1983	145.9	150.8	157.7	137.2	137.2
1984	146.6	148.7	159.4	137.8	138.8
1985	144.4	146.5	155.9	136.0	138.6
1986	181.2	178.3	189.9	173.1	184.4
1987	201.9	200.0	213.1	192.0	204.0
1988	226.9	230.0	249.1	210.2	220.7

Table 5B.10   **Price Indexes For Manufactured Exports by Japan, U.S. Dollars, 1975 Weights of OECD Exports to the World (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	62.3	63.7	55.3	69.2	56.7
1954	60.1	63.8	51.0	67.6	55.1
1955	58.8	59.6	51.8	65.5	54.3
1956	61.7	58.9	58.3	67.7	53.9
1957	62.8	58.1	58.6	70.3	53.6
1958	58.1	53.8	50.4	66.3	52.9
1959	57.9	51.6	52.1	65.0	54.4
1960	57.6	51.4	52.3	63.9	56.2
1961	56.3	49.0	51.4	62.5	55.5
1962	54.9	45.9	49.1	61.6	56.0
1963	54.1	44.6	49.0	60.2	56.8
1964	54.5	45.7	49.9	59.9	58.0
1965	54.5	45.3	49.7	60.2	58.0
1966	54.4	42.8	50.0	60.6	57.5
1967	54.7	42.0	51.1	60.8	57.8
1968	55.2	41.9	51.4	61.6	58.6
1969	56.3	42.3	53.4	62.4	60.2
1970	58.0	41.8	56.2	63.9	62.8
1971	59.9	42.2	57.1	66.7	65.7
1972	65.8	45.6	63.4	73.1	72.7
1973	80.2	60.2	82.7	84.1	87.6
1974	98.9	92.8	107.6	96.3	98.3
1975	100.0	100.0	100.0	100.0	100.0
1976	102.6	101.6	106.2	101.0	102.5
1977	110.6	105.4	114.6	109.4	112.5
1978	134.4	118.5	141.2	134.4	136.6
1979	140.3	147.5	153.2	132.3	135.1
1980	149.0	169.6	170.0	134.9	140.1
1981	155.8	171.8	172.9	144.4	146.0
1982	142.7	151.7	156.8	134.3	133.6
1983	144.1	152.3	156.8	136.4	135.7
1984	144.6	150.0	158.5	136.8	136.8
1985	142.4	147.2	155.1	135.1	136.3
1986	177.2	173.8	186.2	171.3	178.8
1987	197.3	198.3	207.6	189.9	197.0
1988	221.0	227.7	243.4	207.8	212.4

Table 5B.11   **Price Indexes For Manufactured Exports by Japan, U.S. Dollars, 1963 Weights of OECD Exports to Developing Countries (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	60.7	62.8	55.1	65.8	56.8
1954	58.5	61.9	51.1	64.3	55.2
1955	57.3	58.5	51.6	62.4	54.5
1956	60.2	58.0	56.9	65.1	54.4
1957	61.6	57.5	57.3	68.3	54.2
1958	57.3	53.9	50.1	65.0	53.2
1959	57.1	51.8	51.6	63.7	54.7
1960	56.9	51.6	51.8	62.9	56.3
1961	55.9	49.7	51.1	61.9	55.6
1962	54.7	47.7	49.0	61.2	56.3
1963	54.3	46.9	49.2	60.2	57.2
1964	54.8	48.1	50.0	60.1	58.5
1965	54.9	48.3	49.7	60.4	58.4
1966	54.7	46.1	49.8	60.8	57.7
1967	55.0	45.1	50.8	61.1	58.1
1968	55.5	45.3	51.2	61.8	58.8
1969	56.7	45.8	53.2	62.6	60.2
1970	58.2	45.3	55.6	63.9	62.6
1971	60.0	46.2	56.7	66.3	65.3
1972	66.0	50.2	63.5	72.5	72.6
1973	80.5	63.3	82.8	84.1	87.2
1974	98.0	91.0	104.7	96.4	97.5
1975	100.0	100.0	100.0	100.0	100.0
1976	102.8	99.9	106.4	101.3	103.1
1977	111.2	105.6	114.6	110.3	113.5
1978	135.7	124.3	140.4	135.5	138.8
1979	140.2	142.1	150.1	134.0	136.3
1980	148.9	160.5	165.8	136.7	141.9
1981	156.0	165.3	169.6	146.2	147.2
1982	142.9	145.1	155.2	135.7	134.2
1983	146.6	146.0	155.5	138.1	137.3
1984	145.0	144.3	157.4	138.3	138.7
1985	143.4	142.8	154.7	137.0	138.7
1986	181.3	180.1	188.6	175.4	184.6
1987	201.1	200.6	208.7	194.5	205.5
1988	225.8	227.9	243.2	213.9	224.0

Table 5B.12   **Price Indexes For Manufactured Exports by Japan, U.S. Dollars, 1975 Weights of OECD Exports to Developing Countries (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	60.4	63.2	54.7	64.5	56.3
1954	58.4	62.6	50.4	63.2	55.0
1955	57.4	59.3	51.5	61.5	54.5
1956	61.0	58.8	59.1	64.4	54.3
1957	62.9	57.9	60.1	67.9	54.0
1958	58.2	53.7	51.0	64.6	53.2
1959	57.8	51.5	52.7	63.3	54.5
1960	57.6	51.2	52.8	62.7	56.0
1961	56.4	48.8	51.8	61.7	55.9
1962	54.9	46.0	49.0	60.9	56.4
1963	54.2	44.8	49.0	59.8	57.1
1964	54.6	46.4	49.8	59.7	58.0
1965	54.7	46.4	49.5	60.0	58.1
1966	54.5	43.9	49.7	60.4	57.6
1967	54.8	42.8	50.8	60.7	57.9
1968	55.1	42.6	50.7	61.5	58.4
1969	56.2	42.8	52.7	62.3	59.9
1970	57.7	42.2	55.5	63.6	62.5
1971	59.4	42.4	56.5	66.1	65.1
1972	65.3	45.7	62.9	72.5	72.4
1973	79.4	59.3	81.5	84.2	86.4
1974	97.8	89.4	107.5	96.2	97.5
1975	100.0	100.0	100.0	100.0	100.0
1976	102.3	98.9	106.4	101.3	102.2
1977	110.3	102.3	114.5	110.1	111.8
1978	134.5	117.6	142.0	135.1	136.2
1979	139.1	141.0	153.2	132.5	133.9
1980	146.8	160.7	168.0	135.1	138.0
1981	155.0	164.8	174.1	145.2	142.6
1982	142.9	148.0	160.3	134.9	131.5
1983	143.9	149.0	156.3	137.9	134.2
1984	144.6	147.2	159.2	138.1	134.9
1985	142.3	143.4	155.8	136.5	135.0
1986	173.6	163.2	177.2	174.3	172.7
1987	192.6	187.0	193.8	193.6	186.2
1988	219.5	216.6	235.9	213.6	200.0

Table 5B.13   **Price Indexes For Manufactured Exports by the United States, U.S. Dollars, 1963 Weights of OECD Exports to the World (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	51.5	61.4	47.0	51.3	57.7
1954	52.0	62.9	47.1	52.0	57.7
1955	53.3	62.1	49.5	53.1	58.1
1956	55.6	60.8	51.9	56.1	59.8
1957	57.8	62.5	53.8	58.9	60.8
1958	58.2	61.7	53.6	60.2	61.6
1959	59.1	60.9	54.7	61.3	61.7
1960	59.4	61.6	55.2	61.4	62.2
1961	59.1	61.8	54.7	61.1	62.2
1962	58.9	60.3	54.7	61.0	62.4
1963	59.0	59.5	54.7	61.4	62.6
1964	59.3	58.7	55.5	61.9	62.5
1965	60.1	59.1	56.5	62.5	63.1
1966	61.1	59.5	57.7	63.5	65.0
1967	62.4	60.1	57.9	65.5	67.5
1968	63.9	59.3	59.7	67.2	70.7
1969	65.7	58.5	62.2	69.0	73.3
1970	68.1	59.9	64.9	71.7	74.7
1971	70.5	60.3	66.8	75.3	76.0
1972	72.4	60.5	69.7	77.2	77.4
1973	76.0	62.3	75.6	79.4	81.2
1974	89.2	79.7	92.5	88.9	92.9
1975	100.0	100.0	100.0	100.0	100.0
1976	105.4	104.4	106.0	105.6	104.3
1977	111.8	108.6	113.5	111.9	110.3
1978	119.5	111.8	121.8	120.9	116.2
1979	132.3	132.5	136.2	130.6	127.9
1980	146.8	152.3	149.5	144.3	142.6
1981	161.7	166.3	164.9	158.1	162.2
1982	168.5	173.1	165.2	168.9	170.3
1983	171.2	172.4	164.7	173.7	176.3
1984	176.2	177.4	170.3	178.6	179.6
1985	177.6	177.4	168.0	182.4	183.8
1986	179.3	177.2	167.4	185.6	188.3
1987	185.3	185.8	175.7	189.5	191.7
1988	197.5	209.9	193.7	195.2	199.4

Table 5B.14   Price Indexes For Manufactured Exports by the United States, U.S. Dollars, 1975 Weights of OECD Exports to the World (annual averages, 1975 = 100)

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	52.3	65.5	45.9	52.3	58.3
1954	53.0	67.0	46.4	52.9	58.3
1955	54.1	65.9	48.6	54.1	58.5
1956	56.4	64.5	51.0	57.1	60.0
1957	58.8	66.4	53.3	59.9	61.1
1958	59.5	65.2	53.6	61.2	62.0
1959	60.3	64.0	54.6	62.4	62.4
1960	60.5	64.7	54.8	62.5	62.9
1961	60.1	64.6	54.2	62.0	62.9
1962	59.8	63.1	54.1	61.8	62.9
1963	59.8	61.8	54.1	62.0	63.0
1964	60.0	60.4	54.6	62.5	62.9
1965	60.5	60.6	55.4	63.0	63.5
1966	61.5	61.1	56.3	64.1	65.4
1967	62.9	61.7	56.7	66.0	68.1
1968	64.5	60.7	58.6	67.8	71.0
1969	66.2	59.8	60.8	69.7	73.6
1970	68.5	61.0	63.6	72.3	75.0
1971	71.1	61.3	66.0	76.0	76.3
1972	72.7	61.2	68.7	77.6	77.6
1973	75.6	62.7	73.3	79.6	81.2
1974	88.6	79.7	90.5	89.2	92.9
1975	100.0	100.0	100.0	100.0	100.0
1976	105.3	104.6	105.7	105.4	104.4
1977	111.4	108.5	113.1	111.4	110.2
1978	119.2	111.5	122.3	120.2	116.0
1979	131.6	133.9	136.4	129.3	127.1
1980	145.8	152.8	149.8	142.8	141.5
1981	160.7	166.9	166.0	156.5	159.3
1982	168.3	172.9	168.3	162.0	167.4
1983	170.8	172.4	167.0	171.8	172.4
1984	175.4	176.2	172.4	176.5	175.2
1985	176.8	174.9	169.9	180.2	178.5
1986	178.6	174.1	168.5	183.2	183.4
1987	183.9	184.5	176.0	186.9	186.5
1988	195.1	208.3	193.2	192.3	193.4

Table 5B.15   **Price Indexes For Manufactured Exports by the United States, U.S. Dollars, 1963 Weights of OECD Exports to Developing Countries (annual averages, 1975 = 100)**

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	51.2	61.6	47.6	49.8	59.2
1954	51.8	63.3	47.9	50.2	59.3
1955	53.0	62.4	50.1	51.4	59.8
1956	55.2	60.8	52.6	54.5	61.4
1957	57.6	62.9	54.5	57.5	62.4
1958	58.4	62.7	54.7	58.9	62.9
1959	59.2	62.1	55.8	60.0	63.0
1960	59.4	62.8	56.3	59.9	63.5
1961	59.2	63.0	55.7	59.7	63.5
1962	59.0	61.9	55.7	59.5	63.6
1963	59.0	61.1	55.6	59.9	63.5
1964	59.3	60.4	56.2	60.3	63.4
1965	60.0	61.0	57.1	60.9	64.0
1966	61.0	61.7	58.0	62.2	65.8
1967	62.3	62.3	58.2	64.1	68.3
1968	63.8	61.8	60.1	65.8	71.2
1969	65.4	61.0	62.1	67.6	73.9
1970	67.8	62.2	64.4	70.6	75.1
1971	70.4	62.9	66.7	74.2	76.4
1972	72.3	63.1	69.8	76.1	77.9
1973	75.6	64.8	74.9	78.5	81.9
1974	88.6	80.3	92.1	88.3	92.9
1975	100.0	100.0	100.0	100.0	100.0
1976	105.5	104.4	105.7	105.9	104.6
1977	112.1	108.9	113.4	112.7	110.5
1978	120.1	113.8	121.7	121.8	116.0
1979	132.5	131.3	134.7	132.3	127.7
1980	147.5	149.3	149.4	146.6	143.3
1981	162.8	164.8	164.5	160.9	164.8
1982	170.6	173.2	167.3	171.8	171.6
1983	173.0	173.7	165.8	176.5	177.0
1984	177.7	178.1	171.3	181.1	180.2
1985	179.7	180.9	169.5	184.7	184.6
1986	181.2	181.3	168.4	187.8	189.4
1987	185.8	187.3	174.4	191.0	193.1
1988	196.6	206.4	189.8	196.9	201.1

Table 5B.16   Price Indexes For Manufactured Exports by the United States, U.S. Dollars, 1975 Weights of OECD Exports to Developing Countries (annual averages, 1975 = 100)

Year	All Manufactures	SITC 5	SITC 6	SITC 7	SITC 8
1953	50.7	62.7	44.7	50.7	57.1
1954	51.4	64.2	45.6	51.2	57.2
1955	52.5	63.4	47.7	52.3	57.7
1956	54.9	61.6	50.3	55.4	59.2
1957	57.4	63.4	52.9	58.3	60.3
1958	58.3	62.8	53.5	59.7	61.1
1959	59.1	62.0	54.4	60.9	61.2
1960	59.3	62.8	54.6	60.8	61.7
1961	58.9	62.8	54.0	60.5	61.7
1962	58.5	61.5	53.8	60.1	61.8
1963	58.5	60.3	53.8	60.4	61.8
1964	58.8	59.3	54.2	60.8	61.6
1965	59.4	59.7	54.8	61.5	62.2
1966	60.4	60.3	55.5	62.7	64.0
1967	61.8	61.0	55.9	64.6	66.9
1968	63.3	60.1	57.5	66.5	70.1
1969	64.9	58.9	59.7	68.5	73.0
1970	67.3	59.9	62.3	71.1	74.0
1971	70.0	60.4	65.1	74.5	75.1
1972	71.7	60.3	68.0	76.1	76.3
1973	74.6	62.0	72.2	78.7	80.1
1974	87.6	78.8	89.1	88.8	92.2
1975	100.0	100.0	100.0	100.0	100.0
1976	105.3	103.1	105.7	105.8	104.0
1977	111.7	107.3	113.3	112.4	109.4
1978	119.9	111.3	122.9	121.1	115.1
1979	132.0	130.4	135.7	131.2	127.0
1980	146.6	148.6	149.4	145.3	141.8
1981	162.0	163.4	165.3	159.7	164.4
1982	168.2	169.1	169.6	170.4	173.4
1983	169.3	168.3	163.5	175.3	179.5
1984	173.9	170.5	168.4	180.4	183.1
1985	176.0	171.8	166.4	184.8	186.9
1986	177.4	174.1	162.4	188.5	193.3
1987	182.4	185.2	168.7	192.2	197.8
1988	195.0	206.3	186.3	199.3	206.3

Table 5B.17   **Price Indexes For Manufactured Exports by the United States, with Quality Corrections for SITC 7 Using Hedonic Price Indexes, U.S. Dollars, 1963 and 1975 Weights of OECD Exports to the World (annual averages, 1975 = 100)**

Year	1963 Weights		1975 Weights	
	All Manufactures	SITC 7	All Manufactures	SITC 7
1953	59.5	71.1	59.9	68.5
1954	59.6	70.7	60.1	68.2
1955	60.8	71.3	61.2	69.2
1956	62.7	73.8	63.1	71.7
1957	64.7	76.1	65.3	74.0
1958	64.0	74.6	64.7	72.7
1959	64.0	73.8	64.8	72.3
1960	63.7	72.2	64.4	71.1
1961	63.2	71.3	63.9	70.3
1962	63.0	71.2	63.6	70.2
1963	62.7	70.7	63.2	69.6
1964	62.7	70.3	63.0	69.3
1965	62.8	69.2	63.0	68.6
1966	63.3	68.8	63.5	68.5
1967	64.1	69.6	64.5	69.5
1968	65.3	70.5	65.8	70.7
1969	66.8	71.6	67.1	71.8
1970	69.3	74.5	69.6	74.7
1971	71.2	77.1	71.8	77.7
1972	72.9	78.5	73.3	78.8
1973	76.3	80.2	75.8	80.2
1974	88.7	87.7	87.9	87.9
1975	100.0	100.0	100.0	100.0
1976	105.4	105.5	105.3	105.5
1977	110.9	109.7	110.3	109.3
1978	117.9	117.2	117.6	116.9
1979	128.7	122.7	128.0	122.2
1980	144.3	138.8	143.0	137.2
1981	158.8	151.6	157.3	149.8
1982	165.5	162.1	165.0	160.4
1983	166.9	164.2	166.6	163.1
1984	171.5	168.3	170.7	167.0
1985	172.5	171.0	171.8	170.2
1986	174.2	174.2	173.5	173.3
1987	179.4	176.9	178.5	176.3
1988	190.9	181.3	189.2	180.8

Table 5B.18   **Price Indexes For Manufactured Exports by the United States, with Quality Corrections for SITC 7 Using Hedonic Price Indexes, U.S. Dollars, 1963 and 1975 Weights of OECD Exports to Developing Countries (annual averages, 1975 = 100)**

Year	1963 Weights		1975 Weights	
	All Manufactures	SITC 7	All Manufactures	SITC 7
1953	58.0	64.5	57.6	64.8
1954	58.2	64.4	58.2	64.8
1955	59.1	64.7	59.0	65.3
1956	61.0	67.2	61.2	68.2
1957	63.2	70.0	63.6	70.7
1958	63.1	69.4	63.6	70.4
1959	63.2	69.2	63.5	69.9
1960	63.0	67.8	63.0	68.4
1961	62.5	67.2	62.4	67.6
1962	62.4	67.1	62.1	67.4
1963	62.0	66.5	61.6	66.7
1964	62.0	66.4	61.5	66.6
1965	61.7	65.0	61.3	65.7
1966	62.2	64.8	61.8	65.9
1967	63.1	66.0	62.7	66.9
1968	64.4	67.1	64.0	68.2
1969	65.9	68.9	65.4	69.9
1970	68.4	72.1	67.8	72.7
1971	70.6	74.8	70.1	75.3
1972	72.4	76.4	71.6	76.6
1973	75.7	78.9	74.4	78.7
1974	88.2	87.5	87.1	87.8
1975	100.0	100.0	100.0	100.0
1976	105.6	106.0	105.2	105.6
1977	111.4	111.0	110.8	110.6
1978	118.7	118.8	118.4	118.2
1979	129.2	125.5	128.8	125.0
1980	147.2	145.8	145.0	142.1
1981	162.2	159.3	159.8	155.4
1982	170.3	170.8	168.1	166.1
1983	171.6	173.3	168.1	168.9
1984	176.1	177.5	172.4	173.4
1985	177.9	180.8	174.3	177.3
1986	179.6	183.8	175.9	181.2
1987	183.8	186.5	181.2	184.6
1988	194.3	191.8	193.0	191.1

Notes to Tables 5B.17 and 5B.18

The hedonic price indexes for the commodities listed below were substituted for the conventional U.S. export or domestic price series used for the indexes covering SITC 7 and All Manufactures in tables 5B.13 through 5B.16. The hedonic indexes were also inserted in a few cases for which no conventional price indexes had been available, so that the commodity coverage in tables 5B.17 and 5B.18 is slightly higher than in the earlier tables.

SITC Group or Subgroup	Source	Period
711.1	Gordon (1990)	1953–83
711.5	Gordon (1990)	1953–83
712.5*	Gordon (1990)	1953–83
714.2	Cartwright and Smith (1988)	1983–88 (ave. of 3 qtrs.)
	Cartwright (1986)	1970–82
	Gordon (1990)	1953–69
719.1	Gordon (1990)	1953–83
719.4	Gordon (1990)	1953–83
722.1	Gordon (1990)	1953–83
724.9	Gordon (1990)	1953–83
725	Gordon (1990)	1953–83
729.3	Norsworthy and Jang (1990)	1968–86
732.1	Gordon (1990)	1953–83
734	Gordon (1990)	1953–83

*With wheel tractors weighted ⅛ and crawler tractors ⅞ in accordance with U.S. export weights.

Table 5B.19   **Price Indexes For Manufactured Exports by Developed Countries, with Quality Corrections for SITC 7 Using Hedonic Price Indexes, U.S. Dollars, 1975 Weights of OECD Exports to the World (annual averages, 1975 = 100)**

	All Manufactures		SITC 7	
Year	Adjusted for U.S. Only	Adjusted for All Countries	Adjusted for U.S. Only	Adjusted for All Countries
1953	51.0	57.6	53.5	67.2
1954	50.4	56.7	52.8	66.1
1955	50.7	57.0	53.0	66.2
1956	52.0	58.3	54.4	67.7
1957	53.1	59.4	56.0	69.2
1958	52.2	57.7	55.3	66.9
1959	51.7	56.9	54.6	65.4
1960	51.6	56.3	54.1	64.0
1961	52.0	56.5	54.6	64.1
1962	51.4	55.9	54.5	64.0
1963	51.3	55.6	54.3	63.3
1964	51.8	55.9	54.5	63.1
1965	52.4	56.1	55.1	62.7
1966	53.3	56.5	56.0	62.6
1967	53.4	56.4	56.4	62.5
1968	53.1	56.0	56.2	62.3
1969	54.4	57.2	57.5	63.3
1970	57.8	60.6	61.1	66.9
1971	61.1	63.4	65.5	70.5
1972	66.5	68.2	71.2	74.7
1973	76.2	76.8	79.3	80.6
1974	89.8	89.6	88.2	87.7
1975	100.0	100.0	100.0	100.0
1976	102.3	102.8	102.7	103.5
1977	109.9	109.1	110.5	109.1
1978	125.4	122.6	126.8	121.5
1979	141.7	136.5	139.2	129.7
1980	157.7	153.0	153.6	145.0
1981	151.7	150.1	149.7	146.6
1982	147.3	148.1	147.8	149.1
1983	143.4	144.5	145.5	147.6
1984	138.5	139.6	140.9	142.8
1985	139.0	139.9	142.1	143.7
1986	168.5	169.5	173.5	174.9
1987	191.1	192.0	196.1	197.2
1988	207.4	208.0	208.1	208.9

Notes to Table 5B.19

For the indexes labeled "Adjusted for U.S. Only," the U.S. indexes for SITC 7 from table 5B.17 are combined with the indexes for other countries, in the same way as for tables 5B.1 through 5B.4.

For the indexes labeled "Adjusted for All Countries," each U.S. hedonic price index was substituted for the conventional price index for that particular SITC subgroup or group at the 3- or (usually) 4-digit SITC level (or inserted where there was no conventional index) in the index for every country. The individual country indexes for all manufactures and the world indexes were then aggregated, as in earlier tables. To prevent the hedonic adjustment from affecting uncovered groups and subgroups, the substitution was performed by subtracting the unadjusted indexes from the SITC aggregate and adding back the adjusted indexes with the same weights. Where no unadjusted index existed for a group or subgroup, the subtraction was done assuming that the uncovered items had the same price index as SITC 7 as a whole.

Appendix C
Indexes Based on Export Weights of the United States, Germany, and Japan

Table 5C.1   **Price Indexes for Manufactured Exports by the United States and its Competitors, U.S. Dollars, U.S. Export Weights of 1963 (annual averages, 1975 = 100)**

	U.S. Price Indexes		
Year	Export Prices	Domestic Prices	Competitors' Price Index
1953	50.9	48.0	46.3
1954	51.5	48.6	45.8
1955	52.1	50.1	46.2
1956	54.9	52.4	47.2
1957	57.5	54.7	48.1
1958	58.5	55.5	47.8
1959	59.3	56.6	47.4
1960	60.2	57.0	47.5
1961	61.1	57.0	48.5
1962	61.6	57.1	48.1
1963	62.2	57.2	48.3
1964	63.1	57.6	49.1
1965	63.7	58.3	50.0
1966	64.8	60.1	51.2
1967	67.0	61.7	51.2
1968	69.0	63.6	50.2
1969	71.5	65.4	51.6
1970	73.3	68.1	55.3
1971	76.9	70.3	59.2
1972	79.1	72.0	65.5
1973	81.8	74.8	75.7
1974	90.0	87.5	88.8
1975	100.0	100.0	100.0
1976	106.1	105.6	101.6
1977	112.7	112.1	110.7
1978	118.5	119.9	127.8
1979	129.4	133.2	148.5
1980	143.3	148.6	167.8
1981	157.6	164.1	154.0
1982	169.3	169.5	147.3
1983	173.8	173.1	142.1
1984	178.4	177.6	134.4
1985	176.1	179.2	135.3
1986	181.6	179.9	170.3
1987	187.4	184.2	199.2
1988	198.3	194.9	218.8

Table 5C.2   **Price Indexes for Manufactured Exports by Germany and its Competitors, U.S. Dollars, German Export Weights of 1963 (annual averages, 1975 = 100)**

Year	German Price Indexes		Competitors' Price Index
	Export Prices	Domestic Prices	
1953	(36.0)	32.0	52.3
1954	35.1	31.2	52.3
1955	35.3	31.6	52.9
1956	35.9	32.3	54.9
1957	36.5	33.0	56.7
1958	36.3	33.3	56.4
1959	35.9	33.1	56.5
1960	36.4	33.5	56.4
1961	37.9	35.7	56.3
1962	38.4	37.2	55.6
1963	38.4	37.5	55.5
1964	39.3	38.1	56.2
1965	40.3	39.2	57.0
1966	41.1	40.3	58.2
1967	41.1	40.0	58.5
1968	40.7	39.9	57.5
1969	43.5	40.9	59.0
1970	48.6	47.2	61.6
1971	52.9	52.3	64.8
1972	59.1	59.0	69.6
1973	76.2	75.3	75.0
1974	91.3	89.2	88.2
1975	100.0	100.0	100.0
1976	101.1	100.8	102.2
1977	111.0	111.0	110.0
1978	130.3	130.6	124.8
1979	153.1	150.0	143.3
1980	163.4	161.5	164.2
1981	138.6	136.5	164.4
1982	135.4	134.0	161.3
1983	130.8	129.4	158.0
1984	121.4	119.5	154.4
1985	121.3	126.2	156.5
1986	164.4	171.5	180.8
1987	199.1	205.6	200.2
1988	209.9	217.2	219.5

Table 5C.3   **Indexes for Manufactured Exports by Japan and its Competitors,
U.S. Dollars, Japanese Export Weights of 1963 (annual averages,
1975 = 100)**

Year	Japanese Price Indexes		Competitors' Price Index
	Export Prices	Domestic Prices	
1953	63.0	58.1	50.3
1954	59.6	54.9	50.0
1955	58.4	53.5	50.6
1956	61.4	57.4	51.5
1957	60.9	57.9	52.7
1958	55.0	53.8	52.5
1959	56.8	54.3	52.0
1960	57.2	54.6	52.0
1961	54.9	53.8	52.4
1962	53.2	52.8	51.7
1963	53.7	53.1	51.6
1964	54.5	53.3	52.3
1965	54.3	53.2	53.1
1966	53.8	53.4	54.1
1967	54.4	53.8	54.0
1968	55.1	54.2	53.4
1969	56.8	55.7	54.7
1970	58.6	58.3	58.2
1971	60.1	59.7	61.7
1972	65.9	67.4	67.1
1973	81.6	86.0	76.4
1974	100.0	101.4	90.2
1975	100.0	100.0	100.0
1976	102.8	105.9	101.4
1977	108.4	119.0	109.2
1978	130.3	153.9	123.6
1979	137.5	151.9	139.8
1980	147.6	159.4	157.3
1981	152.7	164.6	150.2
1982	140.6	145.5	147.4
1983	138.9	154.4	143.0
1984	139.8	155.8	137.6
1985	137.7	155.1	139.1
1986	168.0	212.7	165.2
1987	186.3	241.0	186.3
1988	210.1	272.1	200.6

Table 5C.4 **Price Indexes for Manufactured Exports by the United States and its Competitors, U.S. Dollars, U.S. Export Weights of 1975 (annual averages, 1975 = 100)**

Year	U.S. Price Indexes		Competitors' Price Index
	Export Prices	Domestic Prices	
1953	54.6	48.3	48.1
1954	55.3	48.9	47.5
1955	56.0	50.2	47.7
1956	59.0	52.6	48.7
1957	62.0	55.2	49.7
1958	63.0	56.2	49.1
1959	64.0	57.2	48.6
1960	65.0	57.6	48.6
1961	66.0	57.6	49.4
1962	66.2	57.6	48.8
1963	66.5	57.5	49.0
1964	67.1	57.8	49.6
1965	67.6	58.4	50.5
1966	68.9	60.0	51.6
1967	71.2	61.8	51.6
1968	73.1	63.6	51.0
1969	75.5	65.3	52.2
1970	76.6	67.9	55.7
1971	80.0	70.4	59.5
1972	81.6	72.0	65.9
1973	84.1	74.4	76.6
1974	92.1	86.5	89.0
1975	100.0	100.0	100.0
1976	106.2	105.6	101.7
1977	112.6	112.3	110.5
1978	117.3	120.4	127.8
1979	127.3	132.9	146.2
1980	141.1	148.5	162.4
1981	154.6	163.2	150.7
1982	165.4	169.7	144.1
1983	170.9	172.8	139.7
1984	175.7	176.9	132.5
1985	177.1	178.5	133.4
1986	179.5	179.2	169.4
1987	184.9	183.0	196.9
1988	194.9	192.2	214.1

Table 5C.5   **Price Indexes for Manufactured Exports by Germany and its Competitors, U.S. Dollars, German Export Weights of 1975 (annual averages, 1975 = 100)**

Year	German Price Indexes		Competitors' Price Index
	Export Prices	Domestic Prices	
1953	36.7	32.4	53.7
1954	35.9	31.7	53.6
1955	36.0	32.0	53.8
1956	36.5	32.7	55.8
1957	37.2	33.4	57.5
1958	37.0	33.6	56.6
1959	36.5	33.3	56.5
1960	36.9	33.7	56.4
1961	38.4	35.9	56.1
1962	38.8	37.3	55.0
1963	38.8	37.5	54.7
1964	39.7	38.2	55.5
1965	40.6	39.3	56.0
1966	41.3	40.2	57.1
1967	41.3	39.8	57.5
1968	40.7	39.8	57.1
1969	43.6	40.9	58.3
1970	48.7	47.2	60.7
1971	53.1	52.3	63.5
1972	59.1	58.9	68.7
1973	75.9	75.1	75.9
1974	91.1	89.1	89.7
1975	100.0	100.0	100.0
1976	101.0	100.5	103.1
1977	110.7	110.7	110.3
1978	130.0	130.2	125.1
1979	152.7	149.1	141.2
1980	162.6	160.2	158.5
1981	137.9	135.7	157.8
1982	135.0	133.4	155.4
1983	130.1	128.5	151.5
1984	120.8	119.0	147.7
1985	120.7	127.4	150.0
1986	163.2	173.9	175.2
1987	197.2	209.2	194.0
1988	208.0	222.0	210.4

Table 5C.6   **Price Indexes for Manufactured Exports by Japan and its Competitors, U.S. Dollars, Japanese Export Weights of 1975 (annual averages, 1975 = 100)**

Year	Japanese Price Indexes		Competitors' Price Index
	Export Prices	Domestic Prices	
1953	64.6	71.0	49.4
1954	60.2	67.6	49.1
1955	60.0	66.1	49.7
1956	64.5	70.7	50.8
1957	65.2	71.4	52.1
1958	57.3	66.3	52.1
1959	58.4	65.8	51.4
1960	58.4	64.9	51.0
1961	56.5	63.3	51.2
1962	54.7	61.5	50.6
1963	54.0	60.7	50.2
1964	54.8	60.3	50.7
1965	54.8	59.7	51.3
1966	54.4	59.6	52.3
1967	54.6	59.8	52.3
1968	54.9	59.1	51.9
1969	56.4	59.8	53.4
1970	58.3	61.3	57.3
1971	60.1	62.6	61.2
1972	65.6	69.5	66.4
1973	78.8	84.0	75.1
1974	100.5	99.9	88.8
1975	100.0	100.0	100.0
1976	99.4	104.2	101.4
1977	103.5	117.4	107.9
1978	125.3	151.5	122.6
1979	131.4	147.7	138.4
1980	138.9	152.1	154.4
1981	145.9	156.2	146.1
1982	134.1	137.3	144.0
1983	133.0	145.4	139.4
1984	134.2	146.7	134.0
1985	131.8	145.2	135.6
1986	157.8	199.4	163.4
1987	175.3	226.1	185.0
1988	197.9	254.4	198.8

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Comment   Catherine L. Mann

This paper constructs and analyzes new indexes for manufactured-goods prices. It starts by discussing the methodology behind the construction of the indexes, then addresses how our "view of the world" might be different using these indexes instead of others previously available. The questions are: Does the systematic aggregation of much micro data yield a macro index with a significantly different perspective? Should we "trust" it more than existing manufactured-goods indexes? My comments follow the two parts of the paper: comments first on methodology, and second on the analysis.

First though, as an occasional tiller of the hand-input data field, I can appreciate the amount of labor required to create these manufactures price indexes. It is a vast task to bring together for five countries price data at the 4-digit level

of the SITC. Beyond that, organizing the data into the indexes represents a computer effort of great scale and scope.

This paper starts with an excellent primer on index construction. All fledgling empirical economists should read it, before using the finished product or especially if they may someday create their own price indexes. Creating an aggregate international index from micro country data requires making decisions: how "micro" the data should be, how to weight the products, how to weight countries, how to handle "missing observations," which time period to use as a base. The strength of the methodology section of the paper is that it outlines at each juncture what decisions were made—no skeletons here.

The authors spend a good deal of time on the problem of "missing observations." There are three established ways to fill in missing observations: use cross-product variation within a country to infer the missing price of a product in that country; use cross-country variation in a product to infer that same price; use both cross-product and cross-country variation to fill in missing cells in the product-country matrix of price observations. The authors use the last method, called the country-product-dummy approach, pioneered by Summers for inferring missing cells in a international comparison of price levels.

Conceptually, the rationale for using the full set of information—about the relationship across countries within a product group and about the relationship within a country across products—is that using either relationship alone ignores some information. However, from an empirical standpoint, we cannot be so sure that using all the information yields a better estimate of the missing cell. This is because potential errors and biases are contained in the two relationships by themselves.

Consider an analogy from econometric techniques. Full information maximum likelihood estimation of a system of equations incorporates the variance/covariance matrix of the residuals into the estimation of the system of coefficients—all the information available in the system is used. However, a common concern in FIML estimation is misspecification or data measurement problems in any of the individual equations. If these are present, the econometric problems of this single equation will infect the estimation of the coefficients in all the other equations of the system through the variance/covariance matrix. In the CPD method, to complete the analogy, if data for country A is relatively more poorly measured or is misallocated to a particular product group, then using that country's cross-product information in the estimation of the missing cell for country B could yield a more biased estimate of that missing value than simply using the cross-product variation in country B alone. Country A's data problems infect country B's missing price estimates.

One way to examine whether this "infection" problem exists in these data is to compare estimates of the manufactured-goods index using the CPD method with estimates using the other two limited-information methods—cross-country variation and cross-product variation. The authors report on

some previous work in this vein, but I would like to see direct comparisons using this data-set.

Continuing with a discussion of the methodology, let me consider the country coverage and the time-period base of the index. These two interact. I can understand, but nevertheless am troubled by, the limited coverage of the developing countries. And given the current interest in international competition, I would like to see the index created also for a time-period base of more recent vintage than 1975 and 1963. On the other hand, in 1963 and 1975 the role played by the developing countries was smaller, so the problem of under-representation perhaps is less relevant for the current set of estimates. But, for example, as of 1985 the developing countries accounted for 24 percent of total world exports, with "other Asia" (primarily the Asian NIEs) accounting for 13 percent of total world exports. Within certain of the 2-digit SITC groups, the share of the developing countries and of Asia is larger: in SITC 84 (clothing) developing countries accounted for 48 percent of total world exports, while "other Asia" accounted for 40 percent. If we think that the presence of lower-priced products from the developing countries puts downward pressure on product prices in the industrial countries, then failing to include the developing countries in the CPD calculations will upwardly bias the estimated manufactured-goods price.

It is of course difficult to find data of the appropriate frequency and length for the developing countries. I suggest using data for South Korea, since those data are compiled in a manner similar to Japanese data (good level of disaggregation, maybe computer-readable, and with English subtitles!). If Korean data do not go back far enough, I suggest trying to integrate them into the CPD methodology perhaps only for the last fifteen years. This would not be completely true to the CPD approach. But because the effect of the developing countries' trade on international prices of manufactured goods is probably only that recent, I would prefer to include those data for the recent years, even if they are absent for the early years of the sample.

The analysis section of the paper discusses the sensitivity of the final index to alternative decisions at key points in its construction, and what we might thereby infer about economic behavior. Let me emphasize and expand on certain of the comparisons made in the paper.

The authors examine what difference it makes whether the 1963 or the 1975 weights are used to aggregate products and countries. The evidence suggests that except for SITC 6 (semimanufactures) there has been a substitution toward the lower-priced products and toward countries producing lower-priced products. This also indicates supply response outweighing demand substitution. It is quite interesting that their results suggest a robust supply response. Most recent literature focuses on the lack of supply response, particularly in developing countries, because of an uncertain international environment and instabilities at home. Would updating the weights to 1985 and including de-

veloping countries reveal any differences in the data that are more in concert with ad hoc stories of today? Moreover, what could be unique about SITC 6 that yields the opposite result? Could it be that intrafirm trade is particularly important, or that quality changes have been different in this category?

In another analysis of their index, the authors compare measures of the terms of trade for developing countries using their index and the more commonly used unit-value index of manufactures exported from the industrial to the developing countries. Their index rose much less than did the unit-value index. This suggests that the terms of trade for developing countries worsened much less than heretofore thought. This terms-of-trade calculation is integral to policy recommendations and lending decisions of the multilateral institutions and underscores the importance of measurement.

There is one aspect of the paper that I think needs some additional thought. The paper purports to discuss competitiveness of different countries' manufactured products in international markets. Given the political state-of-play, one needs to be wary of providing ammunition without a warning label about usage and meaning. Specifically, the authors' price index may tell us whether there is a competitiveness problem in final goods, but does not pinpoint the source of the problem nor whether it represents a sustained deterioration or a self-correcting, shorter-term phenomenon. From a policy standpoint, these gaps are all-important. For example, short-run reductions in Japanese export prices may not be sustainable in the long run if the short-run change in competitiveness comes at the expense of profits. On the other hand, if costs change enough, say because of technology or outsourcing, the change in competitiveness as observed in the export price data could be permanent. Or (on the third hand), the Japanese producer may determine that a lower level of profits is required to remain a player in the international markets in the face of lower-priced competition from Korea.

The problem with using the relative price of exports as the definition of competitiveness is that it is not built up from costs. So we don't know whether changes in competitiveness (as revealed by movements in this ratio) result from changes in the exchange rate, changes in factor costs, changes in pricing strategies, or changes in cross-subsidization patterns between the various markets for the good (export and domestic markets). We should care about these different sources of changes in competitiveness because a policy reaction (whether warranted or not) should be different in each case, even if the consequence (reduced exports by the uncompetitively priced producer) is the same.

In their discussion of the relationship between movements in individual country indexes and movements in that country's weighted real exchange rate, the authors reveal some of the problems of interpreting events using only their manufacturers-prices data. They note that the United States lost competitiveness between 1980 and 1985, but do not explain this as caused by U.S. exporters maintaining dollar prices in the face of an appreciating dollar. They

are surprised that between 1985 and 1987 Japanese relative export prices continued to fall despite the movement in the yen-dollar rate. Many researchers are not surprised by the comovement of exchange rates and Japanese export prices, pointing to changed costs, invoicing, strategic pricing, and cross-subsidization.

All in all, though, this paper represents a herculean task and is an excellent presentation. It also provides a data series that the rest of us will use as both the variable to be explained by more fundamental factors such as unit labor costs and productivity, or as an independent variable in the explanation of macro current account adjustment.