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In recent years, statistical programs to measure prices have received increased attention. Numerous improvements and innovations have been instituted in price statistics programs, including a complete revision of the Consumer Price Index;¹ and a revision of the Industrial Price Program (formerly known as the Wholesale Price Index) which was begun in early 1978.²

The International Price Program (IPP) is a relatively recent addition to the overall price measurement program of the Bureau of Labor Statistics. This program was begun because of the deficiency of other data series that were being used by analysts as proxies for import and export price indexes, and because the growing influence of prices in foreign trade on the U.S. domestic economy increased the need for accurate data for the U.S. foreign trade sector.³ In 1971, BLS published the first set of U.S. export price indexes for a limited number of product categories that covered 11 percent of U.S. product exports by value.⁴ By mid-1978, indexes were published for 65 categories of exported and for 58 categories of imported products accounting for 60 percent of the value of product exports and 25 percent of the value of product imports.^{4,5}

The purpose of this paper is to serve as a brief introduction to the International Price Program to set a frame of reference for two papers on specific survey design problems in the IPP which are part of this session of the Section on Survey Research Methods. The content is primarily addressed to the importance of the foreign trade sector in the U.S. economy, a brief description of the price index methodology and some applications of the U.S. export and import price indexes to current economic problems.

The Foreign Trade Sector in the U.S. Economy

Over the ten year period ending in 1977, the direct contribution of foreign product trade to the Gross National Product of the United States for final products nearly doubled. In 1967, exports and imports of products directly accounted for 12.9 percent of final product production. This percentage increased steadily so that by 1977, 24.6 percent of the value of final product production arose directly from imports and exports (see figure 1). Moreover, it is clear that these direct measures understate the true contribution of foreign trade to output in the U.S. because they do not take into account the indirect contribution to further production made by imports (the majority of imports by value are primary and intermediate products that are used in the production of finished goods), and the indirect income generated from payments to factors of production and payments for material inputs in the export sector. Nor is account taken in these figures of the benefits to the U.S. of international specialization that arise because of the availability through trade of products that are scarce or not economically available in the U.S. Recent estimates by the Treasury Department indicate that production of exports accounts for one-eighth of the jobs in manufacturing and for one-third of agricultural acreage; also, nearly one-third of

U.S. corporate profits derive from the international activities of U.S. companies, including their foreign investments.⁶ It is important to have accurate information on price movements for a sector that accounts for so large a portion of GNP.

IPP Index Methodology: an overview

The principal output of the International Price Program consists of import and export price indexes calculated four times each year.⁷ Prices are collected from a sample of firms located in the U.S. that export and/or import products. As is explained in detail in two other papers in this conference,⁸ the sample of firms is drawn on a probability basis where the probability of a firm's selection is proportionate to the size of the firm's sales or import purchases within an index publication category. Samples of firms are drawn from customs documents which, by law, must be filed for all shipments of products that cross U.S. borders.⁹ These documents require that the shipper be identified, that the product be classified by seven digit product code and that the value of the shipment be reported.¹⁰ Thus, it is possible to identify exporters and importers by narrow product categories and to aggregate individual shipments to estimate the relative size of traders.¹¹

Sample units that are selected are visited by BLS field representatives and products are selected for pricing within the publication category on a judgmental basis. Guidelines are provided in an effort to assure that the selection yields products whose price movements are typical or representative of the firms' product lines within the index publication category. Complete specifications are collected for each of the items priced. Specifications are needed in order to assure that the same item is re-priced in subsequent periods, and that the item is correctly assigned in the product classification scheme. Changes in specifications for a product that is priced are treated as quality changes and adjustments for these changes are made to reported prices so that product improvements (or deteriorations) and/or changes in number of units, terms of transaction, class of buyer or seller, etc., do not influence the price indexes. Thus, the resulting indexes are designed to measure changes in prices and to abstract from all other factors that may influence the amount of money paid for or received for exported or imported products.


An evaluation is nearly complete for a generalized method of probability selection of items to be priced within selected establishments. The method being evaluated utilizes a set of standard questions posed to the prospective respondent by a BLS field agent in a personal visit. The questions rely on respondent knowledge of his firm's product area to identify the price-determining characteristics for disaggregation purposes. This contrasts to the disaggregation method employed in the Revised Consumer Price Index and in the Industrial Price Revision, where the sometimes extensive price determining characteristics were established by economist commodity


U.S. OUTPUT OF FINISHED GOODS, AND VALUE OF MERCHANDISE EXPORTS AND IMPORTS, 1961-77

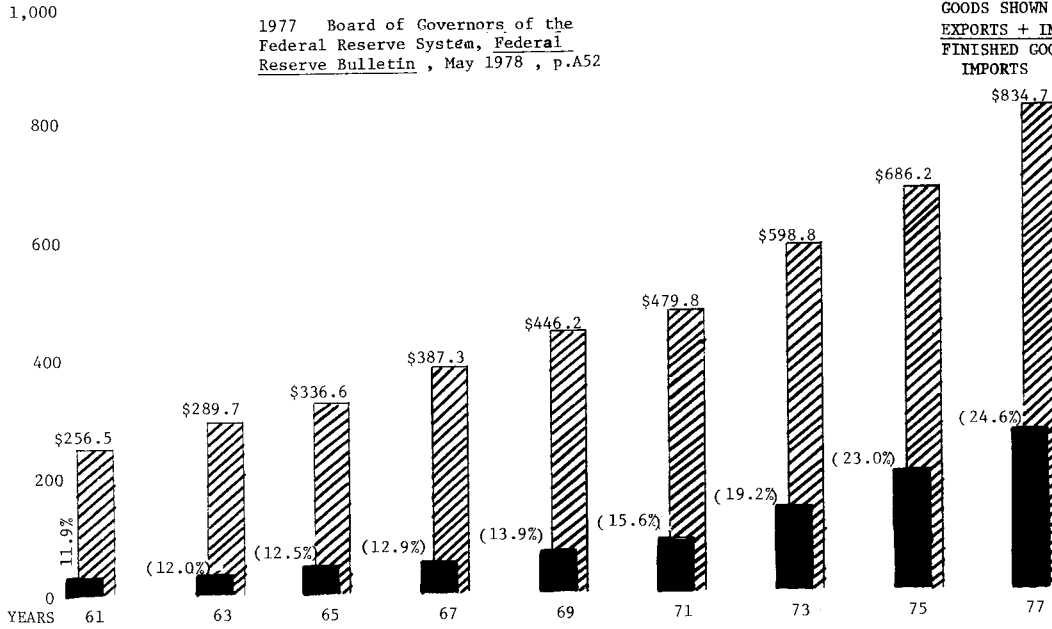
FIGURE 1

BILLION DOLLARS

Source: 1961-76 Economic Report of the President, p.264 , 368
 1977 Board of Governors of the Federal Reserve System, Federal Reserve Bulletin , May 1978 , p.A52

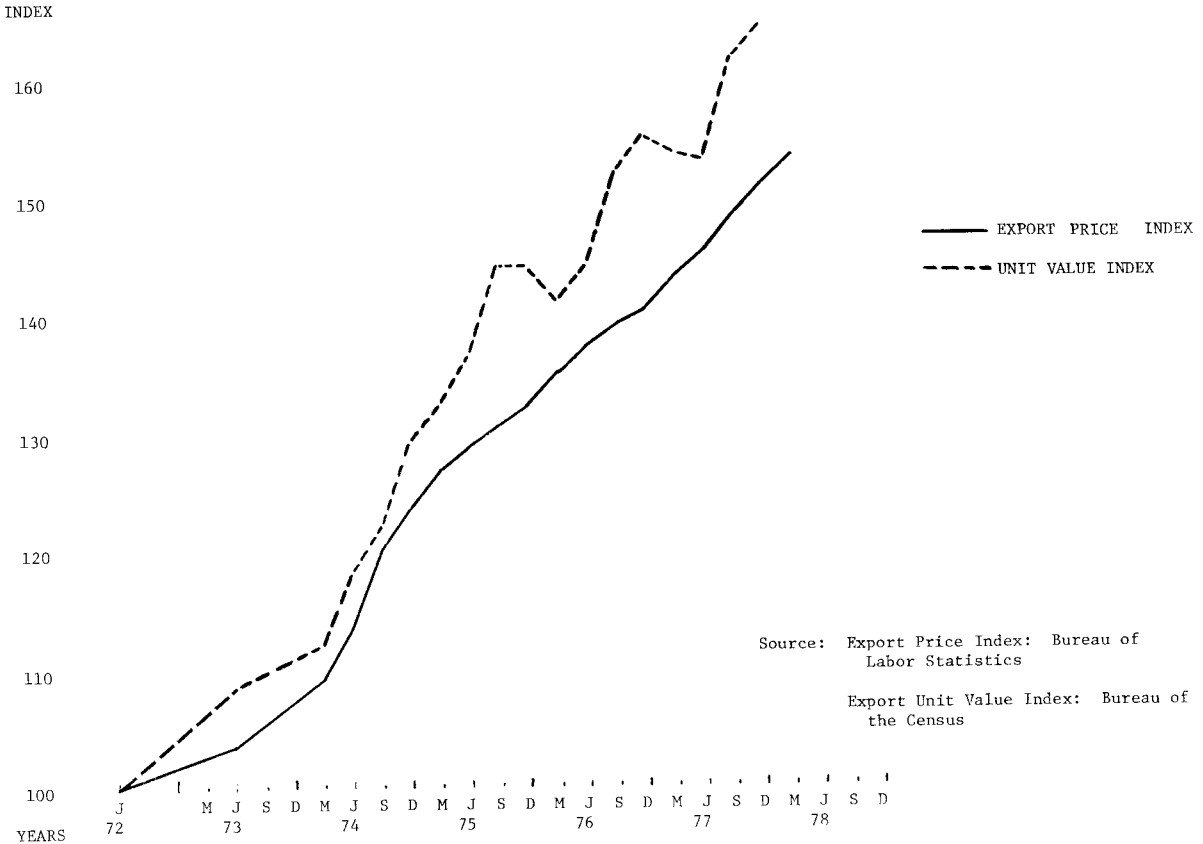
 VALUE OF FINISHED GOODS, BILLIONS OF CURRENT DOLLARS

 VALUE OF MERCHANDISE EXPORTS AND IMPORTS (SHARE IN FINISHED GOODS SHOWN IN PARENTHESIS) = $\frac{\text{EXPORTS} + \text{IMPORTS}}{\text{FINISHED GOODS} + \text{EXPORTS} + \text{IMPORTS}} \cdot 100$



U.S. EXPORT PRICE INDEX AND EXPORT UNIT VALUE INDEX FOR MACHINERY AND TRANSPORTATION EQUIPMENT, 1972=100

170 FIGURE 2 INDEX



Source: Export Price Index: Bureau of Labor Statistics

Export Unit Value Index: Bureau of the Census

specialists in BLS, based on existing product knowledge or after product and market research. The method under consideration builds on the fact that economists generally ask the same questions for determining disaggregate characteristics nearly irrespective of product; the answers vary by product. Thus, it is hypothesized that significant cost savings can be realized by relying on respondents' presumed intimate knowledge of their products to determine price-determining characteristics rather than to attempt to build up such expertise of all exported and imported products on the part of BLS staff. However, whether or not this method yields higher error rates or introduces bias not present in other methods of product selection remains to be determined; and if they do occur, whether they are tolerable within present cost constraints.

Data Applications

In one way or another, prices affect most aspects of U.S. foreign trade. Shifts in U.S. export prices relative to prices in other countries influence the share of U.S. production in world markets. The same holds for U.S. domestic markets: shifts of U.S. domestic prices in relation to prices of exports of other countries will lead to increases or decreases in the share of foreign suppliers in the U.S. market. Of course, abstracting from institutional factors, prices reflect underlying costs, and the principle of comparative advantage based on relative costs will finally determine the size and composition of international trade. However, since detailed production cost data are not available across countries for most internationally traded products and because institutional factors often intervene to break the link between relative costs and relative prices,¹² analysts must rely on price data which are more readily available, more easily constructed, and often more appropriate than costs in order to explain market shares.¹³ Thus, leaving aside why prices have reached particular levels, recent examples of cases where price differences have had significant effects on international market shares include steel, autos, TVs and shoes imported into the U.S. and aircraft, computers, and other automated equipment exported from the U.S.

At aggregate levels, exchange rate policy is partly predicated on movements of the overall export and domestic price levels of the U.S. in relation to those of other countries. This approach, which derives from Keynes' purchasing power parity approach to the analysts of exchange rates, finds application in the "managed float" of the present international monetary system. A further example is found in the bilateral trade between the U.S. and Japan. From 1972 through 1976 industrial prices in the U.S., expressed in dollars, increased faster than the prices of products exported from Japan to the world, expressed in yen. An additional and important factor was that the dollar-yen exchange rate was relatively stable during the period, except for some fluctuations during 1973. As a result of the relative stability of the exchange rate, Japanese export prices in dollar terms increased less rapidly than U.S. domestic industrial prices. For whatever reasons these price movements occurred, the consequence was a rapid growth of U.S. imports from Japan that

was not matched by a corresponding increase of U.S. exports to Japan, an outcome readily predicted by economic theory. This latter development was also partially the result of significant institutional barriers to imports in Japan. It is not surprising that the U.S. deficit in bilateral trade with Japan increased over this period, though with a lag that reflects the supply adjustment process. (See Table 1)

In late 1977 and early 1978, the yen became more expensive relative to the dollar as central banks withdrew their support of earlier rates so that the dollar price of Japanese exports rose rapidly in relation to U.S. prices. A priori, we can expect that the combined effects of this relative price change and lower trade barriers will result in a reduction of the Japanese market share in the U.S. and an increase of the U.S. market share in Japan. Estimation of the size of these effects depends on price and factor substitution elasticities, the estimation of which, in turn, require in part accurate time series on import and export prices as well as on domestic prices.

Finally, statistics on price changes in the foreign trade sector are needed in order to measure the contribution of changes in real net exports to changes in real GNP. These changes are important in determining the extent to which full employment and output goals are achieved. The current and a proposed approach to deflating current value trade flows were discussed in a recent OMB report on methods for improving the GNP statistics.¹⁴ The present method is to deflate current net export values by unit value indexes constructed from trade data; the OMB report recommends that price indexes be used as deflators instead.

The effect of using one or the other series as deflators can be illustrated by an example. Using 1972 as the base, the price deflator for U.S. exports of machinery and transport equipment in 1977 stood at 148.1, and the deflator calculated from unit values stood at 160.0 (See figure 2)¹⁵ The difference in the two estimates of the deflator is due in part to the more rapid growth of export unit values compared with export prices. This apparent secular divergence of export unit values is generally attributed to the inclusion of quality changes in the value of products and the general secular switching to higher valued products as a result of income growth; the result is that the measure of average (or unit) values incorrectly attributes value changes to price increases.¹⁶ A consequence of the use of unit value indexes to deflate exports is that the growth of real exports will tend to be secularly understated. The effect on real net exports, and hence on changes in real GNP, are less clear because it depends on the extent to which bias in the measurement of real exports is offset by bias in the measurement of real imports, though there is no reason to expect they will be offsetting.

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Table 1

Indexes of Prices, Exchange Rate and Value of U.S. Bilateral
Trade Deficit with Japan, June 1972=100

	(1)	(2)	(3)	(4)	(5)
	Japan Export Price Index (Yen)	Dollar/Yen Exchange Rate Index	Japan Export Price Index (Dollars)	U.S. Domestic Industrial Price Index (Industrials)	U.S. Balance of Trade with Japan (Annual data, millions of dollars)
1970 (June)	102.6	84.3	86.5	93.2	-1244
1971 "	103.9	84.6	87.9	96.7	-3255
1972 "	100.0	100.0	100.0	100.0	-4113
1973 "	106.4	114.3	121.6	106.9	-1300
1974 "	144.8	106.9	154.8	130.3	-1690
1975 "	141.1	103.0	145.3	144.8	-1690
1976 "	140.5	101.1	142.0	153.9	-5335
1977 "	133.2	110.8	147.6	165.1	-7984
1978 "	140.4	141.3	198.4	176.8	-3307*

*First quarter 1978

Sources: (1) Adapted from The Bank of Japan, Statistics Department, Price Indexes Annual: Wholesale Price Indexes, Export and Import Price Indexes, Tokyo, various issues. (2) Calculated from monthly average data in Board of Governors, Federal Reserve Bulletin, various issues. (3) Calculated from columns (1) and (2). (4) Adapted from Bureau of Labor Statistics, Producer Prices and Price Indexes, various issues. (5) U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, various issues.

FOOTNOTES

¹W. John Layng, "The Revision of the Consumer Price Index," Statistical Reporter, February 1978, pp. 140-48; and U.S. Department of Labor, Bureau of Labor Statistics, The Consumer Price Index: Concepts and Content Over the Years, Report 517, May 1979 (Revised).

²John F. Early, "Improving the Measurement of Producer Price Change," Monthly Labor Review, April 1978, pp. 7-15.

³See for example, D. Creamer, "Some Recommendations for Data Improvement in the GNP Accounts," in Statistical Reporter, Office of Management and Budget, Washington, D.C., January 1975; for a more complete discussion and references see E. Murphy and J. Perez-Lopez, Estimating Price Trends of Industrial Countries' Exports to OPEC, Bureau of Labor Statistics, Bulletin 1969, Washington, 1977, Part II.

⁴U.S. Department of Labor, Bureau of Labor Statistics, "International Price Indexes," Handbook of Methods, Bulletin 1910, Washington, 1977.

⁵U.S. Department of Labor, Bureau of Labor Statistics, "U.S. Import and Export Price Indexes, Second Quarter 1978," Press Release USDL-78-687, Washington, August 8, 1977.

⁶Honorable C. Fred Bergsten, Assistant Secretary of the Treasury for International Affairs, Statement before the International Trade, Investment and Monetary Policy Subcommittee of the House Committee on Banking, Finance and Urban Affairs, July 26, 1978.

⁷For a general description of the indexes see "International Price Indexes," Handbook of Methods,

op. cit. Detailed and aggregate series are calculated for product groups classified by the 1963 Standard International Trade Classification System (SITC) of the United Nations. The indexes are released quarterly; historical series are available on request from the Bureau of Labor Statistics. For the latest release see "U.S. Import and Export Price Indexes, Second Quarter 1978," op. cit.

⁸Marvin Kasper and Richard Pratt, "Surveying International Prices," and J. F. Carpenter, T. R. Bishop and G. S. Goudie, "System for Matching Company Documents," both in Proceedings of the Section on Survey Research Methods, American Statistical Association, 1978, forthcoming.

⁹Exports are reported on "Shippers Export Declaration," U.S. Department of Commerce, Bureau of the Census, Form No. 7525-V; imports are reported on "Consumption Entry," U.S. Department of the Treasury, Bureau of Customs, Form 7501.

¹⁰For the export classification system see U.S. Department of Commerce, Bureau of the Census, Schedule B: Statistical Classification of Domestic and Foreign Commodities Exported from the United States, 1978 edition; for imports, U.S. International Trade Commission, Tariff Schedules of the United States Annotated, 1978.

¹¹This aggregation procedure is fairly straightforward in the case of importers since a unique importer identification number is assigned to each firm. It is different in the case of exporters, where the matching of export declarations to obtain measures of size is a difficult problem. For an exposition of this problem and the sampling approach followed by BLS see J. F. Carpenter, et. al., op. cit.

¹²Examples are nationalized and subsidized

industries, tariffs, quotas, cartels, etc.

¹³For a more detailed description of this see John W. Suomela, "The Meaning and Measurement of International Price Competitiveness," Proceedings of the Business and Economic Statistics Section, American Statistical Association, 1978, forthcoming.

¹⁴Office of Management and Budget, "Gross National Product Data Improvement Project Report," Summary Chapter, Statistical Reporter,

September 1977, pp. 549-558.

¹⁵Sources: Current value of exports: U.S. Bureau of the Census, U.S. Exports, Schedule B Commodity by Country, various years; Export unit value index: U.S. Bureau of the Census, Foreign Trade Division; Export price index: U.S. Bureau of Labor Statistics, U.S. Export and Import Price Indexes, quarterly press release, various issues.

¹⁶Differences between prices and unit values are discussed in Murphy and Perez-Lopez, op. cit.