Technical Note

BLS publishes average exchange rate and foreign currency price indexes

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To facilitate analysis of price trends in U.S. international trade, the Bureau of Labor Statistics has begun producing several new index series on a quarterly basis. The new index series comprise: (1) nominal average exchange rate indexes; (2) nominal foreign currency price indexes; and, (3) real foreign currency price indexes.

Information on how the export and import price indexes, currently published by the BLS in dollar terms, change when presented in foreign currency terms adds significantly to their usefulness in analyzing U.S. price competitiveness. For example, movements in an import price index in foreign currency terms might be used to observe fluctuations in the revenues received by exporters to the United States, while a U.S. export price index in foreign currency terms could show the price movement of U.S. exports as viewed by the foreign buyer.

The foreign currency price indexes measure U.S. export and import price trends in foreign currency terms, and the average exchange rate indexes measure the change in the price of trade-weighted baskets of currencies against the dollar. These indexes have been designed to match the export and import price index series published by BLS at the 2-digit, 1-digit, all-export, and all-import levels according to the Standard Industrial Trade Classification (SITC), Rev. II system. The nominal average exchange rate index series, which are calculated from the first quarter of 1985, exclude those countries whose inflation rates have varied significantly from that of the United States. The nominal foreign currency price index series are calculated by multiplying the nominal average exchange rate index for a specific SITC category by the corresponding SITC export or import dollar price index published by BLS. The nominal series contain exchange rate data from 41 countries. (See exhibit 1.) The real foreign currency price index series, which are calculated from the first quarter of 1977, use aggregate foreign

consumer price index data to deflate the nominal foreign currency price index series, and are produced with a one quarter lag because of the difficulty in obtaining foreign CPI data on a timely basis. The real foreign currency price index series contain exchange rate data from 64 countries.

The export and import nominal average exchange rate, nominal foreign currency price, and real foreign currency price indexes are calculated using a weighted geometric mean:

$$AERI_{y,t}^{n=41} = 100 \left\{ \prod_{i=1}^{n} (ER_{i,t}/ER_{i,0})^{W_{i,y}} \right\}$$

$$NFCPI_{y,t}^{n=41} = USPI * AERI_{y,t}^{n=41}$$

$$RFCPI_{y,t}^{n=64} = NFCPI_{y,t}^{n=64} / \prod_{i=1}^{n} (CPI_{i,t})^{W_{i,t}}$$

where:

AERI = nominal average exchange rate index;

NFCPI = nominal foreign currency price index;

RFCPI = real foreign currency price index;

$ER_{i,t}/ER_{i,0}$ = foreign currency per dollar exchange rate relative for country i in period t to the relative in base period 0;

USPI = United States import or export price index;

$CPI_{i,t}$ = consumer price index for country i in period t;

$W_{i,y}$ = normalized unilateral (export or import) trade weight of country i in SITC category y;

y = SITC export or import group for which the index is calculated;

t = index reference period;

i = a particular country; and

n = total number of countries.

The export and import weights used in the BLS average exchange rate and foreign currency price index series are based on 1985 trade values collected by the Bureau of the Census. The 7-digit Schedule B values (from *U.S. Exports-Schedule B Commodity by Country*, Report FT-410) and the 7-digit Tariff Schedules United States Annotated (TSUSA) values (from *U.S. Imports for Consumption and General Imports*, Report FT-246) were mapped to the 5-digit SITC level by country. The 5-digit SITC export and import trade values were then aggregated by country up to the 2-digit,

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1-digit, all-export, and all-import levels. To match the weight structure of the SITC export and import price indexes published by BLS, military and commercial aircraft export trade values were excluded from the SITC 79 export weight category, and all export and import trade values were excluded from SITC 9 except for the SITC 971 export and import weight categories. Separate export and import trade weights are used to calculate the separate export and import index series:

$$MW_{i,y} = M_{i,y} \div \sum_{j=1}^{n} M_{j,y}$$

$$XW_{i,y} = X_{i,y} \div \sum_{j=1}^{n} X_{j,y}$$

where:

$MW_{i,y}$ = normalized unilateral import weight for country i in SITC category y;

$XW_{i,y}$ = normalized unilateral export weight for country i in SITC category y;

$M_{i,y}$ = imports from country i in SITC category y; and

$X_{i,y}$ = exports to country i in SITC category y.

As mentioned above, these weights refer to U.S. import and export trade only for the year 1985 and therefore do not reflect the change in the structure of U.S. trade over time. One would expect that the depreciation of the dollar against other currencies would eventually be accompanied by a change in the relative weights among the United States' trade partners. For example, with the depreciation of the dollar against the yen, we might expect imports to decrease from Japan but to increase from other Pacific Rim countries. Therefore, for periods other than 1985, the importance of some trade partners may be either underweighted or overweighted relative to that of other U.S. trade partners.

The trade partners included in the index series were selected on the basis of: (1) their importance in U.S. trade; (2) their exchange rate practices; (3) their rate of inflation; and (4) the availability of data. Countries with a relatively insignificant amount of trade in an import or export product weight category were not included so long as at least 75 percent of trade was otherwise covered in that category. In most cases, trade coverage was over 90 percent in each category. A master list of countries that met this specification was then compiled and was further pruned on the basis of the remaining specifications for selecting countries to be used in the index series. Countries with "nonmarket" economies, whose exchange rates do not reflect market forces, were excluded. Countries using multitiered exchange rate systems were excluded if the rate structure did not mesh easily with the SITC export or import weight categories or if historical exchange rate series were not available. Excluded from the nominal series were those countries whose annual rates of inflation (as measured by the Con-

sumer Price Index) deviated more than 10 percent from the U.S. rate of inflation in 1985, 1986, or 1987. The actual inflation differentials were used for the years 1985 and 1986, whereas the differential rates were estimated for 1987 using the exponential smoothing forecast method.[1] Those countries which do not produce consumer price indexes were excluded from both the nominal index series and the real foreign currency price index series. The beginning point of the nominal series will be moved forward one year on an annual basis. At the same time, the above method will be used to determine which countries are to be included or excluded from the nominal exchange rate series.

The International Monetary Fund publication, *Exchange Arrangements & Exchange Restrictions*, and the *World Currency Yearbook* were very helpful in resolving problems connected with the exchange rate practices of U.S. trade partners.[2] Other problems were resolved through personal communication with professionals specializing in the economic activities of these countries. The 41 countries used in the nominal exchange rate and foreign currency price index series account for 79 percent of total trade. For an individual product category to be published, the nominal index series had to include at least 50 percent of the import or export trade in that category. The 64 countries used in the real foreign currency price index series account for 93 percent of total trade. To be published, a real foreign currency price index category had to include at least 65 percent of the import or export trade in that category.

Exchange rate data are from the International Financial Statistics (IFS) data base of the International Monetary Fund and from the Bank of America. The Bank of America data are received on a more timely basis and are used to update the current quarter exchange rates which are lacking in the IFS data base. Monthly exchange rate averages for the final month of each quarter are used.

Foreign consumer price data are also taken from the IFS data base. Data which are not found in that source are extracted from the information banks of Data Resources, Inc., a private economic research firm. Because of problems in receiving foreign consumer price data on a timely basis, the Bureau's real index series are lagged one quarter behind the nominal index series. However, the most recent published quarterly data still do not include all 64 countries mapped to the real foreign currency price index series. Because the basket of countries used in the real index series varies during some quarters, the real foreign currency price index series are calculated as chained indexes.

Average exchange rate indexes have been produced by the U.S. Federal Reserve Board of Governors, the Morgan Guaranty Trust Co., the International Monetary Fund, the Atlanta Federal Reserve Bank, the U.S. Department of Commerce, the U.S. Department of Treasury, the International Trade Commission, the Dallas Federal Reserve Bank, and Manufacturers Hanover Trust, among others. These indexes differ from one another according to (1) the type of

Exhibit 1. Countries represented in real and nominal BLS foreign currency price index series for U.S. imports and exports

Europe	Asia	Latin America	Oceania
X Austria	X Bangladesh	Argentina	X Australia
X Belgium	X Hong Kong	Brazil	New Zealand
X Denmark	X India	Chile	
X Finland	X Indonesia	Colombia	**Africa**
X France	X Japan	Costa Rica	
X Germany	X Korea	Ecuador	X Botswana
Greece	X Malaysia	El Salvador	X Cote D'Ivoire
Iceland	X Pakistan	X Honduras	X Gabon
X Ireland	X Philippines	Mexico	X Kenya
X Italy	X Singapore	X Panama	Liberia
X Netherlands	X Taiwan	Venezuela	X Nigeria
X Norway	X Thailand		South Africa
Portugal		**The Caribbean**	Swaziland
X Spain			Uganda
X Sweden		X Bahamas	
X Switzerland		Dominican Republic	
X United Kingdom		Haiti	
Yugoslavia		Jamaica	
		X Trinidad	
North America		**Middle East**	
X Canada		Israel	
		X Jordan	
		X Kuwait	
		X Morocco	
		X Saudi Arabia	
		Turkey	

X = country included in nominal index series.

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weight used (bilateral trade, multilateral, elasticity-based, production-based, and so forth); (2) the commodity coverage of the weights (manufactured products only, all commodities or some other system); (3) the reference periods chosen for the weights (fixed-period weights, moving period weights, and so forth); (4) the number of trading partners included (for example, industrial countries only, all countries, or selected industrial and nonindustrial countries; and, (5) the calculation methodology. The above indexes can appear in nominal (undeflated) form or real form (deflated by the differential inflation rates between the base country and comparison countries). The major difference between these other index series and the BLS series is that the BLS series are specially designed to examine U.S. export and import price movements in foreign currency terms at detailed export and import product category levels. For example, for SITC 73 (Metalworking Machinery), separate import and export index series are calculated for the nominal average exchange rate, nominal foreign currency price, and real foreign currency price index series.

THE EXCHANGE RATE and foreign currency price indexes will be included in the quarterly press release published by the BLS Division of International Prices. For further information, please call (202) 272–5020 or write to William Alterman, Bureau of Labor Statistics, Room 3302, 600 E Street, N.W., Washington, DC 20212. □

——— *FOOTNOTES* ———

[1] Inflation differentials were calculated using log change as a percent change measure of the foreign CPI to U.S. CPI ratio between two periods. Any country with a log change greater than 0.1 (10 percent) was eliminated from the nominal series.

[2] See *Annual Report on Exchange Arrangements and Exchange Restrictions, 1986* (Washington, International Monetary Fund, 1986); and Philip P. Covitt, ed., *1984 World Currency Yearbook* (Sharon, CT, Grey House Publishing, Inc., 1985.)