where:

$DF_t^{m,v}$ equals the depreciation factor in time t for model m of vintage v, and N is the number of months since the first month the model was introduced.

Before 1987, an arithmetic calculation was used instead of a geometric calculation when producing the depreciation factors. However, a geometric estimate is theoretically more correct because cars depreciate in value at a constant rate. The geometric estimate was therefore included as part of the revision of the index.

Finally, to compute the depreciated price for the month, the Bureau multiplies the average auction price for the car by the depreciation factor as follows:

$$DP_t^{m,v}   =   (P_t^{m,v})(DF_t^{m,v})$$

where:

$DP_t^{m,v}$ is the depreciated price in month t for model m of vintage v.

To produce the prices used in the index, BLS uses a 3-month moving average of the depreciated prices. This average is used to smooth the index and to adjust for the lag caused by the use of auction prices, which do not immediately reach the consumer market.

Quality adjustments

With the CPI revision, the prices of used cars are adjusted beginning each September for quality differences between model years. This adjustment for quality between the newer vintage cars and the older vintage cars that are being replaced is the same percentage adjustment that was used during the original new car model changeover. Because the index uses a 3-month moving average depreciated price, the adjustment is made over the 3 months that the model year shift occurs. Whenever there is a percentage difference in quality between cars of adjacent vintages, one-third of this adjustment is made in each month of the 3-month period by entering a quality adjustment for each specific quoted car.

Conclusion

The used car index has been improved in four areas: definition of expenditure weight, sampling, methodology of index computation, and introduction of explicit quality adjustments. The relative importance of used cars in the CPI now more accurately reflects their importance in consumer expenditures. In addition, the sample is larger and the cars and options priced are selected using probability proportionate to size sampling techniques. Furthermore, the index computation now uses a theoretically correct geometric formula for computing depreciated prices and explicit adjustments are made for the quality differences between cars of different vintages. As a result of these

enhancements, the used car index, since the revision, is a better measure of price changes in the eligible portion of the consumer market.   □

————FOOTNOTES————

[1] *Price Statistics of the Federal Government*, General Series 73 (New York, National Bureau of Economic Research, Price Statistics Review Committee, 1961), p. 47.

[2] Dealers' profit margins were estimated using the *NADA Official Used Car Guide* and the *Official Used Car Trade-In Guide* (McLean, VA, National Automobile Dealers Association), along with other industry sources.

[3] To learn more about new car quality adjustments, see BLS *Handbook of Methods*, Bulletin 2285 (Bureau of Labor Statistics, April 1988), pp. 168-69.

BLS to produce monthly indexes of export and import prices

WILLIAM ALTERMAN

Twenty years ago the Bureau of Labor Statistics, which is responsible for the Consumer Price Index (CPI) and the Producer Price Index (PPI), began a third price program, designed to track prices of goods in U.S. international trade. The International Price Program (IPP), produces the U.S. Export Price Index and the U.S. Import Price Index. These indexes are intended to reflect price trends of foreign-produced goods entering the United States or domestic products leaving this country or its territories.

The program completed coverage of merchandise trade in the early 1980's with price indexes for all product categories. The indexes are constructed using 23,000 items, approximately 9,000 for the export index and 14,000 for the import series. Originally, data for the indexes were only collected and published annually. However, beginning in 1974, collection was switched to a quarterly basis. (Products are priced in the third month of each quarter: March, June, September, and December.) The Bureau has also recently begun publishing price indexes for selected international services (such as international airline fares).

Uses of data

The export and import price indexes have a variety of uses in economic analysis. Their original purpose centered on their use as deflators for the foreign trade sector of the national accounts. In general, deflating the gross national product values for inflation provides a more useful measure of economic growth because nearly all analyses of the

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Chart 1. Total merchandise imports, December 1984 to June 1988
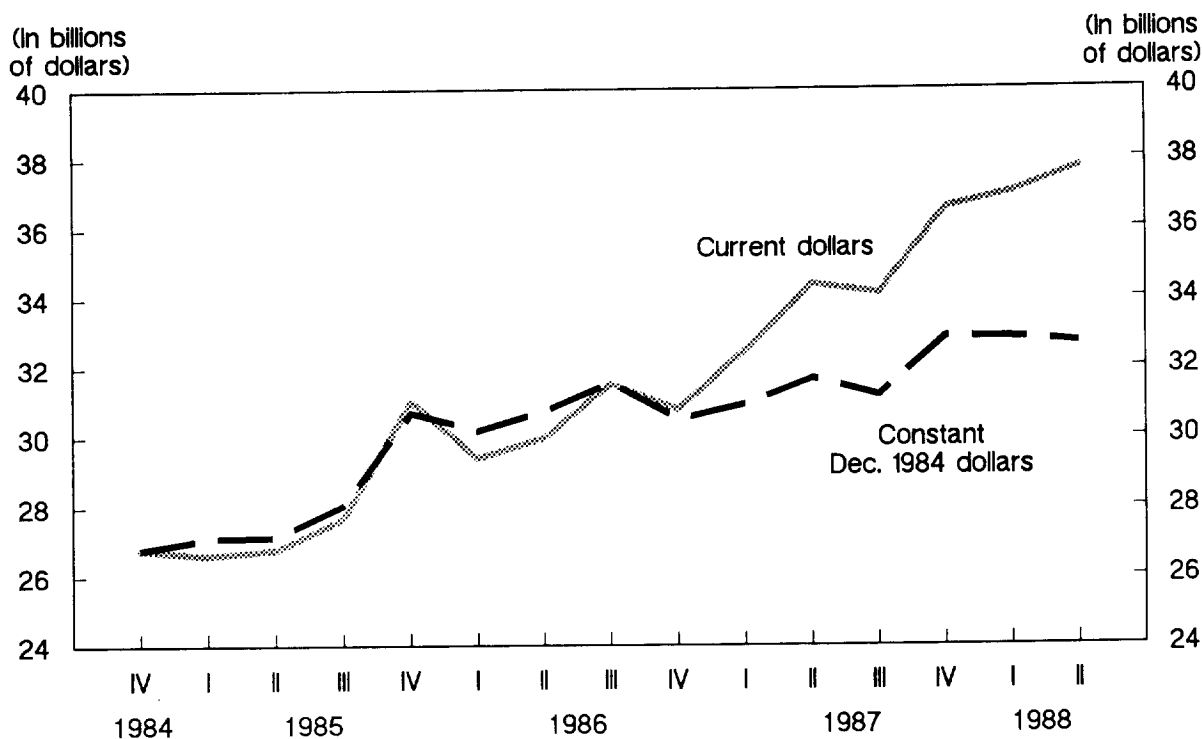
(In billions of dollars)

NOTE: Figures are for the third month of each quarter only: March (I), June (II), September (III), and December (IV).

U.S. economy attempt to focus on real output. Consequently, in order to derive these values, each sector of GNP should be adjusted by the relevant price index. The change 15 years ago from annual to quarterly collection of the export and import price data was to facilitate deflation of the GNP figures because GNP data are also tabulated and released quarterly.

Another application which has recently received a great deal of attention is measuring the impact of exchange rate changes on price levels of both imported and (to a lesser extent) exported goods. To facilitate such an analysis, the Bureau began publication of two new index series in November 1987, one designed to reflect the change in average foreign currency prices of U.S. exports and imports, the other formulated to indicate changes in the exchange rate of the dollar by product area. With the sharp decline of the dollar since 1985, analysts are now able to evaluate how companies and industries are responding to these changes by using these new series.

A third area which has also drawn substantial interest is the use of these indexes in analyzing the effect changes in import prices have on domestic levels of inflation. This area has received special attention due to recent concern over potential inflationary pressures.

Finally, these data have been used in evaluating U.S. industry's "competitiveness." In particular, the Bureau has been able to match, at a detailed level, its export price

series with data for similar products exported from West Germany and Japan. Because these indexes are constructed in a common currency, this series provides analysts with estimates of changes over time in U.S. export prices relative to export prices from its two chief worldwide competitors.

The heightened interest in the past several years in the export and import price indexes has been due partially to the growing U.S. trade deficit. As the trade deficit has burgeoned, and the United States has slipped into the role of a debtor nation, a number of questions and issues have arisen, including those concerning America's ability to compete, the possibility of losing jobs to other countries, and the potential impact on the U.S. standard of living. As these concerns have mounted, interest in the Bureau's international price data has expanded.

Monthly price collection

In view of the interest in the U.S. trade position, the Bureau has been investigating the feasibility of producing a limited number of import and export price indexes on a monthly basis. This study is now nearing completion. Availability of monthly data would be advantageous in several ways.

First, the additional price series would permit U.S. trade data to be inflation-adjusted, or deflated, on a monthly basis. The Bureau of the Census currently pub-

lishes, on a nominal or unadjusted basis, a set of monthly trade statistics which have become one of the most closely watched economic indicators in the Nation. Producing a series of International Price Program indexes on a monthly basis would allow the monthly trade data to reflect the net *quantity* of trade as well as the net value of trade and, thus, significantly enhance their utility.

In addition, while the official GNP data, which are inflation-adjusted, are published only in quarterly totals, actual deflation of the trade data in that series is done on a monthly basis. Consequently, to do this, the Bureau of Economic Analysis, which produces the GNP statistics, currently either uses other sources (Census unit values, for example) or interpolates the quarterly BLS data for the intervening months. Thus, monthly export and import data would allow considerable improvement in the consistency of the adjustment process.

Second, monthly data permit a more timely analysis of price trends. In particular, monthly import and export price indexes would allow the data to be more accurately and effectively compared with the other price data because the CPI and PPI are already collected and published on a monthly basis. Recently, the export and import price indexes, particularly on the import side, have exhibited considerable volatility, largely because of exchange rate fluctuations. At the same time, there has been growing concern about domestic inflation levels. Monthly import

and export price data would facilitate analysis of the effect of exchange rate changes on domestic levels of inflation.

Deflation of monthly trade data

There are two general approaches to deflating the balance of trade, which is defined as the difference between the value of U.S. merchandise exports and imports. The methods are direct deflation and double deflation. Under the direct deflation method, a terms of trade index (usually defined as the price index for all exports, divided by the price index for all imports) is used to directly deflate the nominal trade balance. This results in the real balance of trade, which is implicitly the net quantity of trade. Alternatively, under the double deflation method, export categories and import categories are deflated individually—nominal exports would be deflated by an export price index and nominal imports would deflated by an import price index. The real balance of trade is then determined as the difference between the inflation-adjusted exports and the inflation-adjusted imports.

The direct deflation method is generally associated with analyzing changes in national "welfare." In particular, it is used in determining changes in the quantity of a country's exports necessary to buy its imports. The double deflation method has been associated with calculating changes in production (or output) for a given country, and is the procedure currently used by the Bureau of Economic Analysis in the National Income and Product

Chart 2. **Total merchandise exports, December 1984 to June 1988**
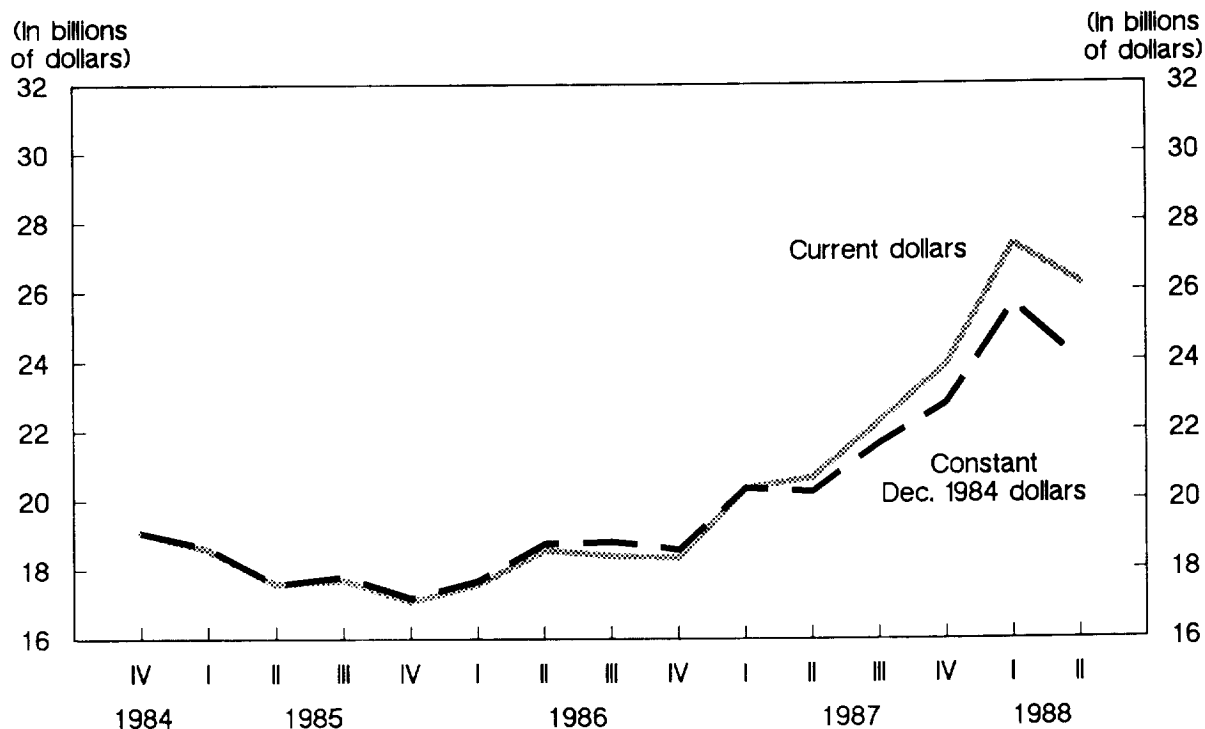
NOTE: Figures are for the third month of each quarter only: March (I), June (II), September (III), and December (IV).

Chart 3. Merchandise trade deficit, December 1984 to June 1988
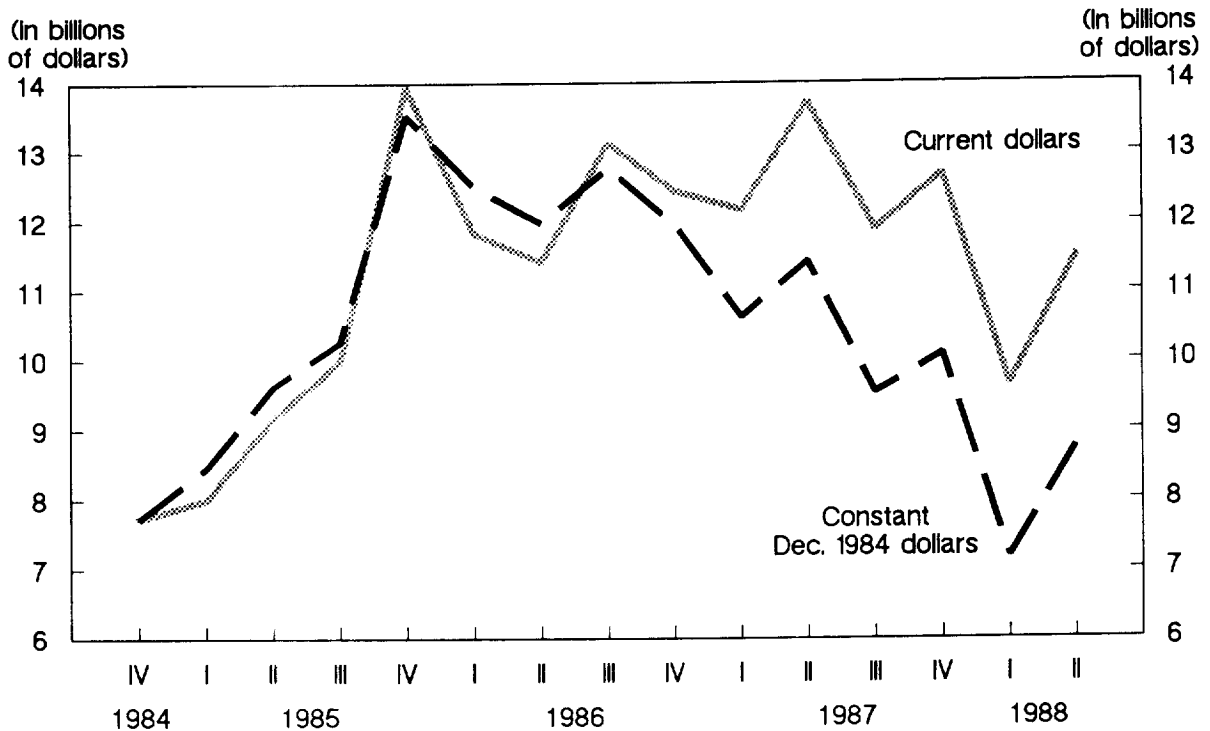
(In billions
of dollars)

(In billions
of dollars)

NOTE: Figures are for the third month of each quarter only: March (I), June (II), September (III), and December (IV).

Accounts. Because double deflation is the more commonly used methodology, it was chosen for the Bureau's analysis.[1]

The Bureau's export and import price data are published by three different classification structures—the Standard International Trade Classification of the United Nations Statistical Office, the end-use system, and the Standard Industrial Classification (SIC). In principle, deflation should be done at the most detailed level possible. Otherwise, misleading results could occur because the mix of products used in the construction of the price index could be very different from the mix of products inherent in the total value data. In fact, components of the foreign trade sector of the quarterly GNP statistics are currently deflated by the indexes constructed at the Bureau's 5-digit, end-use categories. However, in its analysis of monthly deflation, the Bureau attempted to discern which classification structure in conjunction with the minimum level of detail would be necessary to produce indexes sufficient to be used as monthly trade deflators. The Bureau reviewed the trade statistics and separated the data into categories that have demonstrated similar price trends.

After analysis it was determined that the end-use system was the most appropriate classification system to use, first because it is the system used currently in the deflation of the national accounts, and secondly, because it

required the fewest groupings to produce an adequate monthly deflator. More than one index is needed because over time there are changes in the composition of trade and each product area must be deflated by an index that is representative of just that area. While still preliminary, the study shows that although 20 indexes (10 exports and 10 imports) would be sufficient to produce a reasonable estimate, ideally, roughly 70 indexes (approximately 30 exports and 40 imports) should be used to deflate the trade data. Based on these figures, the Bureau also determined that several thousand products would have to be repriced on a monthly basis to maintain these series.

Data used in deflation analysis

To determine the feasibility as well as the impact of deflating the monthly Census trade data, the Bureau attempted to deflate monthly trade data for the past 4 years using the import and export price indexes already available. This required matching up trade values for March, June, September, and December of each year with IPP price data for the same 4 months.

The BLS export and import price indexes are generally designed to represent price trends of internationally traded goods as they cross the U.S. border. This follows the definition of an imported or exported good as it is defined in the national accounts. For exports, the Bureau attempts to collect data on a free alongside ship basis,

while for imports, a foreign port price basis is sought. For a number of products this is not possible. In particular, on imports, a significant percentage of the collected price data includes the cost of overseas shipping. However, because our interest is in trends and not absolute price levels, this would not appear to have a significant impact on the overall deflation figures. In no case does the import price include any U.S. duty.

In the past, when monthly trade data were first released by the Bureau of the Census (approximately 6 weeks after the reference month), the import data were calculated on a cost, insurance, and freight basis with duty excluded. This practice was recently modified so the figures are now presented both with and without insurance and freight. For this analysis, trade values excluding insurance and freight were used. In addition, the trade data used in this study did incorporate later revisions to the monthly totals, and have also been seasonally adjusted. This was appropriate because, beginning in July 1988, the Bureau of the Census began releasing its monthly trade data on a seasonally adjusted basis.

With the release of the first-quarter data in April, the BLS switched to 1985 trade weights and recalculated historical values back through 1985. The export and import price indexes have not been seasonally adjusted, but recent Bureau analysis indicates that seasonal price factors in U.S. trade have been relatively minor.

Results of analysis

The BLS study treated December 1984 as the base period in calculating a deflated trade series. Monthly trade data were adjusted using the Laspeyres double deflation method for the period December 1984 to June 1988. This involved separately deflating each component of exports and each component of imports, in nominal terms, by the appropriate BLS price index, and then summing the values to derive total real, or inflation-adjusted, exports and real imports. Chart 1 shows imports on nominal and adjusted bases while chart 2 does the same for exports. The data clearly show that in real terms, the trade deficit has shrunk more rapidly over the past 3 years than in current dollars. (See chart 3.) The results are similar to other estimates of adjusted trade flows, including the official national accounts estimates.

Future plans

The Bureau is tentatively scheduled to begin publishing monthly export and import price indexes in February 1989 using data collected for January 1989. The intention is to publish as much detail as is sustainable, and at minimum this should include at least 10 groups on exports and 10 on imports. When these monthly price indexes become available, the Department of Commerce will begin work to incorporate them, together with other information, into the quarterly GNP statistics and the monthly merchandise trade series.

————*FOOTNOTES*————

[1] For further discussion of the appropriate methodology for deflating net exports, see Edward F. Denison "International Transactions in Measures of the Nation's Production," *Survey of Current Business*, May 1981, pp. 17–28.

MLR staff positions

The *Monthly Labor Review* would like to hear from persons interested in future staff positions. Applicants should describe editing and economics skills and submit U.S. Form 171 to the editor-in-chief.