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## RESEARCH METHODOLOGY NOTES

### A DATA BASE IMPROVEMENT FOR ANALYSIS OF U.S. IMPORTS AND EXPORTS: PRICE INDICES BY END-USE, 1958:1-1974:4

BY SUNG Y. KWACK\*

I. Disaggregation by end-use categories makes the specification of trade equations clearer than alternative disaggregations and, consequently, is desirable to use for analyzing U.S. trade behavior. Quarterly data of trade value by end-use categories are readily available at least from 1953. However, end-use price indices are only available from 1967:1. Consequently, empirical studies on end-use disaggregations frequently call for such price indices prior to 1967. This note briefly describes the method used and the results achieved in calculating price indices by end-use categories over 1958:1-1974:4 in a consistent way.<sup>1</sup>

II. The interrelations between economic class and end-use trade for the year 1965 has been obtained from the Bureau of the Census.<sup>2</sup> Assuming the relations hold for other years, it is possible to calculate a consistent set of end-use price indices for periods prior to 1967 with the use of available price series for economic class.

The following procedures were used in creating the end-use price indices for the period 1958:1-1974:4.

(a) Because of limited information on the interrelations between economic class and end-use unit values, exports and imports are divided into three major categories: (1) foods, feeds and beverages, automotive vehicles, consumer goods, and others, (2) industrial supplies and materials, and (3) capital goods except automotive. Consumer goods exports (imports) hereafter are defined as those other than both industrial supplies and materials and capital goods excluding automotive.

(b) The interrelations between economic class and end-use price indices for the year 1965, derived on the basis of the Census information, are as follows:

$$PXC = 0.288PXM + 0.458PXC + 0.254PXF$$

$$PXISM = 0.277PXC + 0.391PXSM + 0.332PXF$$

$$PXC_{GEA} = (XT - XC - XISM) / ((XT/PXT) - (XC/PXC) - (XISM/PXISM))$$

$$PMC = 0.219PMM + 0.234PMCF + 0.028PMCM + 0.023PMSM \\ + 0.496PMFM$$

$$PMISM = 0.317PMCM + 0.406PMSM + 0.277PMFM$$

$$PMC_{GEA} = (MT - MC - MISM) / ((MT/PMT) - (MC/PMC) \\ - (MISM/PMISM))$$

\* The views expressed herein are solely those of the author and do not necessarily represent the views of the Board of Governors of the Federal Reserve System.

<sup>1</sup> Detailed discussions of calculated price indices and price and trade value series used are given in: *A Data Base Improvement for Analysis of U.S. Imports and Exports: Price Indices by End-Use, 1958:1-1974:4*, International Finance Discussion Papers, 65 (July, 1975), Board of Governors of the Federal Reserve System, Washington, D.C.

<sup>2</sup> Mr. Kwack gratefully acknowledges the assistance of the Foreign Trade Division, U.S. Bureau of the Census, which supplied the information.

where:

- MC = Import value of consumer goods including automotive and feeds and beverages  
MCGEA = Import value of capital goods except automotive  
MISM = Import value of industrial supplies and materials  
MT = Import value, all commodities  
PMC = Price index for imports of consumer goods including automotive and foods, feeds and beverages  
PMCGEA = Price index for imports of capital goods except automotive  
PMCM = Price index for imports of crude materials  
PMFM = Price index for imports of finished manufactures  
PMISM = Price index for imports of industrial supplies and materials  
PMMF = Price index for imports of manufactured foods  
PMSM = Price index for imports of semi-manufactures  
PMT = Price index for total imports  
PXC = Price index for exports of consumer goods including foods, feeds and beverages, and automotive  
PXCF = Price index for exports of crude foods  
PXCGEA = Price index for exports of capital goods, except automotive  
PXCM = Price index for exports of crude materials  
PXFM = Price index for exports of finished manufactures  
PXISM = Price index for exports of industrial supplies and materials  
PXMF = Price index for exports of manufactured foods  
PXSM = Price index for exports of semi-manufactures  
PXT = Price index for total exports  
XC = Export value of consumer goods including foods, feeds and beverages, and automotive  
XCGEA = Export value of capital goods, except automotive  
XISM = Export value of industrial supplies and materials  
XT = Export value, all commodities

(c) Using the relationships above and the available price data for economic class, the values of PXC, PXISM, PXCGEA, PMC, PMISM and PMCGEA are computed for the period 1958:1-1974:4.

III. To examine the quality of the computed end-use price indices, the calculated values of the price indices are compared to those published by the Bureau of the Census over 1967:1-1974:4. The mean bias, root mean squared error, and correlation coefficient given in Table 1 summarize the errors of the computed values compared with the actual. The computed indices seem to move closely with the actual values. The price indices for capital goods are the least satisfactory. The discrepancies in actual and computed capital goods price indices are not very surprising, however, considering that coverage in the compilation of the actual price index for capital goods changes in recent years and the unit value indices for manufactured goods are of poor quality. Nevertheless, the series which combines the computed values for the period 1958:1-1966:4 and the officially published values for the period 1967:1-1974:4 can be used as a first approxima-

tion in analyzing U.S. trade behavior, until the data of better quality are made available.

TABLE 1  
ERROR STATISTICS, 1967:1-1974:4

	Mean Bias	Root Mean Squared Error	Correlation Coefficient
PXC	0.021	0.087	0.994
PXISM	0.047	0.058	0.992
PXCGEA	-0.048	0.088	0.900
PMC	-0.053	0.068	0.991
PMISM	0.028	0.043	0.999
PMCGEA	0.126	0.160	0.912

Note: Mean Bias =  $(1/n)(\sum P - \sum A)$  and Root Mean Squared Error =  $\sqrt{(1/n)\sum(P - A)^2}$ , where  $P$  is the calculated value,  $A$  is the actual value, and  $n$  is the sample size.

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