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Volume Title: Price and Quantity Trends in the Foreign Trade of the United States

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Volume Publisher: Princeton University Press

Volume ISBN: 0-870-14154-6

Volume URL: <http://www.nber.org/books/lips63-1>

Publication Date: 1963

Chapter Title: Introduction to "Price and Quantity Trends in the Foreign Trade of the United States"

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Chapter URL: <http://www.nber.org/chapters/c1886>

Chapter pages in book: (p. 3 - 7)

PRICE AND QUANTITY TRENDS IN THE  
FOREIGN TRADE OF THE  
UNITED STATES



## Introduction

THIS study grew out of the National Bureau's interest in two related aspects of the international economic relations of the United States: "long-term movements of men, commodities, services, and securities . . . examined against the background of secular movements in the domestic economy . . ."; and the cyclical behavior of American international trade and finance.

In both trend and cycle studies, a major obstacle to the analysis of changes in commodity trade has been the lack of data needed in order to separate price from quantity changes over a long period. This investigation was undertaken mainly to provide comprehensive and detailed price and quantity indexes useful for long-term and for short-term analysis.

Data previously published consisted chiefly of official U.S. Department of Commerce indexes for total exports and imports and five major economic classes. These indexes provided annual figures for 1913 and 1919-28, and quarterly or monthly figures for later years. They are fairly satisfactory,<sup>2</sup> except that export coverage has recently become somewhat inadequate among finished manufactures. We accepted these Commerce indexes for the period after 1923, and have concentrated our attention on the earlier years for which the data were less reliable.<sup>3</sup>

The only existing indexes of total trade for 1879 to 1913 are those computed by Theodore J. Kreps.<sup>4</sup> These measured total exports and imports

<sup>1</sup> Arthur F. Burns, *The Cumulation of Economic Knowledge*, National Bureau of Economic Research, 28th Annual Report, May 1948, p. 22.

<sup>2</sup> The export and import price indexes of the Department of Commerce are appraised by the Price Statistics Review Committee of the National Bureau in *The Price Statistics of the Federal Government*, New York, National Bureau of Economic Research, 1961, Appendix A, pp. 79-86.

<sup>3</sup> For use in business cycle analysis, some provision must be made for filling the gap between the end of the NBER quarterly data in 1923 and the beginning of the Commerce quarterly data in 1929. A set of monthly export indexes constructed by Dudley J. Cowden in *Measures of Exports of the United States*, New York, 1931, can be used as an interpolator for the annual Commerce series for the 1924-28 period. On the import side, however, only a very inadequate American Tariff League index is available for intervals shorter than a year. We therefore produced a quarterly interpolating series for the five major economic classes of imports. The calculation of these is explained in Appendix D.

<sup>4</sup> "Import and Export Prices in the United States and the Terms of International Trade, 1880-1914," *Quarterly Journal of Economics*, August 1926.

A very crude pair of export and import price indexes was constructed from wholesale price data for 1866-78 by Frank D. Graham in "International Trade Under Depreciated Paper. The United States, 1862-79," *Quarterly Journal of Economics*, February 1922. These were extended back to 1860 by Matthew Simon in "The United States Balance of Payments, 1861-1900," in *Trends in the American Economy in the Nineteenth Century*, Studies in Income and Wealth 24, Princeton University Press for NBER, 1960. Douglass C. North presents new export and import price indexes for the U.S. in the period before 1860 in *The Economic Growth of the United States, 1790-1860*, Englewood Cliffs, N.J., 1961.

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only, with no breakdown by commodity group. They were heavily over-weighted with primary, as against manufactured, products, and were available only annually for years ending June 30.

Our new indexes are intended to give a more detailed and a more accurate picture of the period covered by Krepes and the early estimates of the Department of Commerce. The requirement that the data be useful for business cycle analysis necessitated the computation of quarterly indexes. Since quarterly data on imports for consumption were not published, we followed the somewhat asymmetrical procedure of using general imports (rather than imports for consumption) in combination with exports of domestic products.

Because we accepted the Commerce figures for the later period, no important alterations were made in applying the Commerce classification system to earlier years, even where changes seemed desirable to make the categories more homogeneous or economically significant.

We have, however, subdivided the Department of Commerce economic classes considerably and constructed a number of combinations of the detailed indexes. For example, Export Class 207 (foodstuffs, excluding tobacco and products) matches the two Department of Commerce food classes (crude and manufactured), while Export Class 208 (foodstuffs, including tobacco and products) was constructed to fit more closely into the United Nations classification<sup>5</sup> or that used by the United Kingdom. Some of the minor classes of Appendix C fit fairly well into the industrial classification of domestic output, although not as well, of course, as if they had been specifically designed for that purpose.

Commodity prices and volumes describe a good deal, but by no means all, of what one might wish to know in order to analyze the changing size and composition of American trade. The American data, unlike those of many other countries, exclude ocean freight costs on both sides of the account, thus removing the need for an f.o.b.=c.i.f. adjustment to make export and import data comparable. This characteristic of the data leaves the development of transportation costs outside the area of this study, although these costs are of great importance. A forthcoming study by Douglass C. North<sup>6</sup> should make possible a combination of commodity prices and transportation costs for much of the period covered here.

Another missing variable, on both the export and import sides, is the tariff. There is no information readily available on tariff rates applicable

<sup>5</sup> United Nations, *Standard International Trade Classification*, Statistical Papers, Series M, No. 10, 2nd Edition, New York, 1951.

<sup>6</sup> Summarized in "Ocean Freight Rates and Economic Development, 1750-1913," *Journal of Economic History*, December 1958.

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to exports; some kind of composite of the tariffs of importing countries would be the appropriate rate. For American imports there is a tariff index with U.S. wholesale price index weights covering the period 1907 through 1946.<sup>7</sup> There are also data, covering a much longer period, on the ratio of total tariffs collected to total dutiable imports, or total imports. These, as tariff indexes, have the obvious defect that the level of the tariff rate on a commodity influences the weight of the commodity in the index. A sufficiently high tariff could conceivably remove itself from the index by eliminating the import. Nevertheless, these ratios, which were used as tariff indexes by Humphrey<sup>8</sup> for example, were appraised by Lerdaу as being "far less suspect than it would appear on theoretical grounds."<sup>9</sup> Neither of these indexes is altogether satisfactory, but Lerdaу found that his had some net explanatory value in a correlation analysis in which the ratio of imports to gross national product was the dependent variable. Either of these indexes could be combined with our price indexes to produce a crude estimate of changes in the prices actually facing American purchasers of foreign goods.

A number of adjustments to the official series on the total value of U.S. exports and imports have been suggested, both in official customs reports and by independent scholars. We have incorporated into our indexes only those two adjustments which proved allocable by commodity, but it would be fairly simple to make other adjustments in the totals.

For example, exports by land, omitted from U.S. customs data before 1893, could be added. Matthew Simon, using Canadian import data,<sup>10</sup> made such an adjustment in the aggregate figures, but our attempt to break these down by commodity groups was frustrated by difficulties in matching Canadian and U.S. commodity classifications. For a number of products, exports reported by the U.S. were greater than the reported Canadian imports despite the presumed exclusion of exports by land from the U.S. data.

Simon also adjusted for a discontinuity in the prescribed method of valuation of imported commodities: he increased the 1884-91 values by 5 per cent to add certain inland freight and other costs. This followed a suggestion made by the Chief of the Bureau of Statistics.<sup>11</sup> We were not able to find any basis for applying this adjustment to individual com-

<sup>7</sup> E. Lerdaу, "On the Measurement of Tariffs: The U.S. Over Forty Years," *Economia Internazionale*, May 1957.

<sup>8</sup> Don Humphrey, *American Imports*, New York, 1955.

<sup>9</sup> "On The Measurement of Tariffs," p. 239.

<sup>10</sup> "The United States Balance of Payments, 1861-1900."

<sup>11</sup> U.S. Bureau of Statistics, Treasury Department, *Annual Report and Statement of the Chief of the Bureau of Statistics on the Commerce and Navigation of The United States, 1884*, p. XI.

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modities. Since it could have varied a great deal from one commodity to another, we did not take it into account at all.

We have tampered with the official value series in only two ways. The first was a correction for the overvaluation of imports from Brazil in the early 1890's which resulted from the depreciation of the paper milreis. The error was conspicuous and was concentrated in two important commodities, coffee and rubber. More realistic values were estimated by using official quantity data (which were not affected) in combination with outside data on rubber and coffee prices. A description of the adjustment is given in Appendix C.

Official values were further adjusted for changes in the U.S. customs area which took place in 1900. Here again the adjustment, which is described in Appendix F, rested on fairly reliable data and was concentrated in two commodities, exports of green coffee and imports of sugar.

Many fundamental questions about the meaning or validity of long-term comparisons of price levels and terms of trade have been ignored here, as in most empirical discussion of these problems. Except in Chapter 3, where several types of index numbers are compared, we have generally used the Fisher "ideal" indexes to represent "price" and "quantity" as if these terms were unambiguous and independent of the particular weights from which they were computed. It is also assumed that the shift after 1923 from one type of index to another, and the shifts from one base (or weighting pattern) to another before that date, do not by themselves make comparisons meaningless.

The first two chapters survey the outstanding changes in the foreign trade of the United States over the last eighty years. The remaining chapters deal primarily with the construction of the NBER indexes, appraisals of their quality, and an interpretation of the relations among the several types of indexes.

Chapter 1 sets forth the findings on U.S. export and import prices, and their relation to domestic prices and to the export prices of other countries. It describes the evidence relating to the terms of trade of the United States and the terms of trade of primary and agricultural products. Relations between price and productivity changes are also discussed.

Chapter 2 is concerned mainly with quantity trends in relation to domestic output and to the trade of foreign countries. Possible price-quantity reactions are also explored.

The method by which the NBER indexes were constructed is explained in Chapter 3, and comparisons of Paasche and Laspeyres indexes are used as evidence of the connections between price and quantity changes.

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Characteristics of the basic data on export and import quantities and prices are discussed in Chapter 4, with particular reference to the problems involved in using unit value data as prices.

Chapter 5 contains an account of the use of sampling ideas in the construction and appraisal of index numbers and describes estimates of sampling error in the NBER indexes.

Finally the new price and quantity indexes are compared, in Chapter 6, with those of Kreps and the Department of Commerce, as well as with indexes of the Department of Agriculture and the Bureau of the Census.