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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: Comparison of NBER Indexes with Others

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Chapter URL: <http://www.nber.org/chapters/c1892>

Chapter pages in book: (p. 128 - 137)

## CHAPTER 6

### Comparison of NBER Indexes with Others

#### *U.S. Department of Commerce Indexes*

SINCE the NBER and Department of Commerce indexes have been combined to obtain the long series used in Appendix A and Chapters 1 and 2, it is of interest to check their consistency for the years in which they overlap, 1913 and 1919-23. Perfect agreement between the indexes could not be expected, even though both are Fisher "ideal" indexes. The Commerce series were computed with annual linking, each year serving as the base for the following year, while the NBER indexes use 1923 as a base for all the years compared. Furthermore, the value series are slightly different: we have attempted to use the 1949 classification of commodities throughout, and shown overlaps wherever there are changes in the composition of a class, while the Commerce Department used the contemporary classification and ignored small changes in composition. In addition, there are differences in weighting: the Department of Commerce in its computations, moves directly from individual commodities to its five economic classes; the NBER indexes are built up from individual commodities through minor and intermediate classes to major groups, in an attempt to give each class, rather than just each commodity, its proper weight.

Despite all these possible sources of disagreement the two indexes match very well in most years—so well that they could hardly be distinguished on a chart. We therefore compare them, in Table 21, by examining the ratios of the Commerce to the NBER series, year by year and for the period as a whole. Between 1913 and 1923 the Commerce indexes for total exports and imports increased slightly faster than our own. The ratio of 1923 to 1913 was 3 per cent greater in the Commerce series for imports and only 0.3 per cent for exports. In none of the year-to-year indexes for the totals was the divergence more than 5 per cent.

Among the ten comparisons for economic classes (five import and five export) there were three cases where the ratio of the Commerce to the NBER index increased by 6 to 7 per cent over the period as a whole. Among the fifty year-to-year comparisons there were three where the difference was greater than 10 per cent. One of these three was imports of manufactured foods, 1920/1919, for which the Commerce index was 207.8 and our index 184.8. The most important commodity in this class was cane sugar, weighted in the Commerce index<sup>1</sup> at 78 to 93 per cent. This is

<sup>1</sup> Unpublished details of the commodity composition of the Department of Commerce indexes were supplied to us by Mr. Carl P. Blackwell, Director of the International Economic Analysis Division, Bureau of Foreign Commerce.

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considerably greater than its importance in the NBER index.<sup>2</sup> The role of sugar prices in the discrepancy between the indexes is confirmed by the fact that whenever the price relative for sugar was above the two indexes the Commerce index was higher; whenever it was below, the NBER index was higher.<sup>3</sup>

A similar case is the crude materials export index which contains the largest 1923/1913 discrepancy and the third largest year to year discrepancy. The commodity responsible is raw cotton, which Commerce weights 9 to 18 per cent more heavily than we do. Here again the Commerce index is higher when the cotton price relative is higher than the two indexes and lower when the cotton price is lower.

In both of these instances the greater number of commodities in the

TABLE 21  
RELATION OF COMMERCE TO NBER PRICE INDEXES,  
1913-23, YEAR-TO-YEAR COMPARISONS

	<i>Commerce Index as Per Cent of NBER Index</i>					
	1919 1913	1920 1919	1921 1920	1922 1921	1923 1922	1923 1913
<b>Exports</b>						
Total	102.3	100.6	95.7	101.4	100.0	100.3
Crude materials	102.9	95.9	93.6	110.6	104.4	106.8
Crude foodstuffs	100.0	100.2	99.8	103.2	99.2	102.2
Manuf. foodstuffs	101.3	100.5	97.8	99.9	99.4	98.9
Semimanufactures	99.6	101.3	101.2	100.8	98.9	101.8
Finished manufactures	112.6	100.3	95.1	97.6	96.1	100.7
<b>Imports</b>						
Total	103.6	97.7	98.4	100.7	102.8	103.1
Crude materials	100.5	99.8	100.0	103.1	102.8	106.3
Crude foodstuffs	97.6	98.7	98.0	101.7	100.9	96.9
Manuf. foodstuffs	100.7	112.4	91.3	97.8	105.4	106.6
Semimanufactures	94.7	103.0	102.1	98.5	100.8	98.9
Finished manufactures	96.8	100.6	102.3	99.2	104.7	103.5

SOURCES: Commerce indexes: U.S. Department of Commerce, *Foreign Trade of the United States, 1936-49*, International Trade Series No. 7, 1951, Table 10, p. 6 and Table 13, p. 9. NBER indexes: Appendix Tables A-1 and A-3.

<sup>2</sup> It is difficult to measure the weight of a single commodity in the NBER indexes. The weight of a commodity is amplified by the coverage adjustments as minor and intermediate classes are combined. But even if we estimate a maximum weight for sugar by adding the weight of all uncovered items in manufactured foods to that of sugar, clearly an overestimate, its weight in our index remains below that in the Commerce index. The greatest discrepancy is in the 1919/1913 comparison where the Commerce weight is more than 25 per cent larger than even our maximum.

<sup>3</sup> The sugar price relative was never between the two indexes.

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NBER sample as well as the method of weighting tend to reduce the importance of the single dominant commodity.

The discrepancy for exports of manufactured products, 1919/1913, the largest in Table 21, has a different origin: the heavier weight in the NBER index of two groups with below-average price increases. These are vehicles, with a lower price ratio in the NBER index as well as a greater weight (perhaps double),<sup>4</sup> and machinery, heavily weighted in our index while virtually omitted from the Commerce series. The machinery component of the NBER index was constructed entirely from outside price data.

The measures listed in Table 21 might be said to understate the differences between the two series because they are comparisons of index numbers themselves, rather than of changes in them. In two classes the Commerce and NBER import price indexes moved in opposite directions in 1923: crude foods, where NBER showed a decline of 0.2 per cent and Commerce a rise of 0.7 per cent; and finished manufactures, where the NBER index fell 1.1 per cent and the Commerce index rose 3.5 per cent.

In other instances the changes were much more divergent than the indexes themselves. In 1923 again, the ratio of export price indexes for finished manufactures was 96.1 per cent. But the Commerce price index fell by 4.5 per cent and the NBER index by only 0.6 per cent; the Commerce index thus declined by 7.5 times as much. Another example, not so dependent on the smallness of the denominator, was in exports of crude materials in 1922. Here the Commerce index rose 25 per cent, almost twice as much as ours.

### *Kreps Indexes for Exports and Imports*

The only comprehensive indexes duplicating the NBER series for an extended period are those compiled by Theodore J. Kreps.<sup>5</sup> These are annual Marshall-Edgeworth price indexes for total exports and imports covering fiscal years 1879 through 1916, on a 1903-13 base. Kreps used unit values as import prices and U.S. wholesale prices as export prices. The import index included twenty-nine commodities, covering 30 to 40 per cent of total imports; the export index, twenty-eight commodities covering 40 to 45 per cent of total exports.

A comparison of the Kreps and NBER export price series (Chart 27)

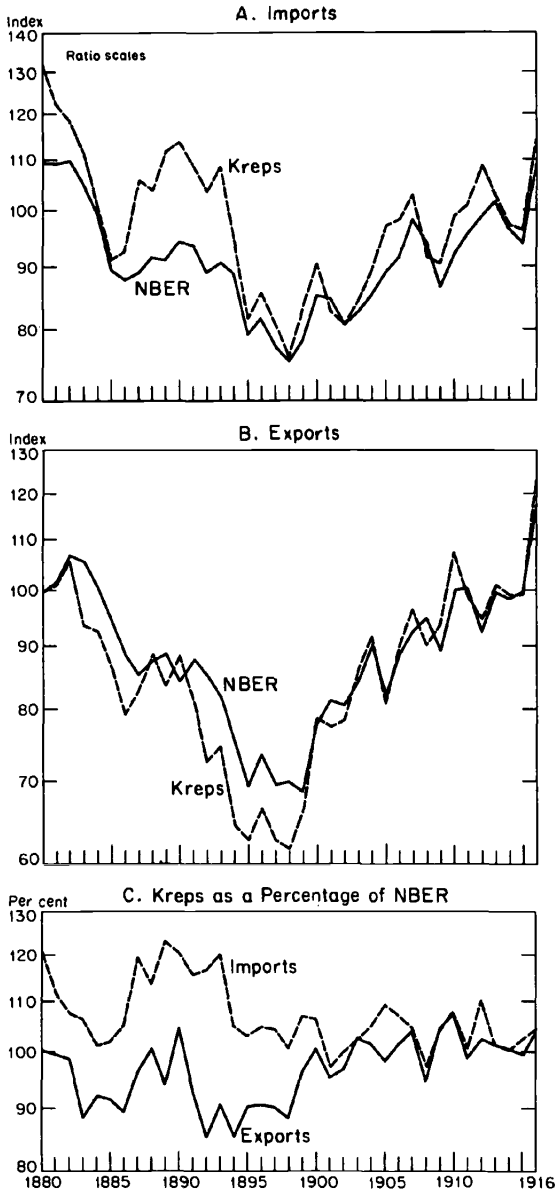
<sup>4</sup> Our index was constructed from price data instead of the unit values used in the Commerce index. By both measurements the price ratio for vehicles was very low.

<sup>5</sup> "Import and Export Prices in the United States and the Terms of International Trade, 1880-1914," *Quarterly Journal of Economics*, August 1926.

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CHART 27

U.S. Export and Import Price Indexes: Kreps and NBER, Fiscal Years  
(calendar 1913 = 100)



Source: Appendix Table G-1.

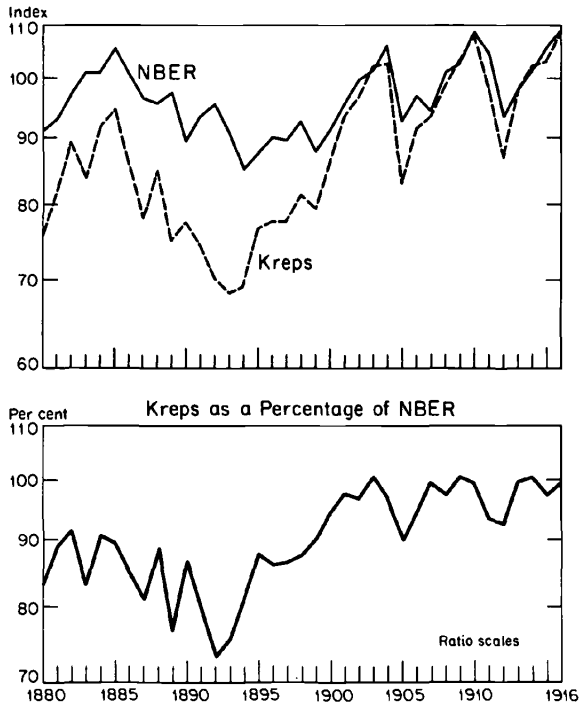
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shows a fairly similar trend between 1880 and 1913 if only the first and last years are taken into account. But the Kreps index was generally below ours before 1900 and could be said to have shown some upward trend by comparison. In addition, its fluctuations were sharper, particularly the decline during the depression of the 1890's and the subsequent rise.

The import price series reveal larger disagreements, as high as 20 per cent or more compared with a maximum of 15 per cent between the two export series. As in exports, the divergences are concentrated in the period before 1900. But there is a somewhat stronger trend in the ratio of the Kreps index to ours—downward in the case of imports. The fluctuations in the Kreps index are more violent, particularly before 1900.

Since Kreps' export price index rose relative to ours, and his import index fell, the two indexes of the terms of trade of the United States

CHART 28  
U.S. Terms of Trade Indexes (Exports ÷ Imports),  
Kreps and NBER, Fiscal Years  
(calendar 1913 = 100)



Source: Appendix Table H-2.

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showed a greater divergence than either of the components. The disagreement is considerable; as can be seen in Chart 28, the Kreps index fell as far as 27 per cent below ours, on a 1913 base.

The Kreps indexes give a much more favorable picture of the development of the terms of trade, showing an improvement of almost a third between 1879 and 1913 instead of the 10 per cent indicated by the NBER indexes, and more than 40 per cent between 1894 and 1913 instead of less than 20. Furthermore, the NBER terms of trade series fluctuates less violently, even after 1900.

The distribution of weights among economic classes in the two indexes is compared in Table 22. Weights in the base period of the Kreps index, 1903-13, are compared with those of the 1899 base for the NBER index, and a similar comparison is made of 1892 weights for exports and 1890 weights for imports (these are the years in which the two indexes were furthest apart).

The main source of the differences in export indexes must have been the much heavier weighting of raw cotton by Kreps. This was a massive 42.7 per cent of the base-year weight of the Kreps index,<sup>6</sup> and only between 15 and, at the very most, 25 per cent of the 1899 base in the NBER index.<sup>7</sup>

In 1892 the two sets of export weights show a large discrepancy only in one class, manufactured products, but the base-year data show that Kreps weighted both crude foodstuffs and manufactured products less than half as heavily as the NBER indexes and gave crude materials more than twice as much weight.

No single commodity stands out on the import side as did raw cotton among exports. The main differences are the much higher weights assigned by Kreps to crude foodstuffs and the much lower ones assigned to manufactured products. Prices for the latter group in our calculations were below the average of all other commodities relative to 1899 and considerably smoother in their fluctuations.

#### *USDA Index of Agricultural Export Prices*

The United States Department of Agriculture has published several indexes of agricultural export quantities and values. The one which best matches the NBER index is a Laspeyres quantity index on a fiscal 1909-14 base. We have converted it into a Paasche price index, for comparison with our series, by dividing it into the Agriculture Department's value series.

<sup>6</sup> Given-year weights could be assumed to be more similar for the two series.

<sup>7</sup> It was during the 1889-99 period that the greatest gaps between the two indexes appeared.

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TABLE 22

DISTRIBUTION OF WEIGHT BY MAJOR CLASS, NBER AND KREPS EXPORT AND IMPORT PRICE INDEXES

	Base Year			Given Year		
	Kreps: Fiscal 1903-13 (1)	NBER: Calendar 1899 (2)	Col. (1) ÷ Col. (2) (3)	Kreps: Fiscal 1892 (4)	NBER: Fiscal 1892 (5)	Col. (4) ÷ Col. (5) (6)
<i>Exports</i>						
Crude foodstuffs	9.1	18.5	49.2	28.8	25.9	112.2
Manuf. foodstuffs	16.6	25.0	66.4	20.6	24.3	84.8
Crude materials	46.8	22.8	205.3	39.5	32.1	123.1
Semimanufactures	16.9	11.6	145.7	4.7	5.5	85.5
Manufactured products	10.6	22.1	48.0	6.4	12.2	52.5
Total	100.0	100.0		100.0	100.0	
<i>Imports</i>						
	Kreps: Fiscal 1903-13	NBER: Calendar 1899	Col. (1) ÷ Col. (2)	Kreps: Fiscal 1890	NBER: Fiscal 1890	Col (4) ÷ Col (5)
Crude foodstuffs	22.1	12.9	171.3	27.2	16.9	160.9
Manuf. foodstuffs	16.2	18.2	89.0	19.2	17.1	112.3
Crude materials	43.6	30.4	143.4	25.6	21.0	121.9
Semimanufactures	12.5	17.3	72.3	12.2	16.5	73.9
Manufactured products	5.6	21.2	26.4	15.8	28.5	55.4
Total	100.0	100.0		100.0	100.0	

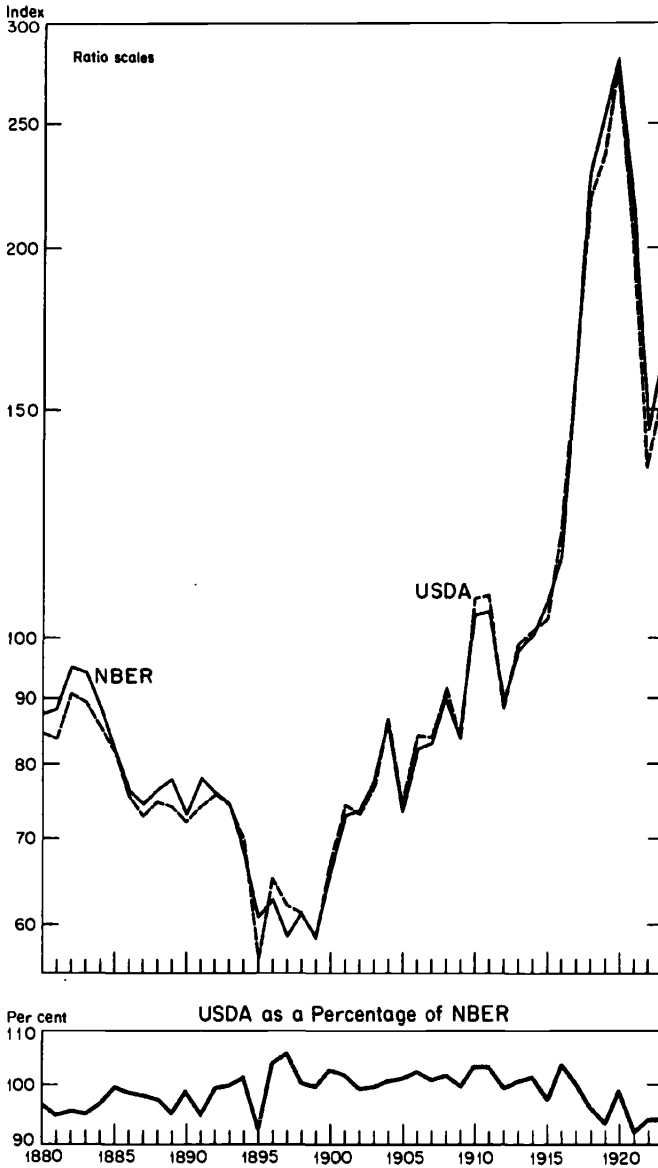
SOURCE: Kreps figures from "Import and Export Prices."

Comparison with the NBER Fisher indexes reveals a remarkable similarity despite the use of different base years and index number formulas. When both indexes are placed on a 1913 base they never differ by as much as 10 per cent and, before World War I, only once by more than 5 per cent (Chart 29). The ratio of the USDA index to ours shows no trend. It is almost a straight line, but droops slightly at the ends. The 1899 to 1913 period, when the base periods for the two indexes are very close and fluctuations in the ratio are at a minimum, is also the one where the ratio is at its highest.



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CHART 29  
 U.S. Agricultural Export Price Indexes: U.S. Department  
 of Agricultural and NBER, Fiscal Years  
 (calendar 1913 = 100)



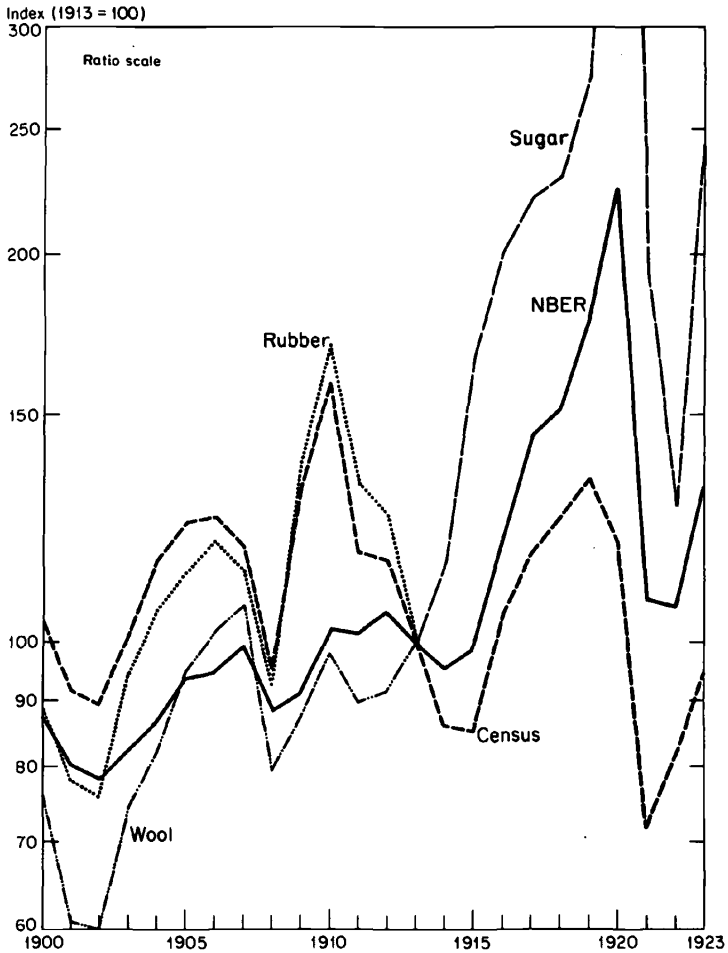
Source: Appendix Table A-24; and USDA, Foreign Agricultural Service, *United States Farm Products in Foreign Trade*, Statistical Bulletin No. 112, 1953, p. 7, divided by quantity indexes, p. 9, converted to 1913 base.

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Census Bureau Price Index for Foreign Agricultural Materials

The Bureau of the Census has published a Laspeyres index of U.S. prices of foreign agricultural materials<sup>8</sup> on a 1935-39 base, with U.S. consumption rather than import weights. The prices are not import unit values

CHART 30  
Prices of Imported Agricultural Products: NBER and  
Bureau of the Census



Source: Appendix Table A-5; Appendix C; and U.S. Bureau of the Census, *Raw Materials in the U.S. Economy, 1900-1952*, p. 90.

<sup>8</sup> *Raw Materials in the U.S. Economy, 1900-1952*, Bureau of the Census Working Paper No. 1, Washington, 1954.

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but are prices "quoted on organized exchanges or markets" at a stage representing "the first important commercial transaction in the commodity after arrival in this country."<sup>9</sup>

The NBER series closest in coverage to the Census index is Import Class 209 (agricultural products). This class is, however, more comprehensive than the Census series because it covers all agricultural products while the Census excludes those which are produced to a substantial extent in the United States, no matter how important they are among imports.

Discrepancies between the two indexes arise not only from differences in coverage, but from the Census Bureau's use of a later base period, consumption rather than import weights, and prices rather than unit values (this last is probably of little significance).

It is clear in Chart 30, that the discrepancies between the two series are very large. The Census index has a strong downward trend by comparison with the NBER series and, in the earlier part of the period, quite different fluctuations as well. After 1913 most of the difference between the two indexes can clearly be attributed to sugar which is the second most important commodity in the NBER index but is excluded from the Census index because it is considered a domestic agricultural product. Other, but less important, factors in these years are the lighter weight of silk and the absence of wool in the Census index. Both commodities rose in price faster than the average.

In the years before 1913 the fluctuations in the Census series follow those of rubber fairly closely, while the NBER index does not. That is because the weight of rubber in the Census index is almost three times that in ours. The falling trend of the Census index relative to our own can be explained mainly by the absence from it of wool prices, which rose sharply. The Census Bureau considered wool, like sugar, a domestic agricultural product.

<sup>9</sup> *Ibid.*, p. 84.

