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Data and Methods

1. Source and Nature of U.S. Export Data

This analysis covers the quarterly value, price, and quantity (i.e., value in constant prices) of total U.S. exports and of the major commodity classes for 1879–1961. The long time span satisfies one major requirement of the analysis—that it should include a substantial number of cycles. Each business cycle has its own peculiar features, and we cannot discover the common characteristics of the cyclical behavior of exports unless numerous instances are observed.

There are, of course, those who believe that it is vain to look for systematic features in business cycles, that each cycle is a unique historical episode having little in common with earlier and later events. This view may seem particularly true of a business like exporting which may be expected to depend considerably on such overpowering forces as political and military upheavals, natural disasters, discoveries, inventions, changes in public tastes. In this view, nothing is to be gained by assembling a large number of observations which are useless to begin with.

Whether such skeptics are right or whether export cycles do have systematic features is a question of fact that can only be answered empirically. Our measures leave no doubt about the power of systematic forces, which shows up in the high degree of consistency among different cycles in a given series, as well as among simultaneous cycles in related series. That these systematic features recur over a period as long as eighty years is particularly impressive.

There are some unique events, however, that really blot out the normal forces, such as the two world wars, which cast an even longer shadow on international trade than on domestic business. The years 1914–20 and 1939–44 have been excluded in all instances and 1945–47 in most cases. Furthermore, we found that export movements during the great depression cycle, 1929–37, differ in important ways from those in other cycles. Since the amplitudes of these exceptional movements are enormous, their inclusion tends to dis-

tort measures of average behavior. They are therefore often, though not always, excluded.

The quarterly time units meet another important requirement of the data. During the century from 1854 to 1954, business expansions in the United States have lasted on the average about thirty months, and contractions about twenty.¹ The shortness of these time spans makes annual data an exceedingly crude measure for studying business cycles. Summations by years sometimes obliterate cyclical fluctuations altogether, and when the cycles corresponding to those in monthly or quarterly data do appear, they are often distorted. Durations are different, amplitudes flattened, and timing relations obscured. Wherever possible, therefore, series in shorter time units must be the basis of cyclical analysis. Since export price and quantity indexes are available quarterly, though not monthly, this investigation is made in terms of quarterly data throughout.

Export values are the official customs data published first by the Treasury Department and later by the Commerce Department.² Export price and quantity indexes for the earlier years, 1879–1923, have been constructed recently at the National Bureau by Robert E. Lipsey and are published in his *Price and Quantity Trends in the Foreign Trade of the United States*. This book contains a full description of the sources and a thorough discussion of the methods by which the indexes were constructed.³

Beginning with 1929, quarterly Department of Commerce price indexes are available. The gap, 1924–28, has been filled by monthly indexes, constructed by Dudley J. Cowden, which have been converted into quarterly series. The Lipsey series, 1919–23, and the Commerce series, 1929–38, have been linked to the Cowden series on either end.⁴

The selection of commodity classes to be analyzed was necessarily determined by the availability of continuous price indexes. The Department of Commerce classes are: crude foods, manufactured foods, crude materials, semimanufactures, and finished manufactures. We have combined the two foods classes into one in order to eliminate the fluctuations in these highly erratic series that are

¹ Geoffrey H. Moore, ed., *Business Cycle Indicators*, Princeton for NBER, 1961, Vol. I, p. 121.

² For source and description, see Appendix A.

³ Published by Princeton for NBER in 1963. Data and indexes are described in Chapters 3 and 4 and compared with the Commerce indexes in Chapter 6. The quarterly series (seasonally unadjusted) are in Appendix A.

⁴ Dudley J. Cowden, *Measures of Exports of the United States*, New York, 1931.

attributable to shifts between crude and manufactured foods, largely between grain and flour, and that obscure the cyclical picture. The resulting class "foods" corresponds roughly to the British class foodstuffs and to the United Nations classification, the main exception being that tobacco is excluded from foods in our case.

Because of the insignificant amounts of semimanufactures exported in the earlier decades, we have combined this class with crude materials for 1879-1913. We have not introduced a new name for this composite series but refer to it simply as crude materials. The analysis thus deals with three commodity classes for 1879-1913 and with four classes for 1921-61.

One adjustment we made to the Lipsey-Commerce series ought to be noted: export values and prices for 1933-38 are converted from current into predevaluation dollars. This was done in order to measure U.S. export changes by the same yardstick by which world import changes are measured in those years.

Export values and quantities undergo large seasonal fluctuations which obscure their cyclical patterns and therefore have to be removed. Most price series also show some seasonal variations, albeit mild ones, and have been corrected. The seasonally adjusted export figures are given on Charts 2-15 (at the end of this chapter), where export turning points are indicated by dots and U.S. business recessions by shaded areas; world import turning points are shown at the top of the graphs. These charts have been consulted at every step of the analysis and should be referred to by the reader throughout the book. The underlying figures for the charts are given in Appendix A where there are also further notes on the construction of the series.⁵

The enormous changes in the commodity composition of U.S. exports during the eighty-odd years covered are of the greatest importance for our analysis. Since an excellent analytical description of these shifts has, however, been given only recently by Lipsey, we omit the topic here.⁶ A summary view of the changes between and within the major commodity classes is provided by the tables in Appendix B.

⁵ See also my *American Exports During Business Cycles, 1879-1958*, Occasional Paper 76, New York, NBER, 1961, p. 71.

⁶ Lipsey, *Price and Quantity Trends*, pp. 45-60. For a history of U.S. exports in 1879-1913, see G. G. Huebner, "The Foreign Trade of the United States since 1789," in *History of Domestic and Foreign Commerce of the United States*, Emory R. Johnson, ed., Washington, 1915, Vol. II. Further, see Matthew Simon and David E. Novak, "Some Dimensions of the American Commercial Invasion of Europe, 1871-1914," *The Journal of Economic History*, December 1964.

2. Quality of U.S. Export Data

Like most economic statistics, export data leave much to be desired, even the best of them, the value series. Their most important limitations are the inaccuracies of early export returns, the timing of the early monthly data (which sometimes represent the values compiled in a given month rather than those exported in that month), and the omission or incomplete inclusion of exports by rail to Canada and Mexico before 1915. However, despite their shortcomings, these can be regarded as among the best statistics available.⁷

Deficiencies in export price and quantity data are more serious than those in export values. Genuine export price indexes, based on direct price observations, do not exist either for the United States or for most other countries.⁸ Instead, the indexes used are unit values, i.e., values traded divided by corresponding quantities. The fault with such unit values is that they reflect not only price changes but also changes in the qualities of goods and changes in the composition of the basic commodity groups, whenever such groups comprise goods with divergent price movements. Even worse, goods for which no quantity is reported are simply not covered by the unit value indexes. This happens especially in highly differentiated manufactured goods.

⁷ As Wesley C. Mitchell said in an unpublished draft of a chapter on foreign commerce: "Mercantilism has produced at least one wholesome result: it has led governments to keep relatively full and careful records of imports and exports. No other type of trade has so long or so adequate a statistical record. Of course the economist who is using these data for any purpose complains of their defects; by the nature of his calling he is ungrateful creature who must begin an investigation by pointing out the limits of the data in scope and in reliability. We follow this time-honored precedent; but we wish that the available records of domestic production and exchange were equal to those of foreign trade."

See also Lipsey, *Price and Quantity Trends*, pp. 91-92, and the sources cited there; and Matthew Simon, in *Trends in the American Economy in the Nineteenth Century*, Studies in Income and Wealth 24, Princeton for NBER, 1960.

It should also be noted that Oskar Morgenstern's sharp criticism of trade statistics applies to data on trade between individual countries, not to total trade. Clearly it is one thing to record all goods leaving or entering a country and quite another thing to classify such goods accurately by country of sale or purchase. (Oskar Morgenstern, *International Financial Transactions and Business Cycles*, Princeton for NBER, 1959.)

⁸ Export price indexes were developed by Germany and Japan in the 1950's. For the United States the National Bureau has started to develop new data of high quality. As a first step, price indexes for manufactured metal products have been constructed for selected years since 1953. (See Irving B. Kravis, Robert E. Lipsey, and Philip J. Bourque, *Measuring International Price Competitiveness: A Preliminary Report*, Occasional Paper 94, New York, NBER, 1965.)

U.S. export price data for 1879–1923 suffer less from these deficiencies than most or all other data because Lipsey used quoted prices in conjunction with unit values. Also, in those earlier years, when a large part of exports consisted of relatively homogeneous, staple commodities, the disadvantages of unit values are not as serious as in recent years.

For later years, however, the only available U.S. export price indexes are those compiled by the Department of Commerce on the basis of unit values. With the expansion in importance of finished manufactures for which quantity measures are often not available, the proportion of exports directly represented in these indexes has gradually diminished. In recent years, only 20 to 25 per cent of finished manufactures have been covered directly.⁹ The situation is thus the reverse of the usual one: the data for the earlier years command more confidence than those for the later ones.

Since quantity indexes are derived by dividing prices into values, their errors are inversely correlated with those in prices. If errors impart a bias to the timing or amplitude of the latter, spurious price-quantity or value-quantity relationships may result. Nevertheless, economists everywhere use unit values in studies of foreign trade because they cannot explain the behavior of current dollar values of exports without distinguishing, however roughly, between their quantity and price components. That sensible and enlightening results can be achieved by analyzing export unit values is illustrated by such leading empirical studies of international trade as, for instance, Lipsey's on U.S. trade, Imlah's on the history of British trade, Maizel's book on growth and world trade, or Kindleberger's analysis of the terms of trade.¹⁰ The findings which will be described in the following chapters should also argue for the data.

In a recent study of the finished manufactures exports of eleven industrial countries in 1953–63, Rhomberg and Junz find that "unit value indices are the most useful indicators currently available for the measurement of price competitiveness of manufactures in international trade."¹¹

It may also be noted that, in the United States, total export prices

⁹ Department of Commerce, *Overseas Business Reports*, May 1964, p. 2.

¹⁰ Lipsey, *Price and Quantity Trends*; Albert H. Imlah, *Economic Elements in the Pax Britannica*, Cambridge, Mass., 1958; Alfred Maizel's, *Industrial Growth and World Trade*, Cambridge, Mass., 1963; Charles Kindleberger, *The Terms of Trade*, New York, 1956.

¹¹ Helen B. Junz and Rudolph R. Rhomberg, "Prices and Export Performance of Industrial Countries, 1953–63," *Staff Papers*, IMF, July 1965, p. 259.

(which are unit values) and domestic wholesale prices moved similarly in 1879–1961, despite the differences in methods of construction and in commodity coverage (see Charts 21 and 22 and Table 4).¹²

3. *World Imports as an Indicator of Foreign Demand*

An analysis of export cycles cannot dispense with an indicator of foreign demand. This presents a serious problem, however. In order to match the export data and to meet the requirements of cyclical analysis, a quarterly series is needed. But for the earlier part of the period there are no relevant quarterly global data of any sort, either on output, income, or trade, so it was necessary to compile a series. We decided to do this for world imports for which at least annual figures and materials for interpolation were available for 1880–1928 and a quarterly series from 1929 on. The series is presented and described in Appendix C, but it should be noted here that U.S. imports have been excluded from the world total in order to obtain an indicator of *foreign* demand. The final series is defined as the dollar value of all merchandise imported by the world outside the United States. For convenience, it will be referred to as world imports or world trade.

It is important to realize that global imports are a more satisfactory indicator of foreign demand for a country's exports than world income would be, assuming that the data were available. First, the relative weights of different countries in international trade are more relevant here than their weights in global income. Second, any shifts in the relation of imports to incomes disturb the latter's, but not the former's, relations to exports.¹³

¹² For a full discussion of unit value indexes, see Lipsey, *Price and Quantity Trends*, Chapter 4. Of particular interest here are Lipsey's comparisons between unit values and domestic prices of individual commodities with respect to timing and amplitude of fluctuations. He finds that unit values tend to lag behind prices, but that these lags are seldom more than one quarter. Furthermore, unit values—contrary to expectations—tend to be somewhat more volatile than prices.

For a critique of export price indexes, see *The Price Statistics of the Federal Government*, New York, NBER, 1961, pp. 79–86.

¹³ For these reasons world trade rather than world income has been used even by investigators dealing with annual data. J. J. Polak (*An International Economic System*, Chicago, 1953, p. 51), for instance, presents the above arguments more fully, noting in particular that "the imposition of import controls in the 'thirties, reducing imports compared to national income, does not invalidate the explanation of exports of any one country if the explanatory variable is world trade . . .

The question arises whether, in addition to American imports, American exports should also be excluded from our world import series in order to avoid comparing them with an aggregate of which they are a part. However, as an indicator of foreign demand for U.S. exports, we consider the series chosen—total foreign imports—preferable to a series representing the imports of foreign countries from each other. Fluctuations in the former reflect more closely fluctuations in general business abroad and hence correspond in concept to domestic business cycles. The argument in favor of foreign imports excluding U.S. exports—that they are independent of domestically induced changes in U.S. exports—is not very strong, since foreign exports can, to a considerable extent, be substituted for American ones.¹⁴ At any rate, this question is not important since it makes little difference to our findings whether one series is used or the other.

Though the world import series is the best tool available, it still leaves much to be desired. In the early years, even the annual figures are probably fairly rough estimates and the quarterly interpolated values are even less precise. Worst of all, global imports represent only total foreign demand. No series have been compiled for

but when world income is used as the explanatory variable, a large residual appears.”

See also Angus Maddison, “Growth and Fluctuations in the World Economy, 1870–1960,” *Banca Nazionale del Lavoro Quarterly Review*, June 1962, p. 140.

Hal B. Lary (*The United States in the World Economy*, Washington, 1943, p. 65) has leveled a different criticism at the use of world income as an indicator of foreign demand. He is concerned with the distortions caused by shifting national prices and exchange rates in current income values. This objection also applies to the value of world imports, but to a lesser extent, since the prices of imports of different countries are more closely interrelated than the prices entering their national incomes.

We may add that, despite conceptual differences, the movements of annual series of world production and world trade in 1948–58 were found to have been quite similar. A correlation coefficient of .99 is reported by Joseph D. Coppock (*International Economic Instability*, New York, 1962, pp. 30–33), who comments: “The first striking fact is that total [non-Communist] world exports amounted to about 12 per cent of total [non-Communist] world production for nearly every year from 1948 to 1958. The average of the 11 annual percentages was 12.4, and the dispersion around this average percentage was only from 11.5 to 13.1.”

¹⁴ For instance, a decline in U.S. exports for domestic reasons—say, due to a poor harvest—is likely to cause a rise in foreign exports. Thus movements in intraforeign imports depend in part on those in U.S. exports, and interpretation of the relations between the two series would in most cases require reference to the more inclusive aggregate.

For evidence on the similarity of the two series, see my *American Exports*, p. 26, and Charts E-1, E-2, and E-3.

world counterparts to the U.S. commodity classes and for world import quantities and prices.¹⁵

4. *Relation of World Import Cycles to U.S. Business Cycles*

The world import series is plotted, together with U.S. exports, in Charts 16, 17, and 18. Cycles in world imports have been marked off and turns are indicated by dots and, in addition, are shown at the top of the graphs. Six peak-to-peak cycles from 1883 to 1913 can be seen, three trough-to-trough cycles in the interwar period, and two-peak-to-peak cycles from 1948 to 1957, followed by a contraction which reached its trough in 1959. The expansion which began at that time still had no recognizable peak in 1965.¹⁶ The duration of the eleven full cycles was about five years on the average, considerably longer than that of American cycles in general business, which, of course, is not surprising. For once, American cycles were short relative to those in other countries. Furthermore, the strong upward trend in world trade which prevailed much of the time caused some contractions to remain submerged.¹⁷ Finally, world trade cycles represent fluctuations in many countries which are likely to offset each other to some extent. The relative mildness of world import cycles may likewise be attributable to the stability of a large aggregate.

¹⁵ The rough estimates of world trade quantities and prices for 1880-1960 given by Maddison ("Growth and Fluctuations," pp. 185 and 189) are annual, not quarterly.

Some authors have substituted British for world prices in studies of long-run trends, but this is not advisable in cyclical analysis. (See Lipsey, *Price and Quantity Trends*, p. 74, on the error introduced even in long-run analysis by the use of British in lieu of world prices.)

A world price index constructed by Tinbergen and used by him and by Pasmazoglu in the analysis of British export cycles is annual and an average of only a few prices (cotton, iron, and steel) of three or four countries' exports. (Jan Tinbergen, *Business Cycles in the United Kingdom, 1870-1914*, Amsterdam, 1951, p. 15 ff., and J. S. Pasmazoglu, "Some International Aspects of British Cyclical Fluctuations, 1870-1913," *Review of Economic Studies*, 1949-50, no. 41, p. 124.)

¹⁶ The omitted war periods are longer here than is customary in studies of domestic cycles. For obvious reasons, the normal flow of foreign trade—and also the compilation of statistics on world trade—suffered longer interruptions than American business. Therefore, the last turn determined before World War I is the peak of 1913 and the first turn after World War II is the peak in 1948.

¹⁷ This trend is also responsible for another noteworthy feature of world trade cycles—the briefness of contractions. Only two of the eleven contractions lasted longer than a year and a half, and the average length of the nine "normal" contractions was only five quarters, against an average of fifteen quarters for expansions. The two exceptions occurred in 1883-86 and 1929-35.

TABLE 1

*Percentage of Quarters in Like Cycle Phase: Domestic Business
and World Imports, Quarterly, 1883-1961*

	1883/II- 1913/III	1921/III- 1938/IV	1921/III- 1938/IV ^a	1948/IV- 1961/I	1921/III- 1961/I
Total number of quarters	121	69	61	49	118
Number of quarters in like phase	72	42	42	32	74
Percentage of quarters in like phase	59.5	60.9	68.8	65.3	62.7

Note: World imports exclude U. S. imports.

Source: Exports and world imports, from Appendixes A and C;
cycle chronologies, from NBER.

^aExcluding 1933-34.

However, an important fact that cannot be accounted for in this fashion must be noted here—the contrast between the amplitudes of the cycles from 1883 to 1913 and those of later years. In the early period world imports moved only by 6.6 per cent as an annual average, against 11.5 per cent in the interwar period excluding 1929–37 and 13.7 per cent in 1948–59. In part, deficiencies in the early data may account for this. But, for the most part, the absence of large waves in the early period mirrors the real stability of international trade in that era.

The relation of world imports to U.S. business cycles will be discussed at various points in this study.¹⁸ A rough preliminary idea can be had by counting the number of quarters in which world trade and U.S. business were in like cyclical phase. Table 1 shows that, before World War I, the relation was hardly better than a chance association. In 60 per cent of all quarters, world imports and U.S. business cycles were in phase, while in the other 40 per cent a world imports upswing was accompanied by a business downswing or vice versa. The situa-

¹⁸ See Chapter 5 on the timing of turns and Chapter 7 on the conformity of world imports to U.S. business cycles and on correlations of their phase amplitudes.

tion in the interwar period appears similar, and even in the most recent period world cycles and U.S. cycles are in phase in only 65 per cent of all quarters.

5. *Trends in the Ratio of U.S. Exports to World Imports*¹⁹

The relation of U.S. exports to world imports will play a prominent role in the discussion of export cycles. It is, therefore, desirable to provide a general idea of its level and long-run development. Moreover, the ratio of exports to world trade is often regarded as a measure of American "competitiveness." A look at the historical experience points to the possible pitfalls of this interpretation.

The annual current dollar value of world imports in 1948-64 was about thirteen times as large as in 1881-96. That U.S. exports increased twenty-one times over the same period, reflects the well known spectacular rise in the United States' role in international trade. In 1948-64, our exports amounted to roughly one-fifth of the outside world's imports; the share was one-sixth in 1922-31, one-seventh in 1897-1913, and one-eighth in 1881-96.

The ratios are shown on Table 2 and plotted in Chart 1. Their most outstanding features are the tremendous leaps during the two world wars.²⁰ After the wars, when conditions returned to normal, the ratio declined but was still higher than before the wars, at least for a considerable period of time. The figures for the 1920's are much above those for 1900-14, and the one for 1958-61 is again higher than those for the 1920's. The deep plunge in the 1930's may be more plausibly attributed to special circumstances than to a return to "normal." Whether the ratio will in the 1960's return to the level of the 1920's cannot yet be told. If it should do so, however, the decline can be regarded as a readjustment of the enormous and not exactly "healthy" spurt during the war rather than as a sign of "weakness." That declining "competitiveness," as measured by the share in world trade, need not indicate an undesirable situation is also shown by the experience in the period before 1913. Chart 1 shows a rising trend until 1900 and then a falling one, i.e., exports rose faster than world trade before 1900 and more slowly afterward. The reversal in total exports reflects foods exports which

¹⁹ Since world imports are not discussed in Lipsey's book, an exception is made here to our rule of not treating trends.

²⁰ See Maddison, "Growth and Fluctuations," p. 144.

TABLE 2

Trends in the Share of U.S. Exports in World Imports, 1885-1963

U. S. Business Cycles	U. S. Exports (annual averages in million dollars)	World Imports (annual averages in million dollars)	Ratio of U. S. Exports to World Imports (per cent)
1885-88	700	6,108	11.5
1888-91	811	6,924	11.7
1891-94	920	7,104	13.0
1894-97	907	7,320	12.4
1897-1900	1,312	8,700	15.1
1900-04	1,422	9,780	14.5
1904-08	1,759	12,264	14.3
1908-12	1,864	14,172	13.2
1912-14	2,345	17,028	13.8
1921-24	3,994	21,924	18.2
1924-27	4,861	28,560	17.0
1927-33	3,578	23,772	15.1
1933-38	1,487	12,072	12.3
1949-54	12,336	63,144	19.5
1954-58	16,602	83,616	19.9
1958-61	17,717	95,208	18.6
Annual average			
1961-63	21,168	116,295	18.2

Based on seasonally adjusted quarterly series.

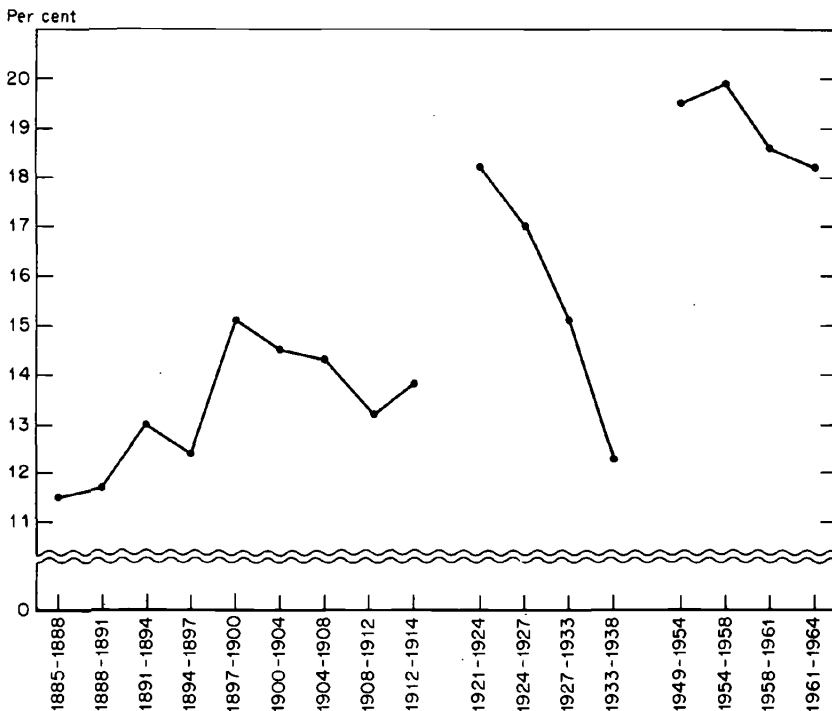
Data for 1933-38 are in dollars of 1930 parity, otherwise in current dollars.

Military grant aid is excluded from exports beginning with the third quarter of 1950.

Figures in the first two columns represent average quarterly values of series during each business cycle, at annual rates, with the exception of the figures for 1961-63 which are averages of the three annual values.

See notes to Table 1.

CHART I

Trends in the Share of U.S. Exports in World Imports, 1885-1961

Source: See Table 2, col. 3, and notes to Table 2.

stopped growing around the turn of the century. At that time the development of the country had reached a stage where the growth of domestic food consumption exceeded that of food output.²¹

Thus American "competitiveness" was advancing in the depressed 1890's, falling off in the prosperous first decade of this century, and falling again when the world recovered from wars. Such declines can hardly be regarded as a symptom of decay, stagnation, or low productivity.

²¹ See Huebner, in *History of Domestic and Foreign Commerce*, Vol. II, p. 88. See also Lipsey, *Price and Quantity Trends*, p. 50, Chart 12, showing the decline in the share of agricultural exports in agricultural output. That the value of agricultural exports continued to rise somewhat after 1900 (*ibid.*, Chart 11) is due to cotton, not to foods.

6. *The Method*

a. THE BURNS-MITCHELL TECHNIQUE AND RANK CORRELATIONS

For the most part, this study is based on the techniques developed by Burns and Mitchell for business cycle analysis, adapted and extended in accordance with our special needs.²² Thanks to their flexibility and simplicity, these methods are particularly appropriate for an investigation of this type. The problems of the international propagation of business cycles are vast and unexplored; hence, the present study is more preliminary and exploratory than those dealing with national cycles.

The concepts and measures are described in detail in Appendix D. Only the most outstanding aspects are noted here. The approach used stresses the end of a rise and the beginning of a decline in specific as well as in general economic activities. Equal interest attaches to the reversal of contraction into recovery. The selection of these turning points is based on series which have been adjusted for seasonal fluctuations but not for long-run trends.

One type of analysis deals with the timing of these turning points. Upturns and downturns in exports are studied for their occurrence near turns in U.S. business and world cycles. Inferences about the presence or absence of causal relationships are based on the consistency of the timing of export turns relative to turns in the reference cycles. This method is less objective than those described below, but it copes with the problem posed by alternately positive and inverse relations between exports and business cycles. Turning points in exports that are due to opposite turns in domestic business cycles can, to some extent, be distinguished from export turning points that are the cause of like business cycle turns. In our measures of conformity and correlation, such a distinction cannot be made.

A second type of analysis focuses on the directions of export changes between peaks and troughs in domestic and world cycles. Observations are made of the number of instances in which exports rise during domestic or world expansions and fall during contractions. This is referred to as conformity to reference cycle phases.

Third, attention is paid to the magnitude of export movements. Their percentage rise and fall is measured between their own high and low points, and between upturns and downturns in U.S.

²² Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles*, New York, NBER, 1946.

business and in world trade. These percentage changes are termed expansion and contraction amplitudes. They are based on the average level of exports during the cycle of which the measured expansion or contraction forms a part.

The long-run trend of exports which causes the average level to differ from one cycle to another does not affect the percentage change measured in this fashion. The intracycle trend, however, is retained.

It is important to note the contrast between this method and the conventional one of removing the long-term trend before analyzing cyclical movements. Secular movements in exports present a difficult problem because they reversed themselves several times during the period covered, so that, by conventional methods, different trends have to be removed from the series in succeeding business cycles. The residual cyclical export change then depends on the investigator's choice of trend line.

The average annual rate of change of exports between their own turns and between reference turns is obtained by dividing the average expansion amplitude by the average number of years duration of expansions. The same applies to contractions and to full cycles.

Comparison of the rate of change of exports in an individual reference contraction to their rate in the preceding and the following expansions yields the "conformity index to full business cycles," a particularly instructive measure because of its independence of long-run trends.

Conclusions about the effects of domestic and foreign fluctuations on exports are based on comparisons of export amplitudes, rates of change, and conformity indexes measured between turning points of U.S. business cycles, on the one hand, and between turning points of world cycles, on the other.

Finally, the original Burns-Mitchell measures are supplemented by a rank correlation analysis of expansion and contraction amplitudes of exports, world imports, and U.S. business. This goes further than most other measures since partial correlation coefficients make it possible to separate the effects of foreign and domestic business on exports.

In sum, the answers to our questions are sought in a number of different, independent ways. And this is crucial. Conclusions need to be based on several results supporting each other, because no measure is trustworthy enough to be relied upon exclusively.

It should perhaps be stressed that the correlation coefficients can no more dispense with control by other findings than any of the

other measures can. Apart from the unavoidably small number of observations and other weaknesses, these coefficients have to be interpreted cautiously because the expansion and contraction amplitudes on which they are based reflect not only cyclical changes but also intracycle trends. For instance, if two series had fallen steeply during the interwar period but risen sharply since 1948, their cyclical amplitudes could be positively correlated even if one series had risen mainly during business expansions and the other one during contractions. And, conversely, opposing shifts of trends can obscure similarity of cycles.

Rank correlations relying on rough orders of magnitude are, in our view, the utmost weight our data can bear. Regression coefficients or elasticities would give the misleading impression of an exactness which most of the data have no claim to. Hence we refrain from using regular correlation analysis. Like any compromise solution, the one adopted here will be attacked from both sides. Some critics will object that we put too much and others that we put too little weight on the figures at our command.²³

b. THE USE OF MATCHING QUANTITIES AND PRICES

All measures are computed for export prices as well as for quantities and values. The fact that matching price and quantity series are available is of crucial importance for the interpretation of export behavior, since simultaneous price and quantity movements permit inferences about causal forces which are not possible when information is restricted to value movements. Prices are not treated here as independent factors explaining the behavior of quantities

²³ On the unsatisfactory results of explanations of exports, see footnote 31 in Chapter 1. See also Haberler's evaluation of existing models: "two ambitious attempts have been made by Neisser and Modigliani and by Polak to construct econometric models of this kind [i.e., combining income and price effects] for an integrated world system—that is to say models based on actual statistical measures of the coefficients involved (price elasticities and income propensities) for many countries which describe in precise mathematical form the interaction of these various factors.

Nobody who has taken the trouble of familiarizing himself with this work can fail to admire the courage of these scholars, their ingenuity and the great intellectual effort involved. However, the difficulties of econometric model building for a single country (let alone for a multitude of countries or for the world as a whole) are so overwhelming and the pitfalls which beset this kind of work are so numerous and insidious that, at the risk of giving the appearance of offering ungrateful and negative criticism, one cannot help having the gravest doubts concerning the concrete results of these two most impressive volumes." (Gottfried Haberler, *A Survey of International Trade Theory*, Princeton, 1961, p. 45.)

but as determined, together with quantities, by demand and supply.²⁴

Lipsey uses price-quantity relations in this manner to interpret secular trends in export behavior. Finding the relation inverse, as a rule, over the long run before 1913, he concludes "that the long-term changes represented shifts mainly in the supply function. . . ." on the other hand, "over shorter time periods, some parallel, instead of inverse, price and quantity movements emerge . . . [suggesting] shifts mainly in the demand function. One would expect a negative price-quantity relation from the former and a positive one from the latter."²⁵

Applying this approach to cyclical analysis where time spans are even briefer than Lipsey's "shorter time periods" and to more volatile quarterly data, we also find parallel as well as inverse changes in export prices and quantities and we also seek their causes in shifts of demand or supply. These concepts, however, must be specifically defined here.

First, "demand" means foreign demand only. When export quantities and prices rise or fall together, we know that the foreign demand for these exports must have moved in the same direction. This provides a valuable check on world imports as an independent indicator of foreign demand.

As for supply, matters are slightly more complicated. A shift in the over-all supply of a good will, it is true, cause export quantity and export price to move in opposite directions. But such inverse price-quantity changes are caused also—and most importantly in our case—by shifts in domestic demand. For instance, an increase in domestic demand will raise export prices and depress quantities (assuming other things equal and finite elasticities). It thus acts the same way as a fall in total supply. Hence, inverse price-quantity relations in exports can be due either to shifts in total domestic supply or to shifts in domestic demand.

A simpler way to put this is to term the difference between supply and domestic demand "export supply." Inverse price-quantity movements in exports then can be said to be caused by shifts in the export supply schedule. However, the concept "export supply" has the disadvantage of suggesting that exports are a residual, and that export supply is what has been left over after domestic demand has been

²⁴ The special problems of export prices are discussed in Chapter 7.

For a corresponding approach to domestic prices and quantities, see Frederick C. Mills, *Price-Quantity Interactions in Business Cycles*, NBER, New York, 1946.

²⁵ Lipsey, *Price and Quantity Trends*, p. 63.

satisfied. Since no such implication is intended, we shall not refer to export supply but rather to its two components separately.²⁶

When we find that the volume of foreign sales of a class of commodities declines regularly during business expansions while their prices rise, and when there is no reason to suspect their total supply of moving countercyclically, we lay the decline in export quantity to the rise in domestic demand. It represents the adverse effect of domestic expansion on exports.

Whether foreign demand has at the same time shrunk or grown cannot be inferred from export prices and quantities in this case. But the world imports series gives the required information. Any change in foreign demand, however, must have been smaller than the change in domestic demand.

Rising export quantities accompanied by falling prices during business recessions are similarly taken as indications of the favorable effects of this cycle phase on the volume of foreign sales. Retardations or accelerations of the series are interpreted in the same fashion as changes in direction.

Instances of the opposite type in which export quantities grow while prices move downward during business expansions, occur rarely, as we shall see. Such a fall in prices at a time of rising domestic demand and of expanding foreign sales points to an increase in supply over and above the increase in total demand. This is what adherents of the expansionist view would expect from the higher productivity which accompanies economic growth.

However, the increase in total supply may also be due to factors other than increased efficiency. When situations of this type occurred in agricultural exports, they meant, in earlier years, that favorable weather had resulted in abundant crops so that prices softened despite domestic prosperity, thus leading to higher export volumes. In more recent times, a shift in the government's agricultural policies could have similar effects. If price supports are lowered in prosperous times, for instance, the effect on exports is the

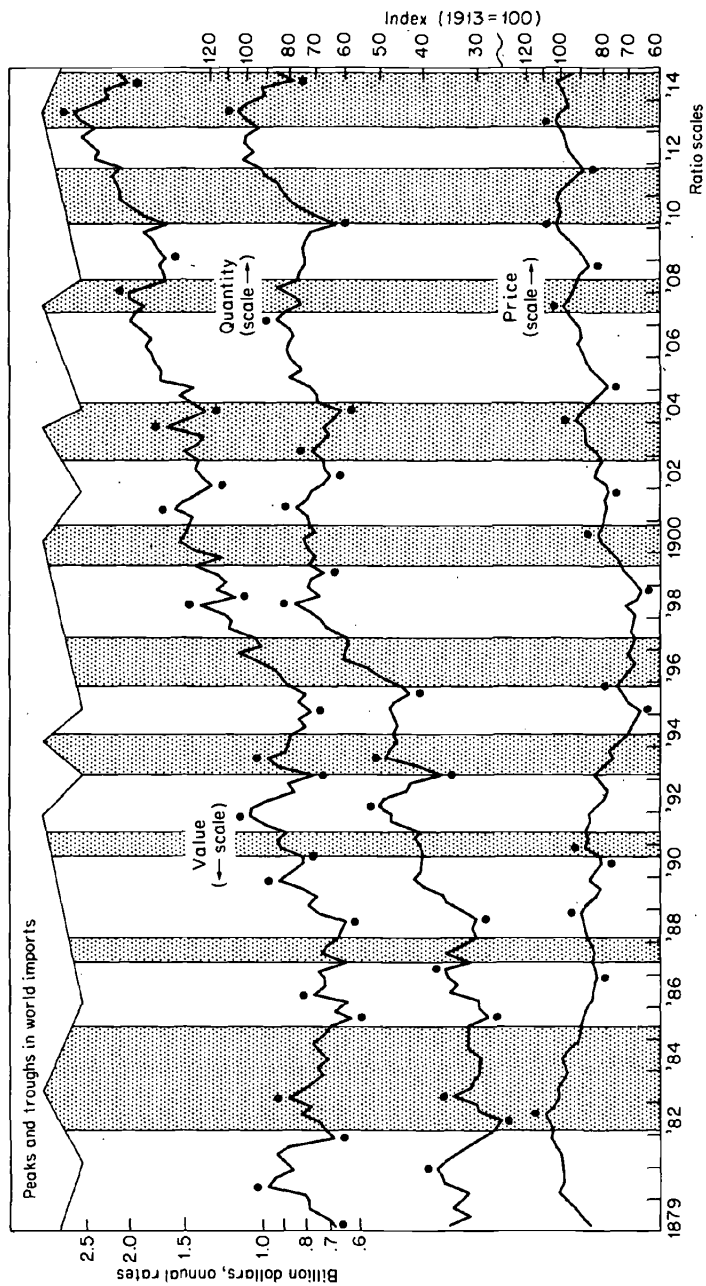
²⁶ Note, however, that the concept "export supply" does occur in the literature: "The supply schedule for exports is the total supply of that commodity forthcoming at any given price minus the amount sold at home at that price. The lowering of the domestic demand curve implies necessarily a downward shift in the derived supply schedule of exports. At any given price more can now be sold abroad." (Ragnar Nurske, "The Relation between Home Investment and External Balance in the Light of British Experience, 1945-55," *Review of Economics and Statistics*, May 1956, p. 141.)

same as that of abundant crops. The additional supply here comes from the drawing down of inventories.

Rising prices accompanied by falling export quantities during business contractions are interpreted, *mutatis mutandis*, in the same fashion.

In sum, observations of simultaneous export price and quantity movements during business cycles are helpful in disclosing something about the causes of export cycles. In addition, they provide a certain check on our indicators of foreign and domestic demand.

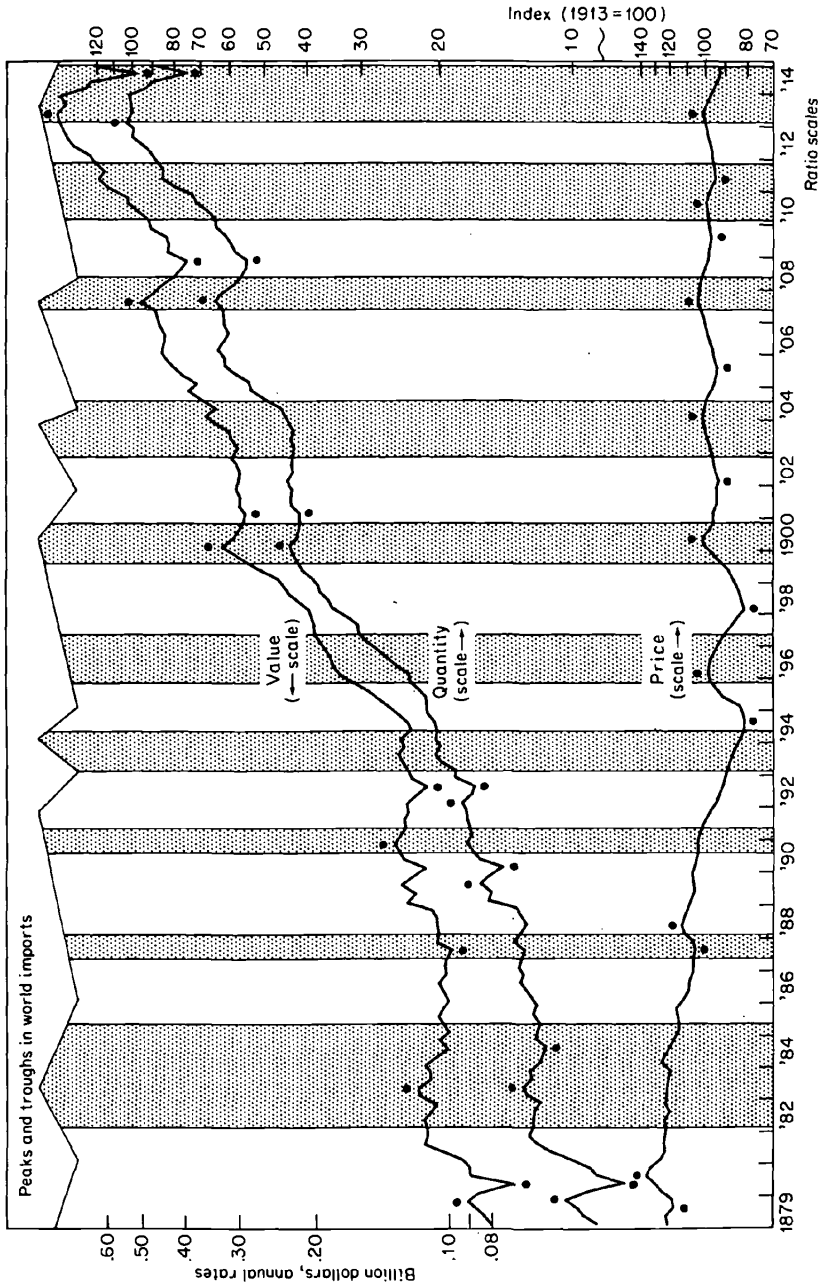
CHART 2
*U.S. Total Exports During Cycles in World Imports and Domestic Business:
 Values, Quantities, and Prices, Quarterly, 1879-1914*



Notes appear after Chart 18.

CHART 3

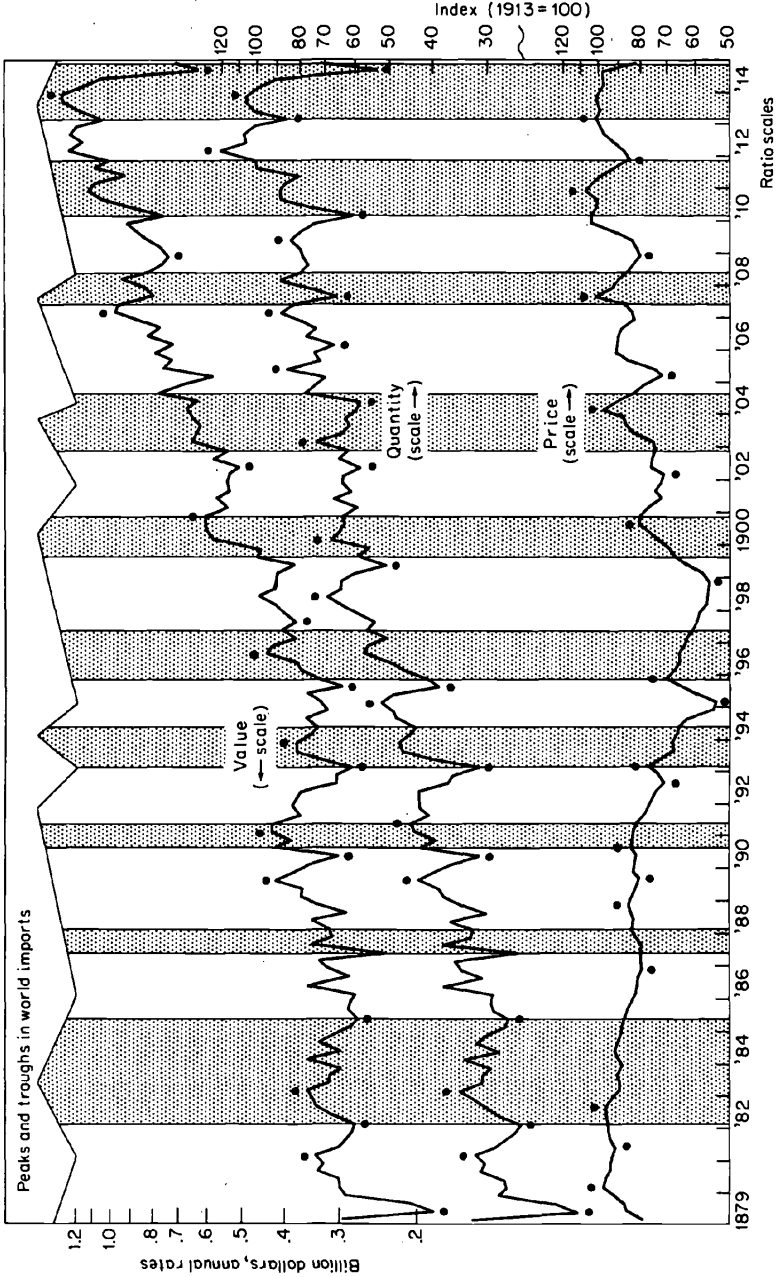
U.S. Finished Manufactures Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1879-1914



Notes appear after Chart 18.

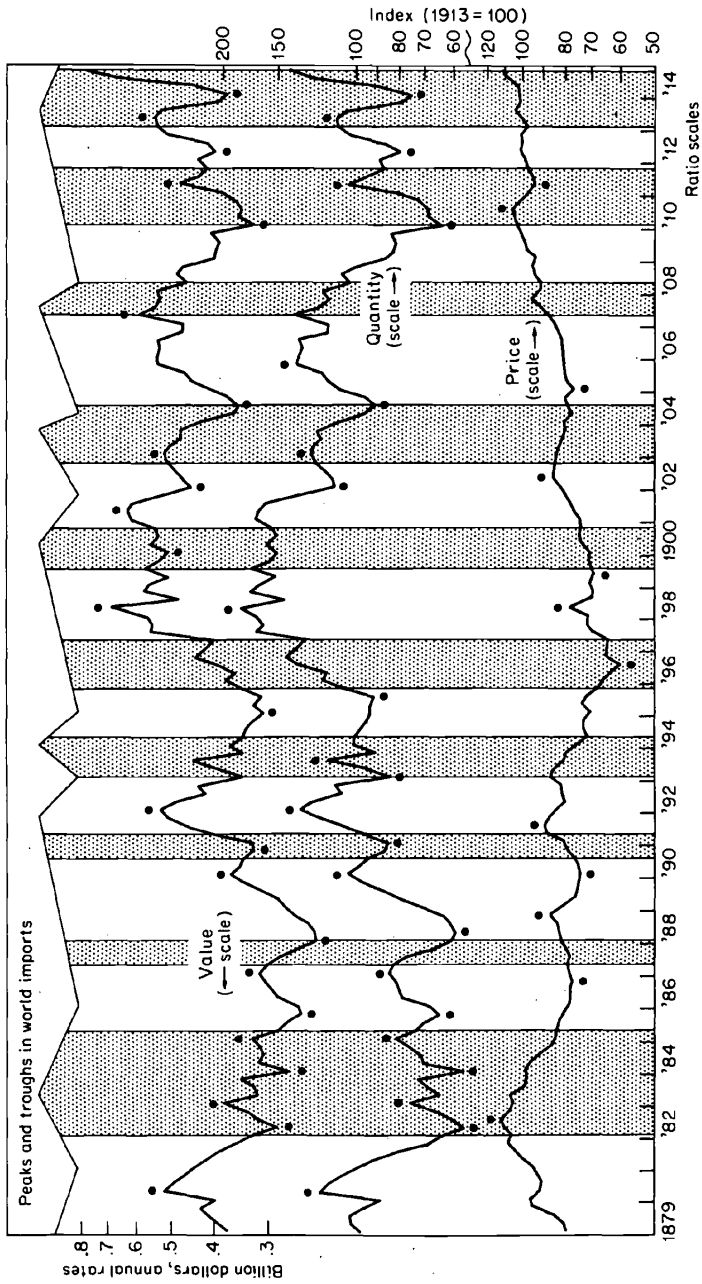
CHART 4

U.S. Crude Materials Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, 1879-1914



Notes appear after Chart 18.

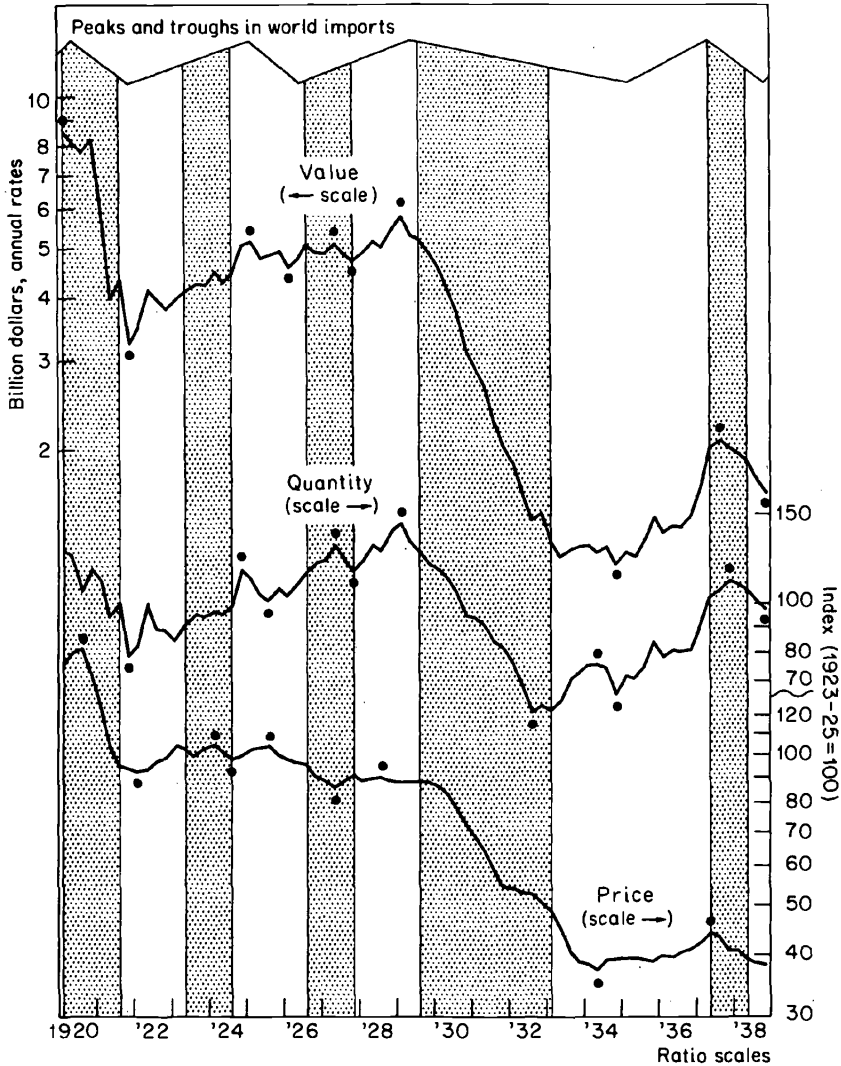
CHART 5
U.S. Foods Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, 1879-1914



Notes appear after Chart 18.

CHART 6

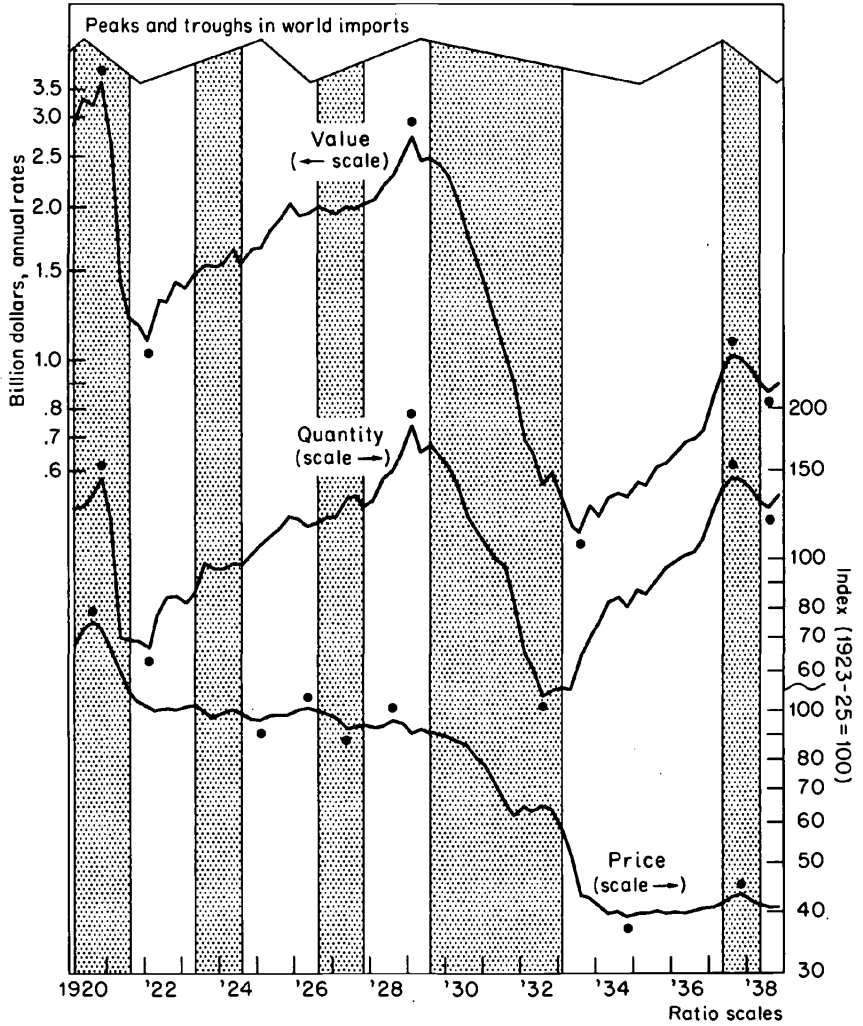
U.S. Total Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1920-38



Notes appear after Chart 18.

CHART 7

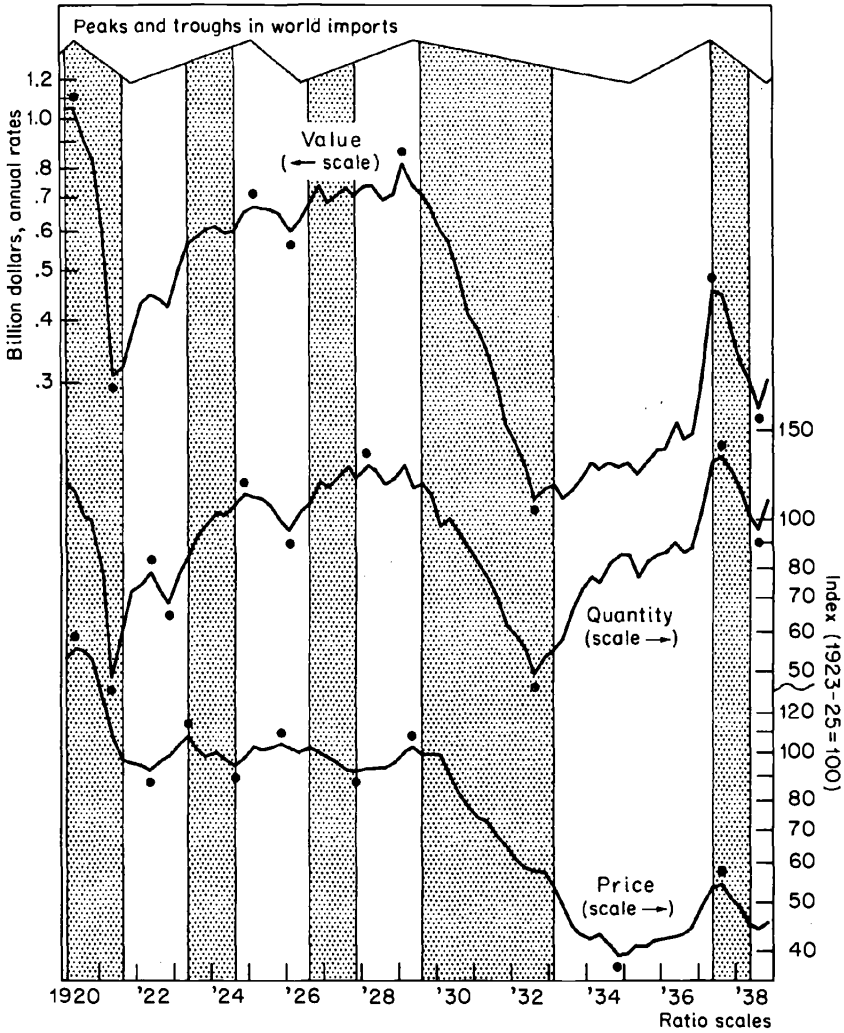
U.S. Finished Manufactures Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1920-38



Notes appear after Chart 18.

CHART 8

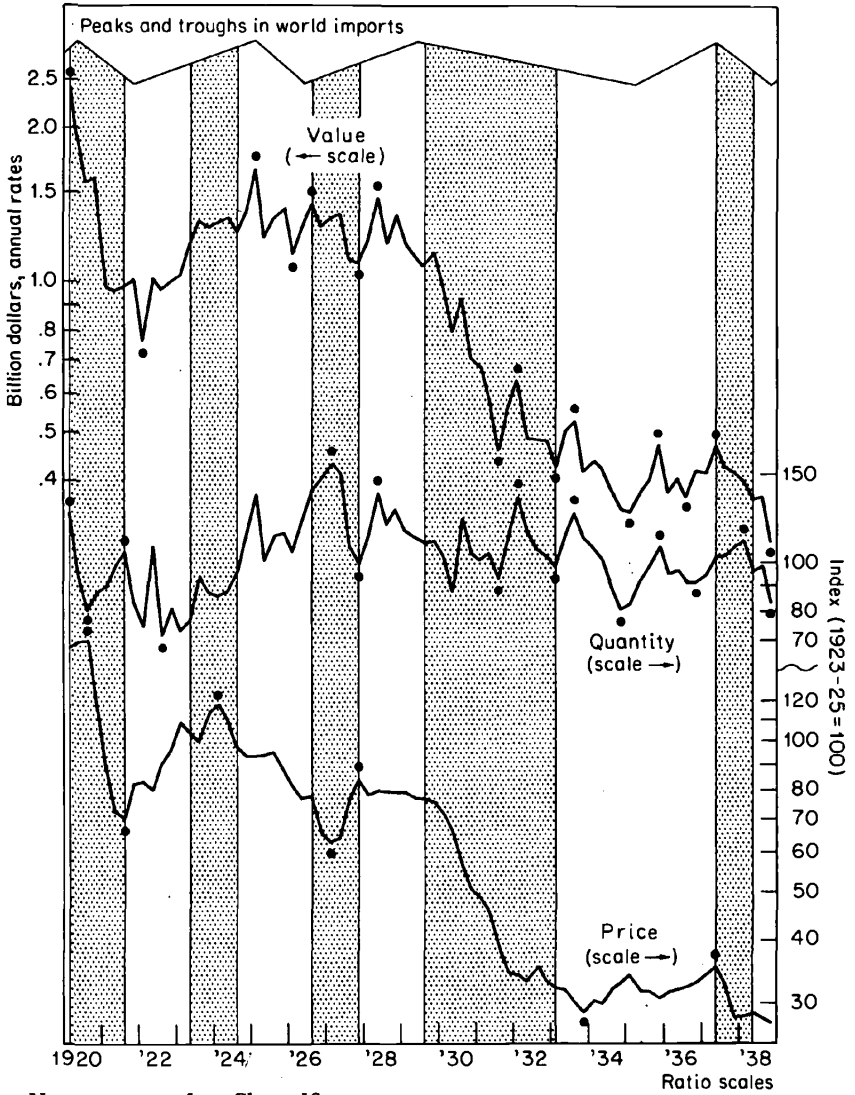
U.S. Semimanufactures Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1920-38



Notes appear after Chart 18.

CHART 9

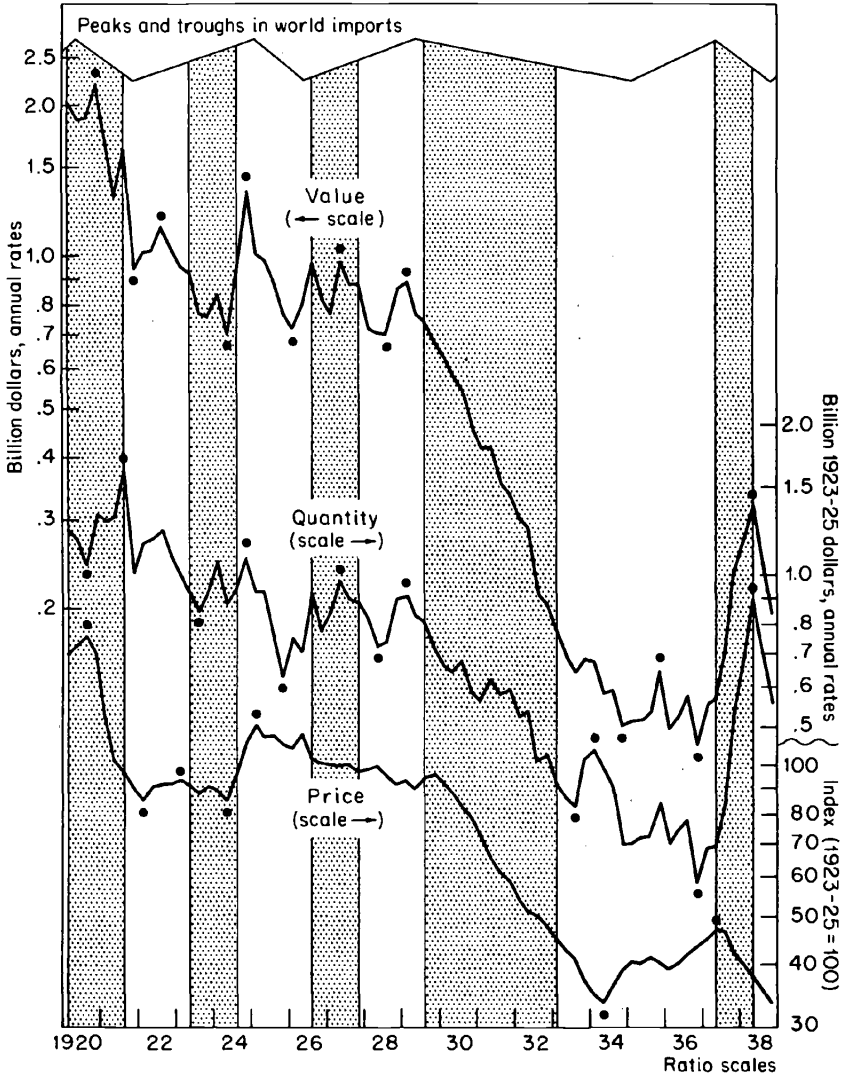
U.S. Crude Materials Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1920-38



Notes appear after Chart 18.

CHART 10

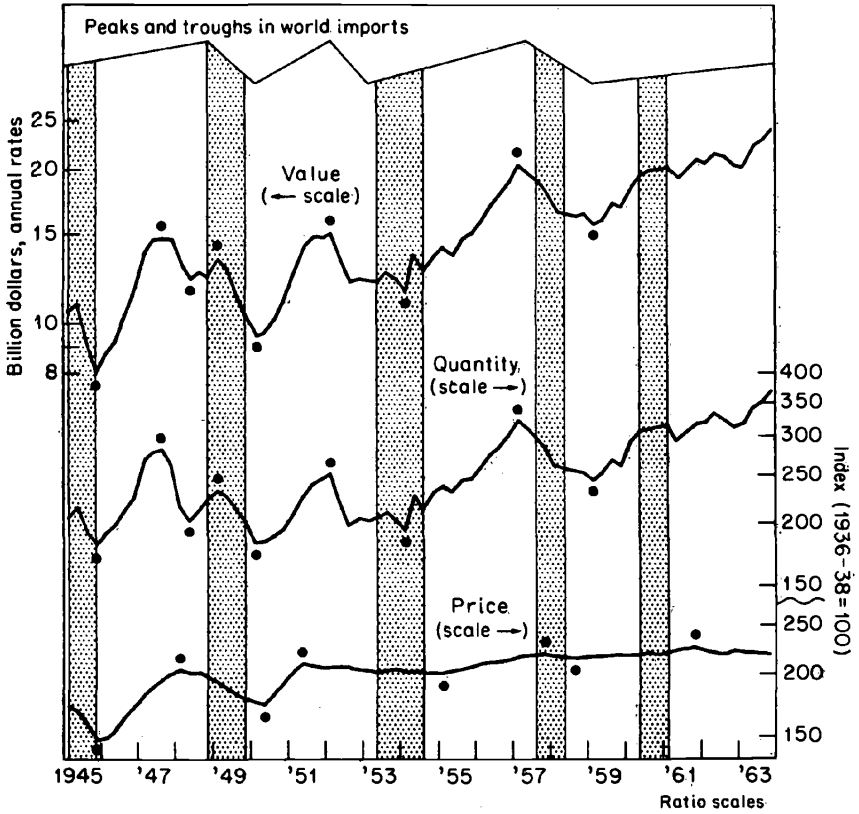
U.S. Foods Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1920-38



Notes appear after Chart 18.

CHART 11

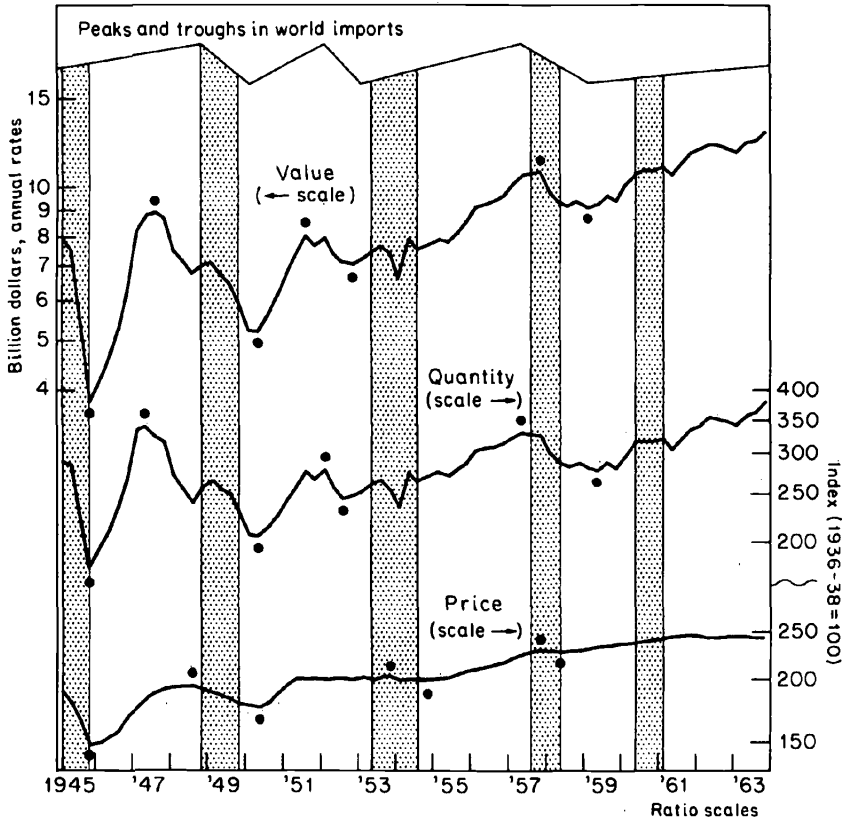
U.S. Total Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1945-63.



Notes appear after Chart 18.

CHART 12

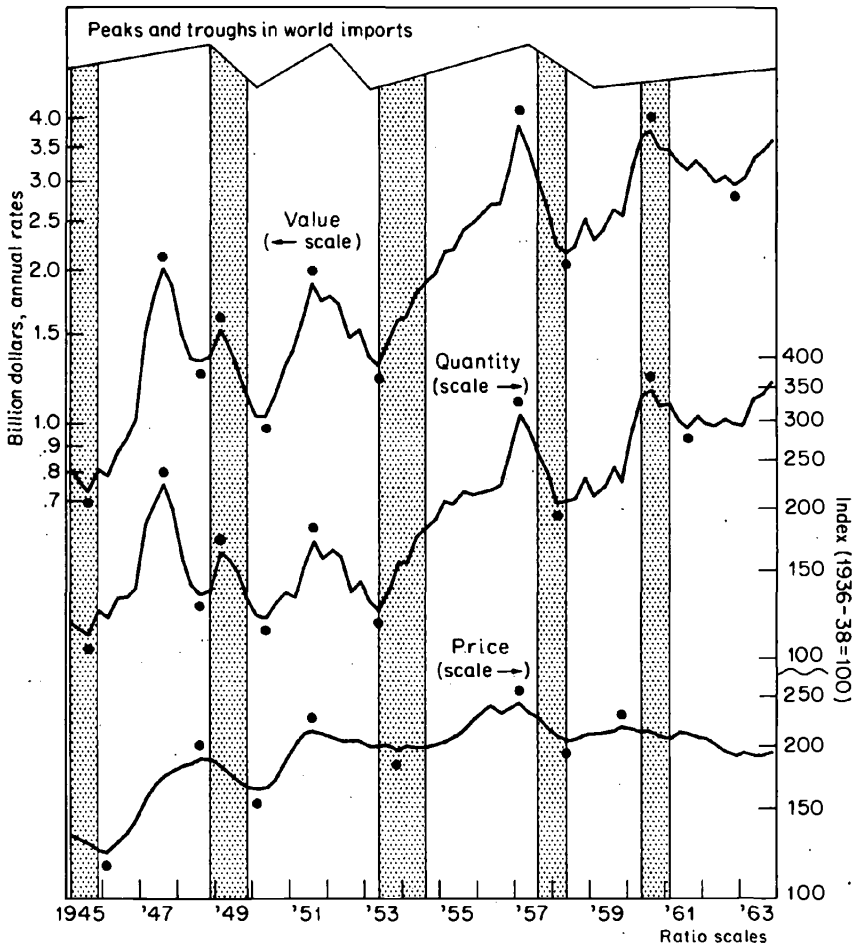
U.S. Finished Manufactures Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1945-63



Notes appear after Chart 18.

CHART 13

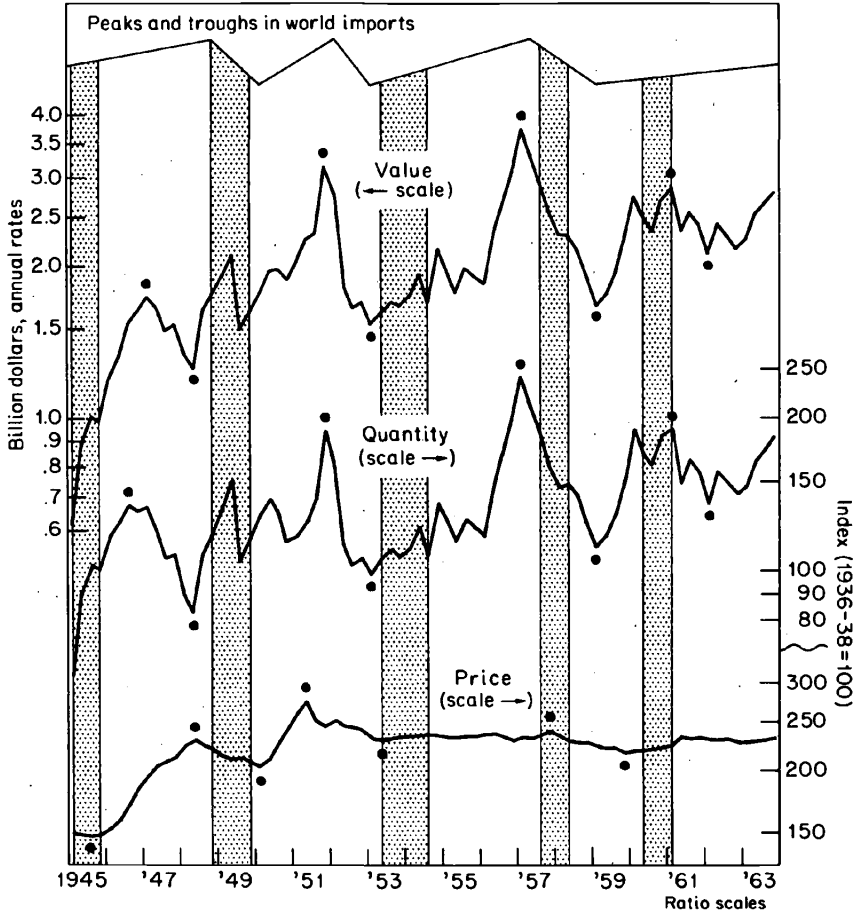
U.S. Semimanufactures Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1945-63



Notes appear after Chart 18.

CHART 14

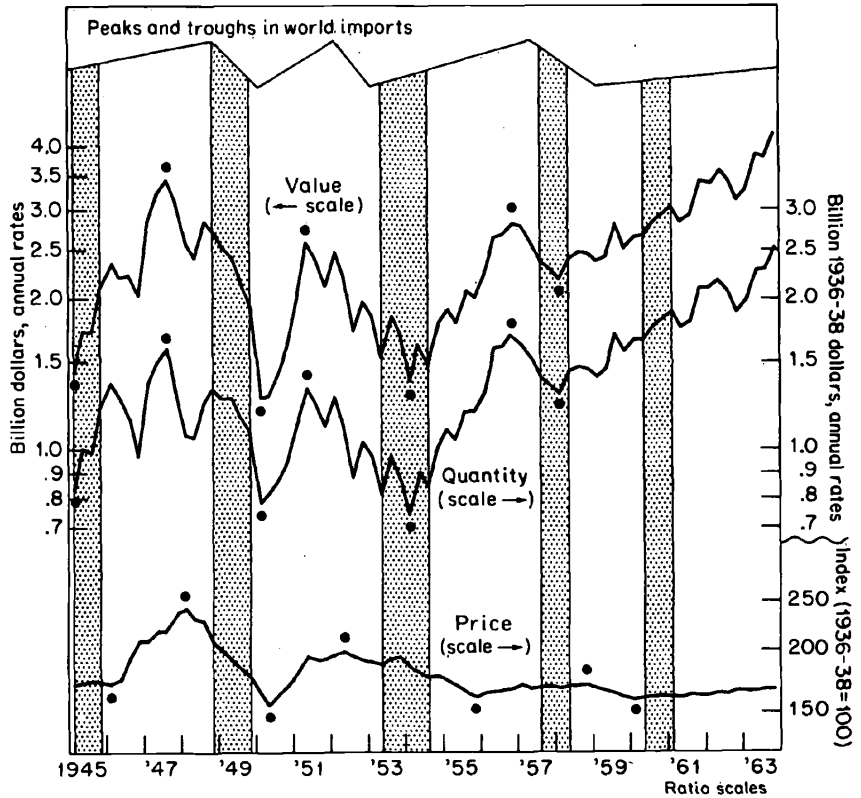
U.S. Crude Materials Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1945-63



Notes appear after Chart 18.

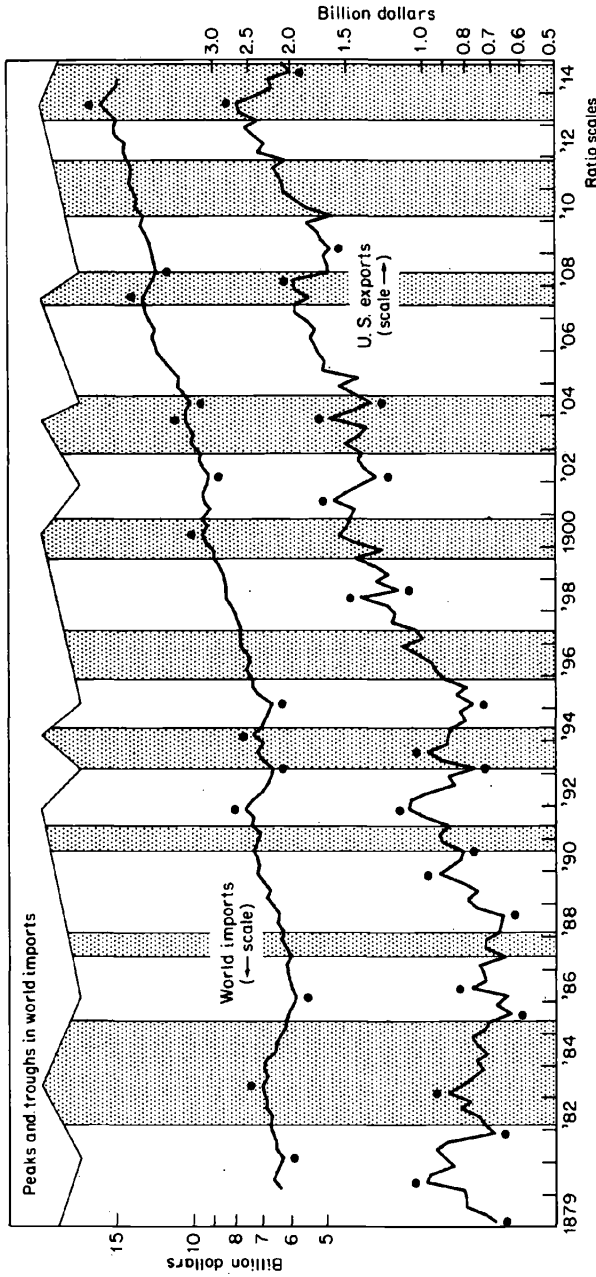
CHART 15

U.S. Foods Exports During Cycles in World Imports and Domestic Business: Values, Quantities, and Prices, Quarterly, 1945-63



Notes appear after Chart 18.

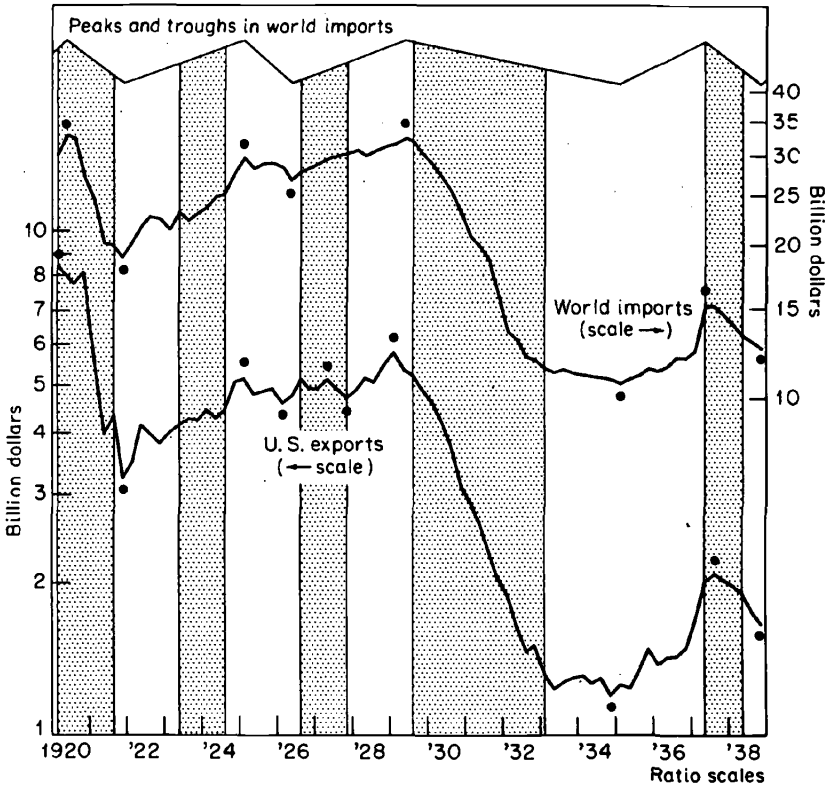
CHART 16
U.S. Total Export Value and World Imports During Cycles in World Imports and Domestic Business, Quarterly Totals at Annual Rates, 1879-1914



Notes appear after Chart 18.

CHART 17

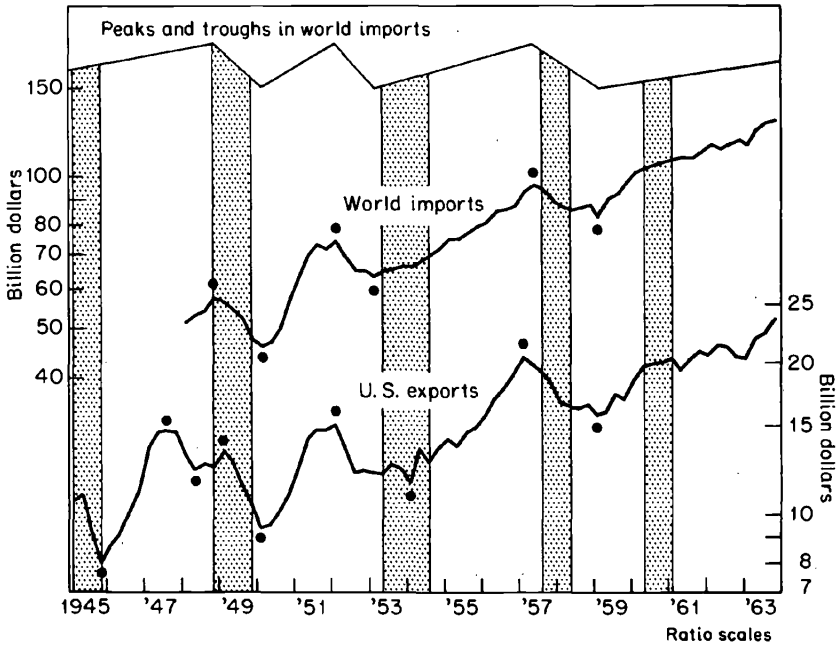
U.S. Total Export Value and World Imports During Cycles in World Imports and Domestic Business, Quarterly Totals at Annual Rates, 1920-38



Notes appear after Chart 18.

CHART 18

U.S. Total Export Value and World Imports During Cycles in World Imports and Domestic Business, Quarterly Totals at Annual Rates, 1945-63



Notes appear on p. 62.

Notes to Charts 2-18

Based on seasonally adjusted series.

Value and price data for 1933-38 are in dollars of 1930 parity, otherwise they are in current dollars.

Military grant aid is excluded from exports beginning with the third quarter of 1950.

World imports exclude U.S. imports. World imports cycles are shown on top of Charts 2-18.

Shaded areas represent business contractions, unshaded areas, expansions.

Dots indicate peaks and troughs of series as shown also in tables of Appendix A.

Peaks and troughs shown on Charts 11-15 differ in some instances from those used in the analysis and shown on Tables 15-38 due to revision of the series. Both revised and unrevised turns are shown in Appendix A.

For Charts 10 and 15, quantity is measured (at annual rates) in billion dollars in 1923-25 and 1936-38 prices, respectively.

SOURCE: Exports and world imports, Appendixes A and C; cycle chronologies, NBER.