Chapter Title: Exports and World Trade Cycles

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Exports and World Trade Cycles

In order to examine the relations between the fluctuations in global demand for imported merchandise and those in U.S. exports, we need a quarterly indicator of the former. The few series which are available for this purpose for any but the most recent period have been discussed in an earlier report.[1] There the decision was made to prepare a series on world imports as the best tool within our reach. What we claim for this series is merely that—in the absence of better data, in particular on world output or income—it does help greatly in clarifying the swings in U.S. exports.

A detailed description of this world import series will be found in Appendix A. Here a few salient facts will suffice. Our quarterly series for 1881-1928 is based on three available annual series, except for a five-year interval for which we had to construct even the annual series from data for individual countries. The annual series was then interpolated with specially compiled quarterly series. For the period 1929-59 we adjusted League of Nations and United Nations series for our purposes.

Since we want to relate American exports to the *outside* world's demand for imported goods, we have excluded American imports from the final series, which is thus defined as "imports of the world outside of the United States." For simplicity, however, we shall refer to it as world imports or world trade.

It may be objected that not only American imports but also American exports should be excluded from the world import series, so that comparison of these exports to an aggregate of which they form a part could be avoided. However, we consider the series chosen—total foreign imports—preferable for our purposes to a series representing the imports of foreign countries from each other. Fluctuations in the former more nearly

[1] Ilse Mintz, *Trade Balances during Business Cycles: U.S. and Britain since 1880*, Occasional Paper 67, New York, NBER, 1959.

reflect fluctuation in general business abroad and hence correspond better to domestic business cycles than fluctuations in intra-foreign imports. The argument in favor of the latter, on the other hand, which claims their independence 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. 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 intra-foreign 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. At any rate, this question need not trouble us since it makes little difference for our findings whether we use one series or the other (Charts E-1, E-2, E-3). Except for the mild cycle 1903-04, the turning points are the same through 1957, whether or not U.S. exports are excluded from world imports. Further, even the direction and amplitude of the shortest movements, from quarter to quarter, are quite similar in both series. This also holds for the most recent decade when American exports loomed so large. Thus no major conclusion is affected by the choice of the alternative series.

Let us now provide an idea of the magnitudes with which the following analysis will deal. The annual dollar value of world imports in 1948-58 was just about ten times as large as in 1881-96. The seventeenfold increase of U.S. exports over the same period illustrates the well-known spectacular rise in the United States' role in international trade. At present (1948-58), our exports amount roughly to 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.

How do fluctuations in world imports compare with those of American exports? The visual impression from Charts 1, 4, and 5 is that the two series, broadly speaking, move together not only in the long run but also in their cyclical swings, except for the greater variability of the exports, which is particularly striking in the earliest period. For more detailed and exact information about the nature of the relation of exports to world imports, systematic measurements are, of course, necessary. One question of particular interest is whether this relationship has changed over time: whether it has become closer or whether exports today are more independent of world imports than before.

We shall use several methods to compare the behavior of the two series. For a first summary view, we look at their shortest movements, quarter-to-quarter changes, and measure the degree of consilience in the direction

of these movements. We find that in about 31 per cent of the quarters covered in 1881-1938, United States exports rose, while world imports fell, or vice versa (Table 6). This percentage may seem unexpectedly

TABLE 6

Sign Correlation: U.S. Exports and World Imports, 1881-1958

	1881/I- 1913/IV	1921/I- 1938/IV	1921/I- 1938/IV a	1948/I- 1958/II	1921/I- 1958/II
Total number of quarter-to-quarter changes (N)	131.0	71.0	62.0	41.0	112.0
Number of opposite changes (σ)	41.0	22.5	18.5	7.0	29.5
Number of opposite changes as percentage of total number of changes	31.3	31.7	29.8	17.1	26.3
Coefficient of covariation $(1 - \frac{2\sigma}{N})$	+0.374	+0.366	+0.403	+0.659	+0.473

World imports exclude ·U.S. imports.
See Table 1, notes 1-3.
a Excluding 1933/I-1934/IV.

large. Offhand one would assume that exports rarely move counter to world trade and the nature of our world import series makes this even more likely. The disagreement is due in part to the much greater stability of world imports, particularly in the early period. A change in their slope often corresponds to a reversal in the direction of exports.

The percentages for 1881-1913 and 1921-38 are nearly equal. From this point of view, there was no shift in the relation of exports to world trade.[2] Even when we exclude 1933 and 1934, on the assumption that the devaluation of the dollar might have caused a larger than usual number of opposite movements, the percentage is only a trifle lower. A radical shift occurs, however, after World War II.[3] The higher degree of covariation of the two series for 1945-58 than formerly could follow simply from the increased share of U.S. exports in world imports. But a similar shift

[2] In current dollars the percentage for 1921-38 is higher.

[3] It is possible that our measures overstate this shift somewhat. For the earlier periods the series have been adjusted for seasonal variation by constant factors, while moving factors, derived by electronic computer methods, have been applied to the recent data. The latter procedure produces a smoother series and may have eliminated some brief countermovements.

is found when world imports excluding U.S. exports are compared to U.S. exports. The finding thus suggests that the ties between U.S. exports and the outside world's trade have become closer. This has to be tested further.[4]

The next approach reduces the role of the shortest, erratic movements and focuses on the longer, cyclical fluctuations. This requires, first, that we mark off cycles in world imports by determining their peaks and troughs. These world import cycles then provide a frame of reference for the study of export movements. In our basic charts (1, 4, and 5) turns in world imports are indicated by dots and, in addition, are shown at the top of the graphs. We recognize six peak-to-peak cycles from 1883 to 1913, three trough-to-trough cycles in the interwar period, and two peak-to-peak cycles from 1948 to 1957.[5] The duration of these eleven cycles was about five years, on the average—considerably longer than that of American cycles in general business and exports. This, 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

[4] Table 6 also presents coefficients of covariation to compare our results with those obtained by Oskar Morgenstern on international financial integration (*International Financial Transactions and Business Cycles,* Princeton for NBER, 1959, pp. 106, 536). Morgenstern finds little covariation of short-term interest rates or share prices in the United States and either Britain, France, or Germany from the 1870's to 1914. None of his coefficients for these series is significant. By contrast, all of our coefficients for covariation of the United States exports and world imports are significant. However, the difficulty with this comparison is that Morgenstern's coefficients relate to pairs of countries, not to one national and one global series as in our case. Furthermore, his series are monthly and therefore more erratic. This may explain in part why his coefficients for pairs of countries including the United States are much lower than ours.

What can be compared more nearly than the level is the change in the coefficients from the prewar to the interwar period. Morgenstern's finding is that covariation of interest rates and share prices was higher in the later than in the earlier period. For instance, the coefficient for share prices, United States and Britain, rises from 0.180 to 0.267; those for interest rates—United States vs. either France or Germany—rise to 0.222 and 0.274 and become significant.

Scanty as it is, this evidence suggests a reasonable conclusion about the change in the international position of the U.S. from before World War I to the interwar period: a distinct advance in the integration of the United States with the rest of the world in monetary and financial matters was accompanied by only a slight rise in the already close interdependence of U.S. exports and world trade.

[5] 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 the peak in 1948. The 1881 and 1959 troughs are tentative and therefore excluded from timing measures, though they are included in measures of cyclical movements.

prevailed over much of the time caused some contractions to remain sub-merged.[6] Finally, world trade cycles represent fluctuations in many coun-tries 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. (Comparison of Tables 4 and 8 shows that rates of change are lower in each period than those of U.S. exports in export cycles.) However, an important fact which cannot be accounted for in this fashon 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 on 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.

One way of describing the relation of cycles in the imports of the world outside the United States and in U.S. exports is to compare the timing of their peaks and troughs. Table 7, which presents this compari-son, reveals first of all the impressive fact that exports without fail took a turn, upward or downward, at about the time that world trade did. Every one of the twenty-six turns in world trade in 1883-1957 is matched by a corresponding turn in exports. The closeness of the rela-tion is further attested by the coincidence of eleven of these turns and the occurrence of nine others within one quarter of the peak or trough in world trade. There is no consistent tendency for exports to either lead or lag behind world trade, nor is there evidence of a shift after World War I in this respect.[7]

The only finding from this approach that might suggest such a shift regards the number of turns in exports which were not matched by world turns. There are six of these before 1913, only two in the interwar period, and none after World War II. The significance of this contrast, however, should not be overestimated. The unmatched export turns as a rule terminated mild and brief waves which were accompanied by even milder and briefer movements of world imports. The former rep-

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[6] 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 excep-tions occurred in 1883-86 and 1929-35.

[7] The fact that it takes time for goods to move from country to country accounts for a lead of exports relative to the corresponding imports. However, there is some evi-dence that this lead is very brief. For world exports, it appears to be a fraction of a quarter only (see Herbert Wooley's manuscript on the structure of world trade and payments).

TABLE 7

Lead (−) or Lag (+) of U.S. Exports at Turns in World Import Cycles, 1883-1957

Turns in World Import Cycles (year and quarter)		Numbers of Quarters	
Peaks	Troughs	Peaks	Troughs
1883 II		−1	
	1886 I		−2
1891 IV		0	
	1893 I		0
1894 I		−2	
	1895 I		0
1900 II		+4	
	1901 IV		+1
1903 IV		0	
	1904 II		0
1907 III		+2	
	1908 II		+3
1913 III		0	
1920 II		−1	
	1921 IV		0
1925 I		0	
	1926 II		−1
1929 II		−1	
	1935 I		−1
1937 II		+1	
	1938 IV		0
1948 IV		+1	
	1950 I		0
1952 I		0	
	1953 I		+4
1957 II		−1	

6 additional export turns, 1883-1913, and 2 export turns, 1920-38, do not correspond to turns in world imports. The 1881 and 1959 troughs are tentative and therefore excluded from timing measures.

World imports exclude U.S. imports.

See Table 1, notes 1-3.

resent the mildest movements that can still be recognized as cycles, the latter are just below the borderline.

We conclude that timing measures suggest a much closer relationship between exports and world trade than correlations of quarterly changes;

that they do not indicate any drastic shift after World War I but at most a very moderate change; and that, as far as any such change did occur, it was in the direction of increased consilience of the two series.

Having concentrated above on the dates of turning points, we shall now observe the changes in exports over periods defined by the cycles in world imports. We use world import cycles as our reference frame and measure export movements during such cycles in the same manner in which these movements were measured during business cycles in Chapter 3.

Results of this analysis are shown in Table 8. The most striking one is the perfect regularity with which exports responded to world trade cycles, rising without exception in the twelve expansions and falling in the twelve contractions. No major shift took place in this respect and all conformity indexes are +100.

The close affinity of exports to world trade cycles is also brought out in Chart 6, which shows that the average movement of exports was a rise between any two stages of world expansion and a fall between any two stages of world contraction. And not only have the average variations of exports been in step with world trade cycles but, what is more, as many as 82 per cent of the ninety-two export movements between stages of individual world trade cycles have followed the direction of these cycles.[8] Again, separate measures for cycles before and after World War I give no evidence of a shift. The percentages of conforming changes are nearly equal for both periods.

The amplitudes of export changes between turns in world trade cycles are also high, providing further evidence of the close relation between exports and these cycles. Annual rates of change average 12 per cent for the full period, as against the 18 per cent rate of change of exports during export cycles.

Examining amplitudes in the shorter periods, we again find no evidence of a decided change after World War I in the behavior of U.S. exports during world import cycles. Despite the larger swings in world trade in the 1920's, the rate of change in exports was of the same order at that time as in the mild cycles before World War I (Table 8). Also similar in the two periods mentioned is the part of the exports' total variations which conformed to world trade cycles. The ratios of the rates of change are 70 per cent for the interwar period (excluding 1929-37) compared to

[8] This may be compared to the corresponding measures of export movements in domestic business cycles in Chapter 3, where it was found that even in 1921-58, when exports on the whole conformed to business cycles, only 70 per cent of their individual interstage movements shared in this agreement.

TABLE 8

**World Import Cycles: Average Change in U.S. Exports, 1883-1959**

	1883-1913		1921-38		1948-59		1921-38 1948-59		1883-1913 1921-38 1948-59	
	U.S. Exports	World Imports	U.S. Exports	World Imports	U.S. Exports	World Imports	U.S. Exports	World Imports	U.S. Exports	World Imports
Number of expansions	6	6	2	2	2	2	4	4	10	10
Number of contractions	6	6	2	2	3	3	5	5	11	11
Conformity index										
Expansion	+100		+100		+100		+100		+100	
Contraction	+100		+100		+100		+100		+100	
Full cycle	+100		+100		+100		+100		+100	
Average total percentage change										
Expansion	+37.3	+25.0	+30.2	+34.8	+47.6	+43.0	+38.9	+38.9	+38.0	+30.6
Contraction	−19.4	−8.3	−16.2	−17.1	−27.5	−18.0	−23.0	−17.6	−21.0	−12.5
Full cycle	56.7	33.3	46.4	51.9	75.1	61.0	61.9	56.5	59.0	43.1
Average annual percentage change										
Expansion	+10.0	+6.7	+9.7	+11.2	+15.2	+13.8	+12.5	+12.5	+10.8	+8.8
Contraction	−15.0	−6.4	−11.8	−12.5	−20.6	−13.4	−17.0	−13.1	−16.0	−9.5
Full cycle	11.3	6.6	10.3	11.5	17.3	13.7	14.0	12.7	12.3	9.0

The conformity index is constructed by rating a rise in expansion or fall in contraction +100, the opposite movements −100, and averaging these ratings. See Appendix B. No index is entered for world imports which conform by definition.
The 1929-37 cycle is included in the conformity indexes, but excluded otherwise.
World imports exclude U.S. imports.
See Table 1, notes 1-4.

CHART 6

Patterns in World Import Cycles: U.S. Exports, 1881-1959
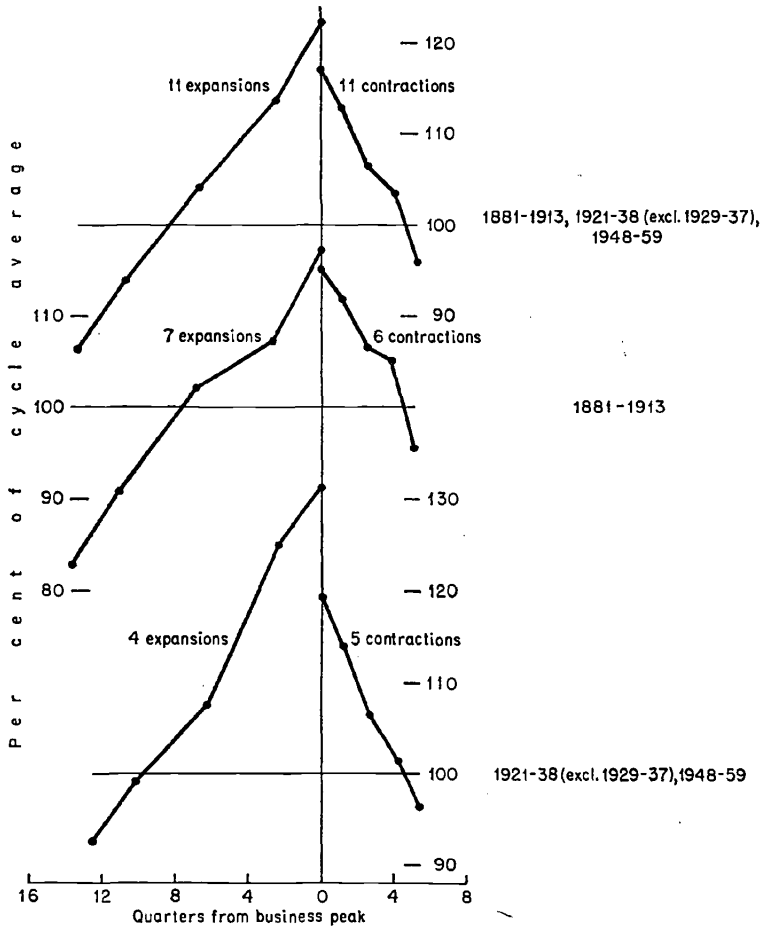
World imports exclude U.S. imports.
See Table 1, notes 1-3.

In order to utilize all available information, incomplete cycles at the beginning or end of periods are included in the averages. An incomplete cycle is an expansion without the following contraction or a contraction without the preceding expansion. Due to the inclusion of incomplete cyles, a given peak date may figure among the peaks terminating expansions but be excluded from the peaks at the beginning of contractions or vice versa. Hence the chart shows two different average standings at peaks in each period.

65 per cent in 1883-1913. At most they show a slight shift toward closer association.

A substantially different situation, however, prevailed during the

Great Depression and again after World War II. In 1948-59 U.S. exports moved at the rate of 17 per cent per year in world trade cycles as against 11 per cent in 1883-1913. The greater amplitude is due in part to the increased instability of foreign trade, but mainly to the closer relation between U.S. exports and world trade. This is shown clearly in the 91 per cent ratio of the rate of change of exports in world trade cycles to their rate of change in export cycles.

Amplitude measures thus confirm the conclusions drawn from the other measures in this chapter: first and most important, the relation of U.S. exports to world trade cycles was close at all times; second, the shift in this relation after World War I was much less drastic than the change in the relation of exports to domestic business cycles, but it too was toward a more intimate association; and third, the degree of interdependence between U.S. exports and world trade was considerably higher in 1948-59 than previously.