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The Effect of U.S. Business Cycles on the Quantity of U.S. Exports

The analysis of turning points in the preceding chapter takes us a certain distance toward understanding what happens to U.S. exports during business cycles. When export turns regularly occur in the vicinity of like turns in domestic business, it can be inferred that exports tend to move in the direction of the domestic business cycle (DBC), while the occurrence of export peaks near business troughs points to the opposite relationship. But in many instances the timing of export turns relative to the DBC was not so systematic as to permit firm conclusions about the typical direction of export change during business expansion and contraction. And even if it were, one would still want to know the magnitudes of such changes, about which timing measures are silent. The present chapter will, therefore, measure directly the directions and amplitudes of movements in export quantities during U.S. business cycles and attempt to explain them. The subjective element involved in the selection and matching of export turns is thus eliminated here. The analysis is based on the Burns-Mitchell procedure, as in Chapter 4. In addition partial correlations of cycle amplitudes are used.[1]

Presentation of the results is complicated by differences in cyclical behavior among classes of export goods and between earlier and later cycles. It may, therefore, be helpful to outline the conclusions in a summary fashion at the outset.

Traditional theory expects exports to be stymied by the expanding phase of the domestic business cycle and to be encouraged by the contracting phase. Our findings on total U.S. export quantity and on nonmanufactures exports are in accordance with this expectation. These exports would have moved in opposition to the DBC during the

[1] The measures in this chapter refer to synchronous changes in export quantities, DBC, and WIC. Experiments allowing for differences in timing yielded less systematic relationships than the synchronous ones due to the briefness and/or irregularity of leads and lags in export quantities.

full period covered if foreign demand had not exerted its influence in the other direction. The agreement of world import cycles (WIC) and DBC resulted in positive conformity of exports to the DBC in the period after 1921, while in earlier cycles this influence did not suffice and exports (excluding manufactures) moved inversely to the DBC.

The pattern of the quantity of finished manufactures exports, however, differs from that of other classes and does not agree with expectations. U.S. manufactures exports quantities develop, as a rule, more favorably during domestic expansion than during contraction and their positive relation to the DBC is only partly accounted for by WIC. This would be in line with expansionist views about the stimulating effects of growth on exports, were it not for the behavior of manufactures export prices which fail to show the required movements. Hence, other explanations of the unexpected findings must be looked into. Having explored several possibilities, we arrive at the conclusion that our measures probably overstate the positive relation of manufactures exports and the DBC, but that the true relation is not the expected negative one either. The cyclical swings in U.S. domestic business, in other words, had no sizable, systematic effect on U.S exports of manufactures, according to our findings.

1. *Measuring the Relation of U.S. Export Quantities to U.S. Business Cycles*

a. TENDENCY OF EXPORT QUANTITIES TO RISE MORE IN BUSINESS EXPANSIONS THAN IN CONTRACTIONS, 1921–61

The frequency with which export quantities have risen during business expansions and fallen during contractions since 1921 is indicated by the conformity indexes in Table 39. The predominance of plus signs shows that in the majority of instances export quantities have moved with, rather than against, the tides of business. Of the sixty-four observations on the four commodity classes in eight cycles, forty-one conform to the direction of the DBC while twenty-three do not.[2] The latter consist of ten export falls in U.S. expansions and thirteen rises in contractions. In expansions there are large differences among commodity classes. While finished manufactures exports (MEQ) have grown in every one of the eight expansions,

[2] This count of direction of movements and similar ones below are implicit in the conformity indexes and not shown separately in the tables.

TABLE 39

Domestic Business Cycles: Change in U.S. Export Quantities, *1879-1961*

	Total		Finished Manufactures		Semimanufactures	Crude Materials		Foods	
	1879-1913	1921-1961	1879-1913	1921-1961	1921-1961	1879-1913	1921-1961	1879-1913	1921-1961
Conformity index									
Expansion	-20	+75	+100	+100	+25	-40	+50	+20	-25
Contraction	-33	-12	-33	+12	+25	-78	+38	-11	0
Full cycle	-22	+57	+44	+100	+14	-78	+57	+11	+29
Average total percentage change									
Expansion	+0.3	+12.2	+16.8	+18.2	+16.2	-7.5	+13.2	+2.0	-8.1
Contraction	+10.7	-1.0	+8.5	-1.7	+2.2	+19.2	-6.2	-1.6	-0.8[a]
Full cycle	-10.4	+13.2	+8.3	+19.9	+14.0	-26.7	+19.4	+3.6	-7.3[a]
Average annual percentage change									
Expansion	+0.1	+5.3	+8.1	+7.9	+7.1	-3.6	+5.8	+1.0	-3.5
Contraction	+7.3	-0.9	+5.8	-1.6	+2.1	+13.1	-6.0	-1.1	-0.8[a]
Full cycle	-2.7	+3.8	+2.7	+5.8	+3.9	-7.3	+5.8	+1.0	-2.2[a]
Percentage ratios of rates of change in U.S. business cycles and:[b]									
Export quantity cycles	-12.77	22.98	28.57	45.86	14.80	-30.38	19.23	10.57	-7.38[a]
World import cycles	-27.27	31.62	43.48	62.89	26.24	-146.94	38.22	31.32	-22.13[a]

Notes to Table 39

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.

The conformity index is constructed by rating a rise in expansion or a fall in contraction +100, the opposite movements -100, and averaging these ratings.

The basis for the percentage change is the average level of the series during a cycle. The averages are weighted.

The war cycle 1938-45 is excluded. The 1929-37 cycle and the 1945-48 expansion are included in the conformity indexes, but excluded otherwise.

Coverage: 1879-1913; ten expansions, nine contractions; 1921-61, conformity index: eight expansions, eight contractions; 1921-61, percentage change: six expansions, seven contractions.

Source: Exports, Appendix A; cycle chronologies, NBER. This source applies to all tables and charts in this chapter, except where otherwise noted.

[a]These measures exclude the enormous rise in food exports during the business contraction of 1937-38.

[b]See note to Table 8.

foods (FEQ) improved only three times. Crude materials (CEQ) and semimanufactures (SEQ) take an intermediate position, with six and five rises respectively. In contractions the range of the indexes is narrower, with all classes declining only in four or five out of the eight instances.

The total quantity of U.S. exports (TEQ) failed to rise in but one expansion (1921–23), a record which reflects the large weight and regular rise of MEQ. In contractions too, rises of TEQ were slightly more frequent than falls. At least two out of the four commodity classes (always including MEQ), rose in four out of the eight contractions covered, and the surge of FEQ alone in 1937–38 caused a fifth instance of rising TEQ during business contraction.

The extent to which the slightly inverse behavior of quantities in contractions reflects rising trends is brought out by the conformity indexes for full cycles in Table 39. All of these have positive signs indicating that export quantities of all classes have, in the majority of instances, fallen more rapidly or risen more slowly during domestic contractions than during the preceding and following expansions. Out of fifty-six comparisons between export changes in the two cycle phases, forty-two conform to this rule.

There are, however, wide differences among the commodity classes in this respect. At one end of the scale, exports of finished manufactures have slowed down, if not fallen, in each U.S. business contraction without exception. The low conformity of MEQ to contractions alone has been noted. The +100 index for their conformity to full cycles tells us that the low conformity to contractions is due to their rising trend and not to opposition to the business cycle. The opposite behavior is shown by exports of semimanufactures, where the rate of change has increased almost as often during business contractions as during expansions. The index for CEQ is fairly high. The positive index of FEQ (+29) may seem to conflict with their negative index for expansions and zero index for contractions. The explanation lies in shifting trends, lowering alternately the conformity to one or the other cycle phase but not necessarily to the full cycle.

Growth of the total quantity of U.S exports slowed down or decline accelerated in six out of eight U.S. contractions since 1921. Only in 1923–24 and 1953–54 did TEQ seem to benefit from domestic recession. As for component classes, the close positive relation of total exports and business activity is due primarily to the similar relation of the largest export class, finished manufactures. Moreover, conformity of an aggregate typically tends to be high relative to that of its components, since divergent movements have more chance to offset each other.

Measures of amplitude of change in Table 39 confirm and supplement the conformity indexes. With few exceptions, the average change of export quantities in U.S. expansions is upward, in contractions downward. In the former, total exports and all classes except foods rise at an average annual rate of from 5 to 8 per cent; a fall of similar magnitude in contractions is shown only by CEQ, however, while the other classes and TEQ exhibit only minor changes.[3]

These rates of change between peaks and troughs of the DBC depend both on the total cyclical variability of exports and on the degree of similarity in timing between export cycles and business cycles. The larger the movements between peaks and troughs of the DBC are in comparison with the swings of export quanti-

[3] To avoid the distorting effect of their extraordinary magnitudes, export amplitudes of 1929–37 are excluded from the averages. For a similar exclusion of this period, see Robert E. Lipsey, *Price and Quantity Trends in the Foreign Trade of the United States,* Princeton for NBER, 1963, p. 8.

ties between their own peaks and troughs, the closer is the relation between the DBC and export cycles. Hence, ratios of average rates of change of exports in DBC to those in export cycles can serve as a rough indicator of the degree of agreement between export changes and the DBC.

Export quantities, it may be recalled, fluctuate strongly, rising and falling between their own turns at rates ranging from 13 to 37 per cent per year. What part of these variations is accounted for by the DBC? For one class of exports, MEQ, the proportion is substantial, amounting to 46 per cent (see Table 39). The ratios for SEQ and CEQ are quite small, however, and the rate of change of TEQ is only a little over a fifth of the rate in its own cycles. (FEQ moved inversely to the DBC.) These small ratios in combination with the high conformity indexes indicate that, though exports did tend to rise more during business expansions than during contractions in 1921–61, the difference between their movements in the two cycle phases is small compared with their large fluctuations within the phases. Their positive relation to the DBC thus appears weaker than the conformity indexes would have it.

How do these findings compare with the timing measures of Chapter 5? Positive conformity of exports to the DBC should be the higher the less frequently export turns coincide with opposite turns in the DBC. Hence the high conformity of finished manufactures to U.S. business cycles agrees with the finding that peaks in this series do not occur near DBC troughs, nor MEQ troughs near DBC peaks.

On the other hand, the low positive conformity of SEQ and FEQ is consistent with an inverse relation between several turns in these series and DBC turns. There is a discrepancy, however, between the rather high conformity of CEQ and their relatively numerous inverse turns. This is a warning, confirmed by the ratios of the rates of change, to regard the conformity measures in this case with caution. As Chart 9 shows, CEQ would sometimes have fallen in expansion and risen in contraction in the interwar period, if short leads or lags were being allowed for.

b. Tendency of Export Quantities to Rise More in Business Contractions than in Expansions, 1879–1913

Before World War I export quantities of the various classes either moved less with or moved more against the domestic business cycle

than later on. This is shown strikingly by the predominance of minus signs in the conformity indexes of Table 39. TEQ has risen more often than it has fallen during the business contractions of this period and fallen more often than it has risen during expansions. Of the fifty-seven observations of the movements of the three commodity classes in ten expansions and nine contractions, thirty run in the direction opposite to domestic business. In ten domestic expansions, CEQ rose only three times and FEQ six times. The regular increase in MEQ in these phases is due in large part to their steep upward trends as shown by the fact that they also rose six times in nine contractions. The predominance of rises over falls of CEQ and FEQ during business contractions, however, cannot be due to trend since these series fall frequently in expansions. It indicates, rather, their negative relation to domestic business. All three classes together have risen nineteen times in business contractions and fallen only eight times.

When the disturbing trends have been eliminated, the conformity indexes for full business cycles are found to be positive for MEQ and FEQ but considerably lower than in the later period (MEQ is +44 against +100, FEQ is +11 against +29). The decisive contrast with the later period, however, occurs in the behavior of CEQ which, with striking regularity (in sixteen out of eighteen comparisons), rose at a faster pace or fell more slowly during business contractions than during expansions in 1879–1913. Thus the low inverse conformity index for TEQ does not signify the absence of a systematic relation between exports and business cycles but the presence of opposing relations of commodity classes. During business contractions, the growth of manufactures exports was likely to slow down, that of materials exports was almost certain to accelerate, and only foods were about as likely to react in one way as in another.

The amplitudes of rise and fall in total exports which result from the opposing class movements are more clearly inverse to the DBC than the conformity measures. According to Table 39, TEQ rises on the average by 7 per cent a year in business contractions, while its average change in expansions is zero. Only MEQ grows vigorously in expansions, but this is offset by a fall in CEQ. On the contrary, in business contractions of these earlier years, the growth of CEQ is enormous, that of MEQ also substantial, and only FEQ moves erratically.

The sharp shift from the earlier to the later period is thus brought out very clearly by the average amplitudes. Almost all of them not only differ in magnitude between the two periods but in direction as well. Where there is an average rise in the early period, for instance, in TEQ during business contractions, there is an average fall in later years. The only instances of similar change in both periods are MEQ in business expansions, which rise by about 8 per cent a year in both periods and FEQ in contractions. The latter probably is a matter of pure chance; the former reflects partly a steady upward trend.

The rise and fall of export quantities in 1879–1913 between turning points in domestic business may again be compared with that between their own peaks and troughs. These ratios of rates of change support the conformity indexes in disclosing that the relation to the DBC was as clearly negative for CEQ, as it was positive for MEQ, and irregular for FEQ. The small inverse movement of TEQ during DBC is only a minor part of the total variation in this series, a result which again reflects the opposing behavior of the commodity classes during DBC.

The foregoing measures thus disclose that (1) all types of exports showed a less positive or a more inverse relation to the DBC in the earlier than in the later period, and (2) the differences between commodity classes are sharper in the earlier period due to the strongly inverse behavior of CEQ, which contrasts with the fairly high positive relation of MEQ and the irregularity of FEQ.

All this agrees with the findings in Chapter 5 on the timing of export turning points. Peaks and troughs of TEQ, CEQ, and FEQ were found to have occurred far more frequently near opposite turns in domestic business before 1913 than afterward. The regularity of such inverse turns in CEQ corresponds to the high inverse conformity of these exports in 1879–1913. The location of turns in TEQ and FEQ, sometimes near like and sometimes near unlike DBC turns, in the same period, reflects the irregularity shown by the low conformity indexes. And the absence of MEQ turns near opposite DBC turns agrees with the positive conformity of this export class.

C. SEVERITY OF U.S. BUSINESS CYCLES AND EXPORT CHANGES: AMPLITUDE CORRELATIONS, 1879–1961

Up to this point, no account has been taken of the varying degree of severity of business cycles. Conformity indexes and average ampli-

tudes distinguish between export changes in expansions and contractions but not between those in vigorous and weak expansions or mild and deep contractions. In the present section, measures of the severity of domestic cycle phases will be introduced and the amplitudes of change in domestic business will be related to that of export changes. (These amplitudes—the raw material for the following correlations—are shown in Tables 40 and 41.) [4]

The hypotheses that will be tested in this fashion differ from those of the preceding sections. For a positive relation between exports and the DBC to be established by conformity indexes, the rate of change of exports during business expansions must, in most instances, be higher than in the adjacent contractions. In the correlation analysis, however, positive relation implies that the rate of change of exports tends to be highest in the most vigorous business expansions and lowest in the most severe contractions. And the same is true, *mutatis mutandis,* for an inverse relation. Shifts in long-run trends, it should be noted, affect the correlation coefficients, since they are based on comparisons of all phases covered. This is in contrast to full cycle conformity indexes which are based on comparisons of adjacent phases only.

Turning to the coefficients in Table 42 (Moore index), one notes that, except for MEQ, they fail to show the positive relation between exports and the DBC in 1921–61 that the conformity indexes had indicated. There is a low positive coefficient for SEQ, which is not significant on the 5 per cent level, while that for CEQ is zero and that for FEQ even negative. Most important, the correlation of TEQ amplitudes and the DBC is also zero as against a conformity index of +57. The correlation coefficients thus bear out measures of amplitudes and ratios of rates of change in suggesting that the conformity indexes overstate the positive relation of export quantities and the DBC.

For the earlier cycles the story told by the correlation coefficients and that by the conformity indexes are similar. The two measures agree for every class as well as for total exports. They both tell us that TEQ, and particularly CEQ, tended to grow least when the

[4] Two indicators of domestic business activity are used: (1) an average of three trend-adjusted indexes of general business (Moore index); (2) bank clearings or bank debits outside New York.

For a discussion of these indexes and the method employed, see Chapter 2 and Appendix D. Note that, unless stated otherwise, the correlations are based on combined ranking of expansion and contraction amplitudes.

TABLE 40

Individual Domestic Business Expansions and Contractions: Amplitude of Change in U.S. Export Quantities, World Imports, and Domestic Business, 1882-1913
(per cent of cycle averages)

Phase		Domestic Business			U.S. Export Quantities			
Beginning in Year and Quarter	Duration (qtrs.)	Moore Index	Clearings Index	World Imports	Total	Finished Manufactures	Crude Materials	Foods
				Expansions				
1885 II	8	+22.7	+31.0	-3.9	-0.9	+8.7	-5.2	+8.2
1888 I	10	+16.6	+31.5	+15.5	+27.1	+24.6	+26.5	+40.4
1891 II	7	+16.3	+19.9	-9.9	-10.6	+7.3	-32.9	-12.3
1894 II	6	+25.3	+13.8	+5.7	-1.0	+12.2	-5.5	+7.0
1897 II	9	+26.6	+34.3	+14.5	+19.0	+30.5	+3.4	+26.5
1900 IV	8	+14.1	+15.7	+1.7	-8.4	+3.6	-1.7	-23.5
1904 III	11	+20.2	+28.9	+27.1	+17.7	+20.8	+4.5	+43.2
1908 II	7	+25.6	+22.9	+12.0	-17.0	+11.9	-23.9	+47.8
1911 IV	5	+13.6	+8.1	+8.1	+0.2	+18.1	-14.8	+24.2
				Contractions				
1882 I	13	-27.9	-11.9	-6.9	+13.6	-3.1	+6.2	+13.9
1887 II	3	-11.2	-0.4	+4.9	-3.7	+0.3	+23.0	-26.9
1890 III	3	-17.0	-8.2	+0.8	+1.6	+1.5	+6.1	+3.3
1893 I	5	-30.7	-27.0	+4.2	+23.3	+10.0	+30.3	+16.0
1895 IV	6	-24.3	-4.2	+5.5	+27.2	+29.8	+30.2	+18.4
1899 III	5	-14.4	+8.9	+5.9	-0.4	-1.4	+8.3	-10.1
1902 IV	7	-14.4	+3.6	+6.9	+3.6	+14.5	+23.9	-26.3
1907 II	4	-29.5	-14.2	-11.4	-9.6	-8.8	-2.6	-32.0
1910 I	7	-11.9	+5.7	+16.3	+40.8	+33.4	+47.7	+29.0

See notes after Table 41.

TABLE 41

Individual Domestic Business Expansions and Contractions: Amplitude of Change in U.S. Export Quantities, World Imports, and Domestic Business, 1921-61
(per cent of cycle averages)

Phase		Domestic Business			U.S. Export Quantities				
Beginning in Year and Quarter	Duration (qtrs.)	Moore Index	Clearings Index	World Imports	Total	Finished Manufactures	Semimanufactures	Crude Materials	Foods
				Expansions					
1921 III	7	+35.9	+20.8	+17.8	-10.9	+19.9	+28.4	-33.9	-66.7
1924 III	8	+18.5	+16.1	+10.3	+14.3	+18.5	-0.3	+34.8	-0.9
1927 IV	7	+16.8	+23.4	+7.9	+17.6	+27.1	-5.9	+12.3	-7.4
1949 IV	14	+24.4	+37.6	+26.5	+0.4	+11.7	-4.8	-5.7	-29.6
1954 III	12	+12.2	+24.6	+30.1	+32.1	+21.8	+33.8	+51.4	+40.9
1958 II	8	+15.2	+16.8	+19.2	+19.5	+9.9	+46.2	+20.1	+15.1
				Contractions					
1923 II	5	-21.0	-3.4	+9.8	+9.4	+13.5	+26.0	+23.3	-0.1
1926 III	5	-9.1	+8.8	+7.6	0.0	+7.1	+13.3	-32.6	-5.3
1937 II	4	-45.1	-20.2	-16.1	+3.5	-9.5	-31.1	-6.5	+160.4
1948 IV	4	-15.8	-6.1	-16.4	-9.7	-9.9	-3.2	-1.7	-19.9
1953 II	5	-12.9	+0.2	+8.1	+6.2	0.0	+39.1	+1.6	+5.4
1957 III	3	-20.6	-2.2	-11.4	-16.8	-13.4	-22.4	-27.6	+3.5
1960 II	3	-11.8	+1.1	+4.0	+0.7	+0.4	-6.6	0.0	+11.6

Notes to Tables 40 and 41

World Imports exclude U.S. Imports.

The basis for the percentage change is the average level of the series during a cycle.

Clearings index is defined as bank clearings outside New York City, monthly, from 1882 through 1919, and as bank debits outside New York City, monthly, thereafter.

Source: 1882-1942, *Historical Statistics of the United States, 1789-1945,* Bureau of the Census, Washington, 1949, pp. 324-325, 337-338; 1943-61, Board of Governors of the Federal Reserve System, Division of Bank Operations, mimeographed table, "Bank Debits and rates of Turnover" (C.5 Revised Series, 1943-52) December 23, 1953; after 1952, from *Federal Reserve Bulletin.* Seasonal adjustment to 1942 by source, 1943-61 by NBER.

Moore index: Unpublished memorandum by Geoffrey H. Moore, revising and updating table in *Business Cycle Indicators,* G.H. Moore, ed., Princeton for NBER, 1961, Vol. I, p. 104. The figures are averages based on three trend-adjusted indexes of business activity—AT&T, Persons-Barrons, and Ayres—each of which was analyzed for specific cycles, suppressing specific cycle turns not corresponding to reference cycle turns.

home economy grew most, whereas MEQ fared the better the more prosperous the home economy. By either yardstick FEQ moved irregularly. The measures agree further that, except for foods, exports in the earlier period were more inversely or less positively related to the DBC than later on.

When the comparison uses the clearings index instead of the Moore index as an indicator of the DBC, most of the positive coefficients are somewhat higher, especially in the later period, and the inverse ones are lower. The main reason for this seems to lie in some similarity of the trends of clearings and exports. In the later period, both series rose more steeply after World War II than in the interwar period, which contributes to the agreement between their amplitudes. The correlation of the trend-adjusted Moore index and exports is not helped by this factor.

2. *World Import Cycles Counteract the Negative Effect of U.S. Business Cycles on Export Quantities*

Having established the patterns of export quantities in U.S. business cycles, we shall now try to interpret them. Foreign demand is generally thought to be the main determinant of the rise and fall in

TABLE 42

Rank Correlation Coefficients Measuring Relations Between Amplitudes of U.S. Export Quantities (EQ), Domestic Business Cycles (DBC), and World Import Cycles (WIC), 1882–1961

	U. S. Export Quantities					
	Total	Finished Manu-factures	Semi-manu-factures	Crude Materials	Foods	World Import Cycles
			1882–1913			
Simple Kendall correlations:						
DBC (Moore index)	-.21	+.33*		-.37*	+.09	
DBC (clearings index)	-.11	+.35*		-.24	+.18	
WIC	+.37*	+.59**		+.19	+.40*	
DBC (Moore index)						+.34*
DBC (clearings index)						+.36*
Partial Kendall correlations:						
DBC (Moore index) holding WIC constant	-.42	+.17		-.47	-.05	
DBC (clearings index) holding WIC constant	-.28	+.18		-.34	+.04	
WIC holding DBC (Moore index) constant	+.48	+.54		+.36	+.39	
WIC holding DBC (clearings index) constant	+.44	+.53		+.30	+.36	

(continued)

TABLE 42 (concluded)

	U.S. Export Quantities					World Import Cycles
	Total	Finished Manufactures	Semi-manufactures	Crude Materials	Foods	
			1921–1961			
Simple Kendall correlations:						
DBC (Moore index)	+.05	+.56**	+.26	+.03	−.36*	
DBC (clearings index)	+.26	+.62**	+.26	+.13	−.15	
WIC	+.41*	+.56**	+.51**	+.33	−.05	
DBC (Moore index)						+.49*
DBC (clearings index)						+.64**
Partial Kendall correlations:						
DBC (Moore index) holding WIC constant	−.19	+.40	+.01	−.16	−.39	
DBC (clearings index) holding WIC constant	.00	+.41	−.10	−.11	−.15	
WIC holding DBC (Moore index) constant	+.44	+.40	+.45	+.36	+.15	
WIC holding DBC (clearings index) constant	+.33	+.27	+.46	+.32	+.06	

*Significant at the .05 level. **Significant at the .01 level. No tests of significance are known for partial coefficients.

World imports exclude U.S. imports.

Coverage: For 1882–1913, eighteen cycle phases (nine expansions plus nine contractions); for 1921–61, thirteen cycle phases (six expansions, plus seven contractions).

Source: For clearings index and Moore index, see source to Tables 40 and 41. See also, notes to Table 39.

exports and the analysis in Chapter 4 (based on world imports as an indicator of foreign demand) confirmed this view. But we have also found (Chapters 2 and 5) that WIC and DBC were not in agreement all the time. The question is, therefore, how regularly and how strongly foreign demand pulled exports in the direction in which domestic demand was moving. Are the postulated inverse effects of the DBC on exports merely outweighed by those of positively conforming foreign demand so that there is no conflict between export behavior and traditional theory? Or should the theory be revised?

a. CONFORMITY OF WORLD IMPORTS TO U.S. BUSINESS CYCLES

A first rough approach to the problem is to compare, cycle by cycle, the conformity of U.S. export quantities and of world imports to the DBC. If most instances in which exports move with the DBC were accompanied by movements of world imports with the DBC, this would support the attribution of the conformity of export cycles to that of world import cycles. If, however, U.S. exports often moved with the DBC while world imports did not, this would agree with the theory that the DBC has a positive effect on exports. Negative conformity of U.S. exports to the DBC accompanied by positive conformity of world imports would support the theory of the inverse effect of DBC on exports. The comparison will further serve to explain whether the fact that world demand in earlier years is less often in agreement with U.S. business than later is the reason why export changes which run with domestic business cycles are less frequent in the earlier than in the later period. The results of this comparison are as follows (see Table 43):

1. In terms of their conformity to full U.S. business cycles, U.S. export quantities and world imports behave similarly during DBC in about two-thirds of the instances covered in both periods. In these instances, i.e., when positive (negative) conformity of U.S. exports coincides with positive (negative) conformity of world imports, the latter could account for the relation of the former to the DBC.

2. Only a small proportion of U.S. export cycles with positive conformity to the DBC was accompanied by world import cycles with inverse conformity. But a large proportion of negatively conforming export cycles coincided with positively conforming world import cycles. In other words, most of the positively conforming export cycles could be accounted for by world demand, but a considerable portion

TABLE 43

Number of U.S. Business Cycles with Indicated Conformity of U.S. Exports and World Imports, 1882-1961

Conformity of Export Quantity	Conformity of World Imports			
	1882-1913		1921-1961	
	Positive	Negative	Positive	Negative
Commodity classes				
Positive	18	6	30	8
Negative	12	15	10	4
Total				
Positive	6	1	8	2
Negative	4	6	2	1

Note: The domestic expansion 1879-82 is not included here, in contrast to Table 39, because it is not covered by the world import series.

World imports exclude U.S. imports. See also, notes to Table 39.

of negatively conforming export cycles could not be so explained. This suggests negative effects of the DBC on U.S. exports.[5]

3. By this standard, the contrast between the two periods is only in small part due to the more positive relation of world imports to the DBC in the later period. The greater part of the shift toward more positive conformity of U.S. export quantities to the DBC occurred within each class of world import conformity. The number of positively conforming export quantity cycles would be only a trifle lower than it actually is in the later period if the relation of world imports to the DBC had remained what it was earlier.

b. ELIMINATING THE EFFECT OF WORLD IMPORT CYCLES THROUGH PARTIAL CORRELATIONS

More information on the role of foreign demand can be derived from the amplitude correlations described in the first section

[5] There are eight instances in 1921–61 when commodity classes of export quantities conformed positively to the DBC while world imports conformed negatively. All of these, and the two corresponding cases in TEQ as well, occurred during the two mild contractions of the 1920's, when the changes in world imports were almost equal in U.S. expansions and contractions.

of this chapter. There the amplitudes of export quantities and U.S. business activity were correlated; now the same will be done for exports and world imports, both during U.S. business expansions and contractions.

Table 42 shows significant positive coefficients for TEQ, MEQ, and SEQ in both periods and also for FEQ in the earlier one. Not only did exports of these classes rise more in world expansions than in contractions, as shown in Chapter 4, but also, as a rule, their increases between turns in the DBC were larger the more vigorous the world import rise, and their declines were sharper the more marked the world decline. The stability over time of the relations of total exports and of manufactures to world imports should be noted. Food exports, on the other hand, which also had been positively related to world imports in earlier years, turned irregular in later ones.

Next, the relation of world to domestic cycles has to be measured. It turns out to be positive and significant in both periods. The higher the rate of growth of U.S. business, the larger, in general, is the rise in world imports. In 1921–61 the relationship is closer than in earlier years, especially when measured by the clearings index whose secular trends resemble those in world trade.

Thus the simple correlations disclose that, roughly speaking, world imports rise more quickly the more vigorous a U.S. expansion, and U.S. export quantities rise more quickly the greater the growth in world imports. If, nevertheless, exports do not rise more the faster the U.S. economy expands, countervailing forces must be at work. That the independent relation between the DBC and total export quantities tends, indeed, to be negative not only in the earlier but also in the later period is brought out by the coefficients of partial correlation which indicate the degree of relation of exports to the DBC when the influence of world imports is held constant (Table 42, Moore index).[6] Of the commodity classes, crude materials also have negative coefficients in both periods and foods in the later one. The zero partial coefficient for FEQ in the earlier period results from the offsetting effects of two opposing relations to the DBC: the usual negative effect of the DBC on exports and the unusual instances of a positive effect of exports on the DBC. It agrees with findings in Chapter 5, which showed that the latter effect did take place

[6] Unfortunately, no tests of significance are yet known for partial rank correlation coefficients.

in a few instances in the nineteenth century when large crops stimulated business revivals.

Apart from this special relation of the early food exports, the results for nonmanufactures and for total exports are consistent with the hypothesis that U.S. business cycles have a negative effect on quantities exported. But for the countervailing effect of foreign demand, these exports would have developed more favorably the deeper the slump in home business.

The negative effect of swings in domestic business on the total export quantity was more substantial before World War I than later. Partly this is a matter of change in commodity mix, partly it reflects the more inverse behavior of CEQ in the earlier period. The prominent negative response of this class of exports to the DBC, inferred in Chapter 5 from the timing of the turning points, is fully supported by the correlations. This also is true of the previous view that the later shift toward a less inverse behavior of CEQ was not mainly due to a similar one in foreign demand. Otherwise, the negative coefficient with constant world demand for the earlier period would not be so much higher than that for the later one.

As to manufactures exports, their deviant behavior will be analyzed in a separate section.[7]

The relations between the three variables show up also, of course, in coefficients measuring the relation of world imports to export quantities with the effect of the domestic business cycle eliminated. All such coefficients are positive, and those for TEQ and CEQ are higher—particularly in the earlier cycles—than the ones for the simple WIC to EQ relation. FEQ after World War I are also more positively related to WIC without the influence of DBC, while the opposite holds for MEQ in both periods. Again this tells us that total exports and nonmanufactures would have risen more in those U.S business cycle phases in which world imports grew rapidly (and

[7] Further testing of the findings by dividing the phases covered in the preceding analysis into expansions and contractions is of limited value since the number of observations becomes very small and the results strongly subject to chance. Still, it may be noted that these coefficients too support the view that the independent effect of the DBC on export quantities was predominantly inverse. Out of the eighteen partial coefficients for the relations of exports to the DBC, fifteen are negative (referring to total exports and commodity classes in both periods, Moore index). The inverse correlation of TEQ amplitudes and amplitudes of U.S. expansions is a perfect one. The exceptions are characteristically MEQ and SEQ in the contractions of the later period and MEQ in the expansions of the earlier one.

fallen more in those associated with steep world import declines) had it not been for the countereffects emanating from the home economy. Such effects are not displayed, however, by the coefficients for MEQ and SEQ which are lower, instead of higher, when the influence of the DBC is eliminated.

C. EFFECT OF DOMESTIC BUSINESS CYCLES ON EXPORT QUANTITIES INFERRED FROM PRICE CHANGES

The small number of observations and other shortcomings make it desirable to check the evidence obtained in the preceding section by other measures. In this section we shall extract some additional information from price patterns.

First, one may want to know whether the amplitudes of export quantity changes during domestic business expansions and contractions are related to the corresponding price amplitudes. The answer, given in Table 44, is that the relation was in most instances a loose one. One single coefficient of the nine is significant at the 5 per cent level. Comparison of the quantity-price and quantity-DBC coefficients, with the DBC represented by the Moore index, shows the former more negative (or less positive) for some commodity classes but the opposite result for others. Generalization about these two relations is, thus, not possible. The situation is different, however, when the relation of export quantities to the DBC as represented by the clearings index is compared with the quantity-price relation. Here the latter relation clearly tends to be more negative (or less positive) than the former. It is noteworthy that the coefficients for finished manufactures quantity-price relations in both periods are again positive, but much lower than those for MEQ-DBC relations.[8]

Since world imports are more closely related to the clearings index than to export prices of manufactures and foods in both periods and of crude materials in the early period, the smaller positive effect of WIC on prices could account for the more negative quantity-price relation. However, this cannot explain that, with world imports constant, most partial coefficients for the quantity-price relation are more negative than their counterparts for the quantity-clearings index relation. The signs of the former, but not those of the latter, are negative for all classes in both periods. Coefficients for crude materials are relatively high and those for finished

[8] Possible reasons for the differences between quantity-price and quantity-DBC relations are discussed in Chapter 1, section 3.

TABLE 44

Rank Correlation Coefficients Measuring Relations Between Amplitudes of U.S. Export Quantities, U.S. Export Prices (EP), Domestic Business Cycles (DBC), and World Import Cycles (WIC), 1882-1961

	U.S. Export Quantities				
	Total	Finished Manufactures	Semimanufactures	Crude Materials	Foods
			1882-1913		
Simple Kendall correlations:					
DBC (Moore index)	-.21	+.33*		-.37*	+.09
DBC (clearings index)	-.11	+.35*		-.24	+.18
EP	-.20	+.01		-.24	-.22
Partial Kendall correlations:					
DBC (Moore index) holding WIC constant	-.42	+.17		-.47	-.05
DBC (clearings index) holding WIC constant	-.28	+.18		-.34	+.04
EP holding WIC constant	-.36	-.18		-.34	-.24
			1921-1961		
Simple Kendall correlations:					
DBC (Moore index)	+.05	+.56**	+.26	+.03	-.36*
DBC (clearings index)	+.26	+.62**	+.26	+.13	-.15
EP	+.17	+.21	+.28	-.36*	-.08
Partial Kendall correlations:					
DBC (Moore index) holding WIC constant	-.19	+.40	+.01	-.16	-.39
DBC (clearings index) holding WIC constant	.00	+.41	-.10	-.11	-.15
EP holding WIC constant	-.14	-.09	-.10	-.49	-.07

*Significant at the .05 level. **Significant at the .01 level.
No tests of significance are known for partial coefficients.

Note: The 1929-37 cycle and the 1945-48 expansion are excluded.

Source: For clearings index and Moore index, see source to Tables 40 and 41. See also, notes to Table 39.

manufactures low. Total exports resemble crude materials in the earlier period and finished manufactures in the later period.

The negative signs of the partial quantity-price coefficients indicate that, were it not for the influence of foreign cycles, export quantities would show the expected tendency to grow most when their prices slump most. But the low values of the coefficients suggest that this tendency was far weaker than one might have thought.

A more fruitful method of utilizing price measures is to ascertain, cycle by cycle, whether a rise or a fall in the rate of change in export quantity is associated with a rise or a fall in the rate of change of export prices. This information permits inferences about the effect of the DBC on exports and thus supplements other measures.

In a business contraction, when both quantity and price of exports fall or their growth is retarded relative to the preceding and following expansions, foreign demand must also have fallen and this may account for the positive relation of export quantity change to the DBC (Table 45, column 1).

When falling prices and rising quantities go together during business contractions, the assumption of an inverse effect of the DBC on exports receives support, except when an inverse supply cycle (harvest cycle) can account for such movements (Table 45, column 3).

The third possibility is a decline or retardation in export quantity during a business recession accompanied by a rise in the rate of change of prices (column 2). In this case the supply of the export goods must have risen more than the demand for them. Domestic expansion could bring about such a situation if it led to reduced costs and thus to a lowering of prices and an increase in quantities. Or the coincidence of falling prices and rising quantities may be due to a chance increase in supply, such as an unusually abundant harvest. If the latter case is treated as exceptional, inverse prices coinciding with positive quantities may be regarded as supporting the view of a positive effect of domestic cycles on exports, while positive prices with positive quantities do not.

Finally, a rise in foreign demand is indicated when both export quantities and prices move upward while home business stagnates (Table 45, column 4).

In addition to thirty-two comparisons between movements of TEQ and TEP in domestic expansions and contraction, Table 45 covers 110 such comparisons for commodity classes. In eighty-five of these,

TABLE 45

Simultaneous Conformity of U.S. Export Prices (EP) and Quantities (EQ) to Domestic Business Cycles, 1879-1961

	Number of Cases Where Rate of Change in Contraction Is Lower Than in Preceding or Succeeding Expansion			
	In EQ and EP (1)	In EQ, Not in EP (2)	In EP, Not in EQ (3)	In Neither EQ Nor EP (4)
		1879-1913[a]		
Total	8	0	10	0
Finished manufactures	10	3	4	1
Crude Materials	2	0	15	1
Foods	5	5	6	2
		1921-1961		
Total	10	1	3	0
Finished manufactures	11	3	0	0
Semimanufactures	8	0	6	0
Crude materials	6	5	3	0
Foods	7	2	2	3

Note: The war cycle 1938-45 and the 1945-48 expansion are excluded.

[a]Measures refer to lagged prices in all cases except foods. See notes to Table 39.

export prices have fallen more or risen less during contractions than during adjacent expansions. The proportion of conforming changes is almost exactly the same in the earlier and later periods. Yet the similarity is not as great as would appear from this comparison. It is reduced by the shift in timing of export prices relative to business turning points. Before World War I these prices, except foods, regularly lagged at business peaks and troughs, and our measures allow for average lags. In the later period prices do not lag systematically and are treated on a coincident basis.

In the earlier period lagged prices of total exports rise less or fall more in every business contraction than in adjacent expansions and the record of crude materials prices also is nearly perfect. Lagged prices of manufactures conform rather well; only food prices exhibit no regular lags and move irregularly in this as well as in the later period.

From 1921 to 1961 TEP again conform nearly always and there is not a single lapse in SEP, while CEP behave more irregularly than previously and finished manufactures more regularly.

The fact that prices of total exports fell more rapidly or rose more slowly in practically all domestic recessions compared with adjacent expansions, indicates that nearly every retardation of total export quantity during business contractions was accompanied by falling foreign demand and every acceleration could have been due to the favorable influence of domestic contraction.[9]

The pattern of the commodity classes resembles that of the total, but is less regular in most instances, during the full period.

When the quantity of an export class moved counter to the DBC, prices typically (in thirty-six out of forty-three cases) moved with the DBC as in the total. Almost all the exceptions occurred in food exports, whose quantity *and* price sometimes rose in business contractions.[10]

The picture is less regular, however, in those instances in which an export quantity was positively related to the DBC. In forty-nine out of the sixty-seven such instances, a fall or retardation of export quantity during a business contraction was accompanied by a fall or retardation in prices signifying declining world demand. All cases of semimanufactures and the large majority of those in finished manufactures are of this type.

There are also, however, eighteen among our 110 observations for commodity classes in which the rate of change of quantity falls while that of prices rises in business contractions, the kind of behavior which is consistent with a positive effect of the DBC on exports. Twelve of these exceptions occurred in crude materials and foods

[9] The only case in which a TEQ rise slowed down during a U.S. contraction while the TEP rise picked up was in 1960–61. Both changes were too small to be of much importance.

[10] Both quantity and price of food exports fell less or rose more during the contraction of 1923–24 than during the preceding and following expansions due to similar change in world imports. In 1960–61 such a situation was caused by government policies.

and may be attributable to the vagaries of the weather rather than to the depressing effect of business recession on these exports. The cotton harvest of 1927 is a case in point. Another explanation is government policy which, for instance, depressed both quantities and prices of cotton exports in the 1960–61 business contraction.

The six cases where inverse price cycles accompany positive quantity cycles in exports of finished manufactures are more difficult to explain, however. In the earlier period all three comparisons of this type are due to the behavior of manufactures exports in one cycle, 1885–88, which is characterized by the mildest of all business contractions and thus is likely to be atypical. In each of the instances in the later period, the rate of change of prices is nearly equal in both phases of the DBC. Thus, given the weaknesses of the data, these exceptions might simply reflect errors of measurement. Certainly they represent no strong evidence of an export-depressing effect of business contractions. Still, the fact that MEP (finished manufactures export prices) conform less well to the DBC than MEQ is noteworthy and conflicts with the theory of the inverse effect of the DBC on exports. This problem will be treated further in the following section.

Before closing this section, we may note how clearly Table 45 reflects the contrast between our two periods in the relative frequency of the two main types of export patterns. In the earlier period, instances where prices move with and quantities move counter to the DBC predominate over those where both prices and quantities conform positively. In the later period, the former are a small minority.

The contrast between the commodity classes is also clearly seen. In the earlier period, price-quantity relations are predominantly inverse in crude materials and foods. The rate of change of CEQ is regularly lower in domestic expansion than in contraction, while the opposite holds for CEP (crude materials export prices). This supports the view that rising domestic, not falling foreign, demand is the main cause of the relative fall of these exports in domestic expansions. Food export quantity, on the other hand, falls in contractions while prices rise almost as often as it rises while prices fall. As noted above, the latter behavior is probably due to fluctuations on the supply side.

Exports of finished manufactures appear dominated by demand effects. In the majority of U.S. contractions, both MEQ and MEP fell more rapidly or rose more slowly than in the preceding or fol-

lowing expansions. In most instances, falling foreign demand can account for this. But several exceptions, as well as the complete absence of any indication of inverse DBC effects in the later period (the zero entry in Table 45, column 3), again point to the exceptional behavior of this class.

d. COMPARISON OF RATES OF CHANGE IN EXPORT QUANTITIES, 1879–1961

A final approach to the problem using information not utilized above is to compare the rise and fall of exports between turning points in the DBC and in the WIC. If the (positive) movement of exports during domestic cycles is far smaller than during world import cycles, the former may be presumed to have no positive effect on export quantities. And, conversely, if the (positive) rate of change of exports during DBC is larger than during WIC, this suggests an independent positive relation between DBC and export quantities.

The case is clear, of course, when a series moves inversely to the DBC and in agreement with the WIC, as is the case with TEQ and CEQ in the earlier period and with FEQ in the later period (last line of Table 39). The high negative ratio of CEQ in 1879–1913 should be noted; it is the sole instance in which the DBC accounts for a larger part of export quantity change than the WIC and it occurs, significantly, when the inverse effect of the DBC is the strongest.

In all other instances the rate of change of exports in DBC was positive, but markedly smaller than the rate in WIC. In TEQ, SEQ, and CEQ after 1921, U.S. business cycles accounted for from 26 to 38 per cent of the variation accounted for by the world cycles. The corresponding ratio for FEQ before 1913 is of the same order. Even the relatively large proportion accounted for by the DBC in MEQ movements amounts to only 43 and 63 per cent of the proportion accounted for by the WIC in the earlier and later cycles respectively.[11]

The showing of the rates of change of exports in DBC and WIC thus agrees broadly with the rank correlations in suggesting that positive relations between fluctuations in export quantities and in domestic business may be due largely, if not entirely, to the influence of changes in world demand.

[11] In evaluating these ratios, it may be helpful to look at comparable figures for export prices (Table 12). With one exception, the proportions of change in

3. *Search for Explanations of Positive Relation of Manufactures Exports to U.S. Business Cycles*

a. RECAPITULATION OF FINDINGS

At every step in the analysis it has been found that the behavior of manufactures exports differs from that of other classes and of total exports and, most important, differs from the behavior postulated by traditional theory.[12]

The quantity of finished manufactures exports tends to fare better in expansions than in recessions of the U.S. economy during the full period covered, and especially in the later cycles. The crucial point is that this positive relation does not seem to be fully accounted for by the covariation of foreign demand and U.S. business activity.

Let us briefly recapitulate the measures. Correlation of the amplitudes of the DBC (Moore index) and of MEQ in 1921–61 yielded a significant and rather high coefficient of +.56. The relation of MEQ to the WIC is equally close, closer than those of other export classes. Yet it does not suffice to account for the positive relation of MEQ to DBC as shown by a partial coefficient of +.40. The corresponding partial coefficient for 1882–1913 is only +.17, but even this contrasts sharply with the negative coefficients for the other classes and TEQ. (Note that the contribution of world demand to the positive relation of MEQ to the DBC is about the same in both periods.) [13]

Conformity indexes, rates of change, and timing observations indicate likewise that MEQ were more positively related to DBC than other export classes or total exports. They cannot disclose whether foreign demand is responsible for all or only for part of the positive

prices accounted for by a positive relation to the DBC are higher than the corresponding ratios for quantities. This reflects the contrast between the positive impact of domestic business on export prices and their negative impact on quantities.

[12] It may be recalled here that some writers hold that the negative effect of the DBC should be stronger, rather than weaker, on finished manufactures than on other classes (see Chapter 1, section 3a).

[13] The independent positive correlation between MEQ and the DBC is also found when the period 1921–61 is split into the interwar cycles and the post-World War II ones. The number of observations in each of these subperiods is woefully small (six and seven, respectively), and the results thus have to be viewed with great caution. Still it is noteworthy that there is a clear positive correlation between the amplitudes of MEQ and those of the DBC in each of the periods, if WIC is held constant. The partial coefficient for the interwar period is fairly high (+.30), that for the cycles after 1948 high (+.67).

relation, but they definitely do not testify to any negative influence of the DBC on manufactures exports.

Thus the index for conformity to full business cycles is much higher (positive) in both periods than indexes for other types of exports and reaches the maximum +100 in the later period.

The ratio of rates of change in DBC to rates in export cycles are far more substantial for MEQ than for nonmanufactures before and after World War I, indicating that the DBC accounts for a larger share in the variations of the former than in those of the latter. Still, even for MEQ this share is much smaller than that accounted for by the WIC, and could thus be due to the parallelism between world and domestic cycles.

Observations of simultaneous price and quantity changes suggested again that MEQ are more demand-determined than other exports. But they also brought out some instances which defied explanation by demand changes.

In Chapter 5 it was shown that peaks and troughs in MEQ have not occurred at opposite turns in the DBC since 1900. But turns in the DBC were not associated with like turns in MEQ either, except for those close to like turns in WIC. When domestic business turned down without world imports experiencing a simultaneous reversal, MEQ would continue to rise. This suggests a positive relation of MEQ to the DBC, though one that might be fully accounted for by the WIC.

In sum, none of the evidence shows that U.S. business contractions are more conducive to rising manufactures exports than business expansions, and the amplitude correlations even suggest the contrary effect.

b. EXPANSIONIST EXPLANATION

In order to know whether these findings should be interpreted to mean that traditional theory must be amended and that the expansionists are right in claiming that domestic expansion has favorable effects on exports and contraction has adverse effects, one must look at the patterns of manufactures prices.

If the greater efficiency generated by rapid growth raises the quantity exported, as expansionists maintain, it also should hold down export prices. More generally, an inverse relation of finished manufactures prices to the DBC should correspond to the positive relation of MEQ to the DBC. It is possible to tell whether MEP did, in

fact, move countercyclically from the findings of the following chapter on the behavior of export prices (Table 49).[14]

Correlating the ranks of the amplitudes of MEP with those of the DBC and the WIC, as done above for export quantities, yields a low positive partial coefficient (+.19) for 1921–61. Thus there definitely is no inverse relation between MEP and the DBC, although there is much less of a positive independent relation than might have been expected. Prices do tend to rise more in strong than in weak domestic expansions, and conversely in contractions, but most of this correlation is accounted for by the similar behavior of world demand. The experience before 1913 is similar when a time lag in price changes is allowed for. In that period, too, there was a positive relation between MEP and the DBC, independent of the WIC (+.27).[15]

In sum, the prices of finished manufactures exports were at no time found to be inversely related to domestic business, even when the influence of world demand is eliminated. In no period would these prices have tended to decline more the more rapid the growth of the domestic economy, if world demand had been constant. This is not in accordance with the expansionist view. It contradicts the attribution of the relatively high growth of MEQ during business expansions to the relative decline in costs and prices.

What must also be noted, however, is that manufactures prices do not seem to be tied more closely to the DBC than to the WIC; that the former does not seem to have a stronger positive effect on them than the latter; and that, therefore, the independent positive relation between the DBC and MEP is not as close as might have been expected. Thus rising domestic business activity, while it does not depress MEP—as it should according to the expansionist views, also does not seem to raise them as regularly as traditional theory would lead us to expect. This suggests that any inverse effect

[14] Export prices have been analyzed in the same fashion as quantities, i.e., they have been correlated with the domestic business cycle, as represented by the Moore index and the clearings index, and with world imports. However, references in the text here are always to clearings, not to the Moore index, since, as a value series, the former corresponds better to prices than the Moore index, which is a physical volume series.

[15] The relation of MEP to the DBC differed far more between the interwar and the post-1948 periods than the MEQ relation. In the interwar period there was no relation between the amplitudes of either the DBC (clearings index) or the WIC and those of prices. After 1948 there is a very close positive relation to both the DBC and the WIC, and the partial coefficients for both relations are the same, positive and fairly high (+.48).

that the DBC may have on MEQ may be much weaker than is generally thought.[16]

Since the behavior of prices does not support the expansionist explanation of the positive correlation between MEQ and the DBC, other possible interpretations of the evidence must be explored.

C. FAULTINESS OF THE DATA AN EXPLANATION?

Resolution of the problem might lie in the poor coverage and other shortcomings of the price index for finished manufactures (see Chapter 2). The index shows mild MEP movements in the direction of the DBC. If the prices of goods not covered by the index had much larger (positively conforming) movements than the prices of covered goods, the rise and fall in the value of manufactures exports would be swelled by the rise and fall of the prices not covered. Dividing this value by the relatively small changes in covered prices would yield a quantity series exhibiting a spurious positive conformity to the DBC.

Not knowing how the prices that are not covered behaved, we cannot rule out the possibility of such a bias. But how likely is it that this could account for more than a very minor part of the quantity pattern? The composition of manufactures exports has changed rapidly and radically during the eighty years under observation. Hence, prices of very different goods are covered by the index in the course of time and a changing assortment of goods are left uncovered. The aforementioned bias would require that the varying bundle of goods included in the index have smaller movements than the varying bundle of excluded goods through all these many years. Furthermore, to account for amplitude correlations of MEQ and the DBC by this bias, it would be necessary for the difference between amplitudes of the prices covered and those not covered to be positively correlated with DBC amplitudes throughout the period.

The presence of bias in the data could be tested to a certain extent by analyzing price and quantity patterns of subdivisions of manufactures exports for which the price index has high coverage and whose behavior, thus, cannot be caused by the prices that are not covered. Such a test, however, is feasible on a very limited scale only. Since there are no data on subdivisions for the later period, it is restricted to the earlier one, in which manufactures exports were

[16] For a discussion of the relation of prices and domestic and foreign cycles, see Chapter 7.

relatively unimportant and their positive relation to the DBC much less pronounced than later on. Even in the earlier period, only three subdivisions lend themselves to this analysis: (1) iron and steel products, including machinery and vehicles; (2) petroleum products; (3) cotton textiles.[17]

Iron and steel exports are found to behave much like total MEQ, i.e., they moved with, rather than against, the DBC (see conformity index, rates of change, and amplitude correlation in Table 46). Exports of petroleum products moved erratically, but to the extent that there was any relation to the DBC, it too was positive rather than negative. The third group—cotton textiles—move definitely in opposition to domestic business, similarly to crude cotton, though not quite as regularly or as strongly.

As far as these findings go, they suggest that the positive relation of MEQ to the DBC is not produced by the weakness of the data. Iron and steel are, of course, more representative of manufactures in later years than cotton and petroleum. The fact that they do not move counter to the DBC makes it unlikely that the behavior of MEQ can be discounted as spurious.

It is also relevant that the prices of such very different goods as cotton and iron show similar patterns (see correlation coefficients and rates of change in Table 46). This means that the prices that are not covered would have to behave very differently from either group for MEP to understate greatly the true price pattern.[18]

d. STATISTICAL TECHNIQUE AN EXPLANATION?[19]

All our correlations are based on amplitudes of changes between peaks and troughs of U.S. business cycles. Such amplitudes are, of course, larger for the DBC indicators but smaller for exports and

[17] I am grateful to Robert E. Lipsey for suggesting this test and for help in selecting the testable groups. For the approximate values of the groups, see Appendix B.

[18] It should be noted that the value of manufactures exports, which is not affected by the weakness of the price index, is about as closely positively related to the DBC, independently of WIC, as the quantity (Table 54). Also, the contrast between the relation of MEV and CEV to DBC is about as great as the contrast between MEQ and CEQ.

If the true pattern of MEQ were inverse to the DBC, while that of MEV is positive, it would mean that falling quantities exported yield rising proceeds to the United States due to sharply rising prices.

[19] I am indebted to Victor Fuchs and F. Thomas Juster for suggesting this possibility.

TABLE 46

Domestic Business Cycles (DBC): Change in Subdivisions of U.S. Finished Manufactures Export Quantities (EQ) and Prices (EP), 1879-1913

	Quantities				Prices			
	Total Finished Manufactures	Iron and Steel	Petroleum	Cotton	Total Finished Manufactures	Iron and Steel	Petroleum	Cotton
Conformity index								
Full cycle	+44	+22	+44	-44	-17	+11	-33	+33
Average annual percentage change								
Expansion	+8.1	+11.4	+7.3	-0.5	-0.1	+0.2	-1.6	+0.9
Contraction	+5.8	+7.2	+3.2	+13.2	-1.5	-1.4	-1.3	-1.4
Full cycle	+2.7	+4.2	+3.2	-5.1	+0.5	+0.7	-0.4	+1.1
Simple Kendall correlation coefficients:								
EQ and DBC (Moore index)	+.33	+.24	+.03	-.19				
EP and DBC (Moore index)					+.23	+.18	-.03	+.24
Partial Kendall correlation coefficients:								
EQ and DBC (Moore index) holding WIC constant	+.17	+.07	+.02	-.24				
EP and DBC (Moore index) holding WIC constant					+.16	+.14	-.04	+.13

Analysis of all series is based on coincident relationships.

WIC = World import cycles. World imports exclude U.S. imports.

Source: Manufactures subdivisions, unpublished NBER data. For clearings index and Moore index, see source to Tables 40 and 41. See also, notes to Table 39.

world imports than amplitudes measured between turns of the WIC.[20] Since rankings of small amplitudes are likely to be subject to more random error than those of larger amplitudes, our analysis based on the DBC chronology can be expected to yield more reliable results for clearings and less reliable results for exports and world imports than an analysis based on the WIC chronology. When all three variables are used, it is impossible to tell which method would have more reliable results. A bias is not involved in either one. My reasons for preferring the method chosen are: first, the main object of the analysis is to find what is happening in U.S. business cycles; second, the Moore indicator would have to be sacrificed, which would greatly weaken the whole analysis; [21] third, the number of observations would be reduced due to the smaller number of world cycles.

However, in order to check our results, we have computed a second set of correlations for MEQ in 1921–61, using amplitudes in WIC rather than amplitudes in DBC. The number of phases covered is thereby reduced from thirteen to nine. The amplitudes of clearings are smaller and those of the other two series larger than with the former method.

The result is that the relation between MEQ and WIC is exactly the same whether based on DBC or WIC amplitudes. The relation between the WIC and the DBC also is similar in both cases. However, the correspondence of the ranks of MEQ to those in the DBC is considerably worse now than it was with the DBC amplitudes, the coefficients being reduced from +.62 to +.43. Taken together, this means that, on the basis of WIC amplitudes, MEQ movements are still positively related to DBC phases, but all of this relationship can be accounted for by world cycles so that the net relation between MEQ and the DBC becomes zero. Conversely, the net relation between MEQ and the WIC is closer now than with the previous method.

It thus appears that the degree to which MEQ changes correspond positively to business cycle changes is considerably higher measured in terms of business cycle amplitudes than it is measured in terms of world cycle amplitudes. Though results based on the latter are prob-

[20] Amplitudes of the Moore index which are taken between the underlying series' own turns are the largest possible for this indicator. Amplitudes of clearings are smaller than if they were taken between clearings peaks and troughs but are still larger than between turns in the WIC.

[21] Since the Moore index is based on specific turns in three indicators, it cannot be analyzed in another chronology.

ably less reliable than those based on the former, they suggest that the positive relation of MEQ to the DBC may well be exaggerated in correlations of amplitudes in U.S. business cycles. The actual relation may be less close than appears in these measures and a larger part of it may be accounted for by the WIC. This interpretation would accord with other findings in this chapter and in Chapters 5 and 7.

e. WORLD IMPORTS OF MANUFACTURES AN EXPLANATION?

In the quest for an explanation of the puzzling net positive correlations between MEQ and the DBC, the next step is to explore the possible effects of the use of world imports as an indicator of foreign demand for U.S. manufactures exports. If this demand should, in fact, prove to be tied more closely to the DBC than world imports are, it would account for a larger part of the positive relation between MEQ and the DBC than it does in our measures.

The reasons for suspecting that this is, indeed, the case are the following. The countries to which the United States sells its exports take manufactures and nonmanufactures in differing proportions. If the domestic economies of the main buyers of U.S. manufactures moved in closer agreement with the U.S. economy than the domestic economies of the main buyers of nonmanufactures, this would explain the closer relation of the demand for the former to the DBC.

To test this hypothesis, one would need quarterly exports of manufactures by country of destination and measures of the covariation of these countries' economies and the DBC. None of this is available, of course. A stab at the question can be made, however, in the following way.

First, it can be ascertained that the share of European countries in U.S. exports of finished manufactures was smaller than their share in U.S. exports of nonmanufactures. The reverse holds for countries of the Western hemisphere and other countries outside Europe. As Table 47 shows, the contrast was very great in earlier years. From 1905 to 1914, about two-thirds of manufactures exports went to countries outside Europe, against only about one-fifth of nonmanufactures. Since then, the two proportions have become more similar. Still, even in 1957–61, non-European countries took 78 per cent of U.S. manufactures exports, against 60 per cent of nonmanufactures.[22]

[22] For a discussion of shifts in the commodity composition of U.S. exports in 1871–1914, see Matthew Simon and David E. Novack, "Some Dimensions of the American Commercial Invasion of Europe, 1871–1914: An Introductory Essay," *The Journal of Economic History*, December 1964.

TABLE 47

Share of U.S. Finished Manufactures Exports in Total U.S. Exports to European and Non-European Countries, Selected Years, 1905-61

Period	U.S. Exports to European Countries			U.S. Exports to Non-European Countries			Percentage Share of U.S. Exports to Non-European Countries in U.S. Exports to World		
	Total	Finished Manufactures	Finished Manufactures As Per Cent of Total	Total	Finished Manufactures	Finished Manufactures As Per Cent of Total	Total[a]	Finished Manufactures[b]	Nonmanufactures[c]
	(annual avg. value in million dollars)			(annual avg. value in million dollars)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1905-09	1,178	158	13.4	529	298	56.3	31.0	65.4	18.5
1910-14	1,334	209	15.7	796	445	55.9	37.4	68.0	23.8
1921-25	2,279	446	19.6	2,031	1,119	55.1	47.1	71.5	33.2
1926-30	2,207	673	30.5	2,481	1,453	58.6	52.9	68.3	40.1
1957-61	5,207	2,229	42.8	12,516	8,081	64.6	70.6	78.4	59.8

Source: 1905-09: *Statistical Abstract of the U.S.*, 1934, p. 421; 1910-30: *Foreign Trade of the U.S.*, 1933, p. 44; 1957-58: *Comparative Statistics on Exports of Manufactures from the U.S., Western Europe, and Japan, 1954-58*, Dept. of Commerce, September 1959; 1959-61, cols. 2 and 5: *Survey of Current Business*, August 1962, p. 29; cols. 1 4: *Overseas Business Reports*, April 1963, p. 11.

[a]Col. 4 divided by the sum of cols. 1 and 4.

[b]Col. 5 divided by the sum of cols. 2 and 5.

[c]The difference between cols. 4 and 5 divided by the sum of cols. 1 and 4 minus the sum of cols. 2 and 5.

If it were true that European economies fluctuate more independently of the U.S. economy than non-European ones, the fact that the former play a greater role in U.S. exports of nonmanufactures than in exports of manufactures could account for the finding that the demand for nonmanufactures was more independent of the DBC than the demand for manufactures. A priori, this is plausible. The economies of Western hemisphere countries, in particular, are probably more strongly affected by fluctuations in the U.S. economy than those of European countries.

Whether the demand for U.S. exports is tied to U.S. business cycles through U.S. imports, U.S. foreign investments, or, more generally, through commodity and financial markets need not concern us here. What matters is that the tie is closer with some countries than with others, and that the former are relatively more important buyers of finished manufactures.

For a rough test of the hypothesis that non-European demand for imports is tied more closely to the DBC than European demand, at least during some of the periods covered, we use the existing quarterly series for imports of OEEC countries in 1949–61 and our own compilation of quarterly imports of ten important European countries in 1923–29. These European imports were seasonally adjusted and subtracted from total world imports to derive a series which we term, somewhat inaccurately, non-European imports. This series is shown together with European imports on Chart 20.

The first impression from inspecting the two series is the great similarity of their movements, particularly in the later period. Countermovements are rare (eleven out of fifty-six changes in 1949–61) and short-lived. Only two last more than one quarter. Some discrepancies may, moreover, be due to the independent seasonal adjustment of European and world imports.[23]

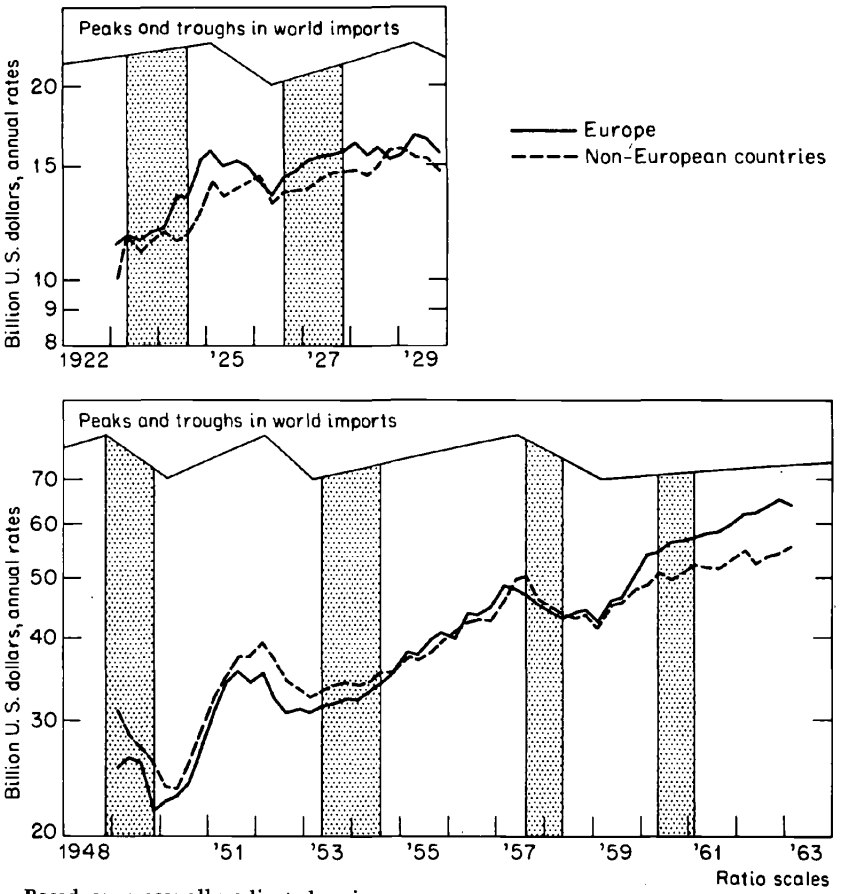
The similarity between European and non-European imports, and hence between either component and world imports, is reflected in their relations to MEQ. The coefficients are nearly the same whether one series is used or the other. The same holds for MEV. Quite apart from our present problem, this stability of results is noteworthy and reassuring.

What matters in the present context, however, is whether non-

[23] That these two subdivisions of world trade move in such close conformity to each other reflects the high degree of world integration, which is also shown by measures of diffusion of world trade. See my *Trade Balances during Business Cycles: U.S. and Britain since 1880*, Occasional Paper 67, NBER, New York, 1959, pp. 69–73.

CHART 20

European and Non-European Imports During Cycles in World Imports and Domestic Business, Quarterly Totals at Annual Rates, 1922–29, 1948–63



Based on seasonally adjusted series.

World imports exclude U.S. imports. World import cycles are shown on top of charts.

Shaded areas represent business contractions, unshaded areas, expansions.

SOURCE: see source to Table 47.

European imports are more closely related to the DBC than world imports are. First, a comparison of the amplitudes of the two series during U.S. expansions and contractions shows that in seven out of the ten instances covered non-European imports conformed better to the DBC than European imports. The former rise more than

the latter in two U.S. expansions, and fall more or rise less in five U.S. contractions. On the other side of the ledger, there are only two instances when European imports rise more during U.S. expansions than non-European ones do (1949–53, 1958–60).

The correlation coefficients confirm this picture. For the ten phases covered by non-European imports, the coefficient for the relation of world imports to the DBC is only +.42, while for non-European imports to the DBC it is +.66. This meets the expectation that non-European demand for imports is more closely related to U.S. business cycles than world demand, a finding which is of some interest in its own right.

Nevertheless, when the influence of non-European imports is eliminated, the net relation between the DBC and MEQ is only moderately lower than before when the influence of world imports was eliminated. The partial coefficient, which would be +.44 for the ten phases covered if world imports were held constant, becomes +.37 when non-European imports are held constant. Substitution of one indicator of foreign demand for the other has a similar effect when applied to the value instead of to the quantity of manufactures.

Though the change in our measures produced by the experiment is in the expected direction, it is too small to affect the essential character of the result. It is possible, though, that better indicators of foreign demand would account for more of the variation in exports of finished manufactures and thus further reduce the net effect of the DBC. The conclusion, thus, is again that our measures may well exaggerate the positive relation between MEQ and the DBC.

f. CONCLUSIONS ON MANUFACTURES EXPORTS

All the evidence indicates that U.S. finished manufactures exports have tended to fare better during cyclical upswings in domestic business activity than during downswings. The question is whether this positive correlation can be attributed entirely to the positive correlation between these exports and world demand and between the latter and U.S. business cycles; or whether part of the relation is due to a direct positive effect of the swings in domestic business on manufactures exports.

The most plausible answer is, it seems to me, that foreign demand accounts for most, if not all, of the positive correlation of MEQ and the DBC and that its role is understated by our measures. The evidence fails to support the other possible interpretation, namely, that business expansion favors and contraction hampers these exports,

as claimed by expansionists. It is equally important to realize, however, that general prosperity cannot have been in the way of such exports to any considerable extent either. The evidence suggests that whatever influence cyclical fluctuations in domestic business had on these exports was weak and sporadic.

The reasons for this independence of U.S. finished manufactures exports from domestic business swings may be sought in the following factors. First, substitution of domestic for export sales, or vice versa, is a sluggish process for many highly differentiated manufactured goods. Even when the identical physical product is sold at home and abroad, shifting between markets may require changes in sales and service organization, which are made only when a lasting adjustment is contemplated (see Chapter 1).

Second, the over-all supply of some manufactured goods is probably elastic enough in the United States to accommodate cyclical variations in domestic demand with very little change in price. And, third, what little price movement does occur may have little effect on exports as the price elasticity of foreign demand for manufactures is also likely to be low in the short run.[24]

4. *Summary of Findings on Export Quantities in U.S. Business Cycles, 1879–1961*

First and foremost, it is demonstrated that total U.S. export quantities and nonmanufactured export classes were, throughout the eighty years, stimulated by domestic business recession and adversely affected by the expanding phase of the business cycle. This agrees with what traditional theory leads us to expect.

Equally important, however, is the finding that, during the full period, exports of finished manufactures do not behave like the other classes and hence are not in accordance with theoretical expectations. The movement of these exports *with* the domestic business cycle is not entirely accounted for by the parallelism between world demand and U.S. business cycles. According to my reading of the evidence, this does not indicate a positive effect of swings in home business

[24] In the longer run, the demand for manufactures exports may be expected to be far more price elastic than in the short run. For evidence on this point, see, e.g., Helen B. Junz and Rudolf R. Rhomberg, "Prices and Export Performance of Industrial Countries, 1953–63," International Monetary Fund, *Staff Papers*, July 1965, p. 259. It should be noted, however, that this and similar studies differ from ours in dealing with the relation of a country's *share* in world export quantities to the *ratio* of its export prices to foreign prices.

on these exports, but neither does it suggest a negative one. Whether the home economy expands or contracts does not seem to affect the presently most important class of exports.

The agreement of movements in foreign and U.S. domestic business and the close ties of U.S. exports to foreign cycles have sufficed, since 1921, to outweigh the negative impact of domestic business on total and nonmanufactured exports so that they moved in general with, rather than against, U.S. business cycles. They typically fell more rapidly, or rose more slowly, during business contractions than during the preceding or following expansions.

However, their rates of rise and fall during domestic business cycle phases were quite moderate and accounted for only a minor fraction of their cyclical movements. Also, vigorous expansions and severe depressions were not, as a rule, associated with larger changes in these exports than weak expansions and mild recessions were. The conclusion is that the relation of export quantity changes to U.S. business cycles in 1921–61, although positive, was weak except for manufactures exports.

Before World War I, the depressing effect of home prosperity was lessened but not compensated by the stimulation of exports by rising foreign demand which, then too, often occurred during U.S. business upswings. In 1879–1913 the total quantity of U.S. exports and also that of crude materials exports tended to fall (or to grow less rapidly) when business expanded and to rise (or to fall less rapidly) when business slumped. A high growth rate in domestic business tended to be associated with a low one in total and crude materials export quantities.

The behavior of the second large class of exports of that period—foods—was basically the same as that of crude materials. However, the adverse effect of domestic expansion on food exports is obscured in average measures by the few instances in which an upsurge of food exports was the cause of the business revival. These episodes of a positive relation between food exports and business cycles turn what otherwise would be an inverse relation into a mixed one.

The comparison of the two periods thus reveals glaring contrasts as well as impressive continuities which makes it understandable that different investigators—depending on their disposition and on the specific area studied—arrive at diametrically opposed views on the stability of international economic relations. Friedman and Schwartz, for instance, stress the "striking" stability of "the behavior of relative prices in the United States and Great Britain" despite "vast

changes . . . in the economic structure and development of the United States, the place of Britain in the world economy, the international monetary structures of both the United States and Britain, and the international monetary arrangements linking them." Morgenstern, on the other hand, concludes that "World War I brought about such behavioral changes as to make it virtually impossible to extend theoretical explanations . . . from one of these periods to any other period." [25]

The behavior of exports agrees partly with one view and partly with the other. On one side is the unmistakable family resemblance of the relations of nonfood exports to U.S. business cycles in both periods. The fact that, independent of world cycles, the total quantity of exports and the quantity of crude materials exports move inversely to, and the quantity of finished manufactures moves in agreement with, the DBC in both periods certainly reflects stability of relationships.

But there is no doubt, either, that a decisive shift in the behavior of export quantities in U.S. business cycles has taken place; a shift toward less inverse, more positive movement.

One factor explaining this shift is the increasing integration of the world economy. As timing discrepancies between U.S. business cycles and world import cycles have lessened, demand effects run more often parallel with the DBC and thus pull exports into line with domestic business.

But part of the contrast between the two periods persists when the impact of foreign demand is eliminated. This is due to a second factor, the change in the commodity composition of exports which was such as to reduce progressively the inhibiting influence of domestic expansion and the stimulating effect of recession on export quantities. As goods with elastic supply came to play a larger role, fluctuations in domestic demand were absorbed to a greater extent and their effect on foreign sales was neutralized. This applies not only to the increasing importance of finished manufactures which, of course, is responsible for part of the more positive relation of TEQ to the DBC in the later period. It applies also to shifts within commodity classes which account for the less inverse and more positive patterns of CEQ and MEQ, respectively. The reduced role of agri-

[25] Milton Friedman and Anna J. Schwartz, *A Monetary History of the United States, 1867–1960,* Princeton for NBER, 1963, pp. 678–679; and Oskar Morgenstern, *International Financial Transactions and Business Cycles,* Princeton for NBER, 1959, p. 563.

cultural goods in both classes and the higher degree of fabrication and differentiation of manufactured goods should generally lessen the influence of domestic sales on exports. The reduced role of cotton exports is the most important case in point.

In sum, export quantities are more in step with domestic business in recent than in earlier times for two reasons: first, the better agreement in timing of U.S. and foreign business cycles; second, the increasing share in exports of goods whose foreign sales are not very sensitive to the domestic business cycle, either because they differ in some ways from the home market variety or because their over-all output adjusts so readily to cyclical variations in domestic sales as to leave exports unaffected.