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Export Prices and Export Values in Domestic Business Cycles

1. *Domestic and Foreign Influences on Export Prices*

Before drawing conclusions about the cyclical behavior of export values from the preceding analysis of export quantities, a discussion of export prices is required. Again, there is no established view of the relations of these prices to swings in domestic economic activity. Most authors would agree on the *direction* in which prices may be expected to be pulled by the domestic business cycle (DBC)—i.e., that they will tend to be raised by business expansion and lowered by recession. But the *extent* to which the home market, as opposed to foreign buyers, has any effect on export prices is highly controversial.

It is argued, on the one hand, that goods sold abroad are for the most part sold on the home market as well. Hence their export and their domestic prices can hardly move in different directions.[1] If it is accepted as an established fact that domestic prices typically rise and fall with the tides in domestic business, export prices should respond in a similar fashion.[2] The literature and the daily press abound with assertions that domestic prosperity inflates export prices.

[1] "Regardless of the relationship between business conditions in the United States and other countries we should expect positive correlation between domestic and export prices, since exports of most products constitute only a small proportion of their production." Dudley J. Cowden, *Measures of Exports in the United States,* New York, 1931, p. 78.

For empirical confirmation of the conformity of export and domestic prices of individual commodities, see Robert E. Lipsey, *Price and Quantity Trends in the Foreign Trade of the United States,* Princeton for NBER, 1963, Chapter 4.

[2] On the cyclical behavior of domestic prices, see, e.g., Wesley C. Mitchell, *What Happens during Business Cycles,* NBER, New York, 1951, pp. 170, 171: "Most prices rise and fall with the cyclical tides of business activity most of the time—not always."

See also Arthur Burns, *Prosperity Without Inflation,* New York, 1957, p. 12: "One of the plainest teachings of history is that rising prices are a recurring feature of the expanding phase of business cycles." Agricultural prices and prices regulated by the government are exceptions to this rule.

Furthermore, the view that export prices depend primarily on the home economy is implied in the uses made of price measures. For instance, measurements of export elasticities treat prices as causal factors in the determination of quantities.

Opponents of this view stress, on the contrary, that export prices must meet foreign competition and hence must adjust to rises and declines of world prices.[3] A country's share in world exports of specific commodities is small in most instances and, therefore, "it may be safely assumed that most countries . . . exert only a little influence on world prices of their export goods, or on the price level of their exports in general. These prices are determined by supply and demand conditions in the world as a whole, and their changes are determined by world-wide developments." [4] This view implies that when prices abroad move counter to a country's domestic economy, so will export prices. For staple goods traded on world markets this is obviously true, assuming no interference from transportation costs and tariffs.[5] But it can be defended also for differentiated goods, as will be seen later.

The issue has recently been argued by Stern and Zupnick on one side and Preeg on the other.[6] Stern and Zupnick contend that, even in the case of differentiated goods, a given country's export prices are too much swayed by foreign influences to indicate causal forces operating on that country's export quantities and that there is thus no justification in using such prices in the measurement of elasticities. Export prices are strongly affected by shifts in the demand for export goods caused by changes in prices of foreign competing goods. Foreign-induced price changes, however, will not affect a country's export quantity in the same fashion as would price changes originating

[3] To quote a recent restatement of this classical view: "Different economies are, to the extent that they are not separated by rigid trade barriers, communicating vessels between which prices for the same commodity cannot normally differ by more than tariffs and transport costs. Whenever there is a tendency for the price differential to exceed this maximum, it is (making due allowance for lags and frictions) counteracted by commodity flows. . . ." (Egon Sohmen, "The Dollar and the Mark," in *The Dollar in Crisis*, S. Harris, ed., New York, 1961, p. 188.)

[4] Michael Michaely, *Concentration in International Trade,* Amsterdam, 1962, pp. 96, 97.

[5] For a discussion between Viner and Bresciani-Turroni of the possibility of divergent price movements in different countries due to transport costs and import duties, see Jacob Viner, *Studies in the Theory of International Trade,* New York, 1937, pp. 317–318, note 19.

[6] Robert M. Stern and Elliot Zupnick, "The Theory and Measurement of Elasticity of Substitution in International Trade," *Kyklos,* 1962, Fasc. 3; and Ernest H. Preeg, *Kyklos,* 1963, Fasc. 4.

in the home economy. "The observed prices of countries' exports are of little use, and may actually be misleading, in attempting to explain observed changes in export volumes. The reason is that these prices are not likely to reflect fully the disequilibrating, or 'impact,' price differences in the movement of a market to a new equilibrium." [7]

These objections to the use of observed price data have been termed "exaggerated" in Preeg's comment on the Stern and Zupnick article. Preeg argues that the price of a nonhomogenous export good will be only very slightly affected by a change in foreign prices. The shift in the demand for a nonhomogenous export good caused by a change in the price of a foreign competing good will be a minor one, he deems. Since the supply of this type of good is likely to be highly elastic, the resulting price change is negligible and represents only an insignificant part of the actual changes in export prices. In this view the latter do, in fact, reflect mainly domestic forces as assumed in the measurement of elasticities.

The dispute thus turns largely on the *extent* to which foreign and domestic demand for an export good shifts in consequence of price movements of foreign competing goods. In weighing the arguments, it is important to note that both sides assume for simplicity that the export good is not consumed at all in the exporting country. If this assumption is dropped, the demand shift depends not only on the reaction of the foreign buyers but also on that of the domestic buyers of the good to a change in the price of a foreign competing good. For instance, a fall in the price of the Volkswagen may not only reduce the *foreign* demand for Ramblers but also the *domestic* one. This makes it even more hazardous to judge a priori whether the relative change in the total demand for the good, and hence in its price, will be considerable or negligible. Such a judgment cannot be based, it may be noted, on the ratio of exports to total output. Since domestic demand may be sensitive to foreign prices, a low ratio of exports to output does not necessarily imply immunity of their prices to foreign influences. To assert that in the United States export prices are not affected by conditions abroad due to the small role of foreign trade is, therefore, erroneous.[8]

[7] *Kyklos,* 1962, Fasc. 3, p. 590.

[8] For examples of such assertions, see, for instance, Jaroslav Vanek, "Long-Run Factors in the United States Payments Disequilibrium," in *The Dollar in Crisis,* p. 178: "In a country whose exports do not exceed 4 per cent of the national income, export prices will tend to be fairly independent of foreign demand conditions. For all practical purposes, supply elasticities of most products may be regarded as infinite. Much greater will be the influence of domestic conditions of cost and demand on prices." See also Cowden, *Measures of Exports,* p. 78.

The issue can be decided only empirically. Some evidence bearing on it has been brought out by new export price indexes, constructed by Kravis, Lipsey, and Bourque in order to measure changes in competitiveness. The authors expected and did find differences in price levels and price movements among exporting countries which they attribute to a number of factors. They mention transportation costs, fragmentation of markets, product differentiation, governmental measures, and nonprice aspects of sales, all of which may account for a degree of independence in price movements.[9]

On cyclical changes, our findings may be of some help. Though they do not apply to individual commodities, as the Stern-Zupnick argument does, they do reveal the extent to which groups of export prices reflect foreign as opposed to domestic influences. The more closely the changes in U.S. export prices are correlated with changes in foreign business and the less closely they are related to changes in domestic business, the more they support the view that export prices are world prices. Conversely, if these prices conform very well to the domestic cycle and are little affected by world cycles, their relative independence is supported.[10]

The following analysis thus serves two purposes. The first is to clarify the role of export price in export value fluctuations. Comparison of quantity and value movements, of course, also permits inferences about price behavior, but the study of prices themselves gives a clearer and more direct picture. The second purpose is to cast some light on the main forces causing export price changes and thus to help in deciding to what uses observed export prices can properly be put. We shall begin by examining the relations of export prices to U.S. business cycles in 1921–61 and then try to determine the role of world import cycles in these relations.

[9] Irving B. Kravis, Robert E. Lipsey, and Philip J. Bourque, *Measuring International Price Competitiveness: A Preliminary Report,* NBER, Occasional Paper 94, New York, 1965, pp. 16–18.

Another study dealing with long-run divergencies between export prices of different producing countries is Alfred Maizels' *Industrial Growth and World Trade,* Cambridge, Eng., 1963, pp. 203–209.

[10] In the Stern-Zupnick example, the initiating change occurs in foreign supply, while our analysis deals with changes in foreign demand. However, this does not affect the main question at issue.

Since we are concerned with price aggregates rather than with prices of individual commodities, the results are affected by shifts in the weights of components. These shifts can be expected to accentuate price declines as the sales volume of goods with the greatest price fall tends to rise most or fall least. Correspondingly, price rises should be moderated. Cyclical amplitudes of export price indexes may thus differ from those of prices of single goods. This does not imply, however, any bias of the indexes in favor of or against conformity to the DBC.

2. *Close Agreement Between Movements of Total Export Prices and Domestic Business, 1921–61*

Actual movements of total export prices (TEP) in 1921–61 confirm the expectation of positive correlation with domestic business cycles. With only a single exception, TEP has fallen less or risen more in domestic expansions than in adjacent contractions, a record of conformity which exceeds even that of domestic wholesale prices (Table 48).

Fluctuations in export prices are much milder than those in export quantities. Total export prices vary by less than 5 per cent a year, even between their own peaks and troughs, compared with 16 per cent for total quantity in quantity cycles. It is, therefore, not surprising that the amplitude of TEP during business cycles is moderate despite high conformity. The average total rise in expansions is about 5 per cent and the fall in contractions about the same. The annual rate of change of TEP during full business cycles is less than 3 per cent, on the average, but this accounts for more than half of the total cyclical variation of this price index, which testifies to the agreement between price cycles and the swings in the U.S. economy (Table 48).

What is true for total export prices, however, does not hold for prices of all commodity classes. While prices of manufactures respond rather regularly to the DBC, foods and raw materials prices are but loosely related.

The highest conformity is shown by prices of semimanufactures (SEP), which rise and fall almost without fail in business expansions and contractions. Since these are the prices of metals, lumber, etc., which make up the domestic index of sensitive prices, this is not surprising.[11] The much milder variations in finished manufactures export prices (MEP) are sometimes submerged by long-run trends. The downtrend in the interwar period, in particular, opposed the cyclical rise in expansions. Still, the index of conformity to full cycles shows that their rate of change responded, as a rule, to the influence of the DBC. Where there was no change in direction, the rate of decline retarded in the expansions of the interwar period and the rate of increase accelerated in those of the period after World War II.

The rates of change of MEP and SEP in the DBC are strikingly high compared with the total cyclical variability of these prices. As

[11] That cyclical fluctuations are among export prices "most accentuated in the case of semimanufactures" was noted by Cowden, *Measures of Exports*, p. 82.

TABLE 48

Domestic Business Cycles:
Change in U.S. Export Prices and Domestic Wholesale Prices, 1921-61

	Export Prices					
	Total	Finished Manufactures	Semi-manufactures	Crude Materials	Foods	Domestic Wholesale Prices
Conformity index						
Expansion	+25	+25	+75	0	0	+75
Contraction	+75	+50	+100	+25	+25	+44
Full cycle	+86	+57	+100	+29	+29	+71
Average total percentage change						
Expansion	+4.5	+3.5	+11.1	-0.1	-2.0	+4.9
Contraction	-4.9	-2.7	-10.1	-3.1	-6.1	-3.9
Full cycle	9.4	6.2	21.2	3.0	4.1	8.8
Average annual percentage change						
Expansion	+2.0	+1.5	+4.8	0	-0.9	+2.1
Contraction	-4.7	-2.6	-9.8	-3.0	-5.9	-4.0
Full cycle	2.9	1.9	6.5	1.0	1.4	2.7
Percentage ratio of rates of change in U.S. business cycles and:[a]						
Export price cycles	53.06	71.79	71.95	0.16	6.60	48.94
World import cycles	123.81	466.67	140.48	0.00	35.00	95.83

Notes to Table 48

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

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. See Appendix D.

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: For conformity index, eight expansions and eight contractions: for percentage change, six expansions and seven contractions.

Source: Exports: Appendix A; cycle chronologies: NBER. These sources and notes apply to all tables and charts in this chapter.

[a]See notes to Table 12.

much as 72 per cent of the latter is accounted for, in either series, by their variations during DBC so that there can be no doubt as to the close agreement of these price movements with domestic business cycles (see Table 48). The ratios of the rates of change appear even more impressive when compared with those for the corresponding quantities, which are only 46 and 15 per cent, respectively.

Prices of crude materials and foods (CEP and FEP) also rose more or fell less during business upswings than during adjacent downswings in the majority of instances. But there were also several exceptions in the 1920's as well as in the 1950's, so that the indexes of conformity to full business cycles are only +29 for each of these series.

In addition to other irregularities, CEP and FEP were swayed by strong and varying trends so that they rose about as often as they fell in business expansions and fell only slightly more often than they rose in business contractions. Their average change in both cycle phases is downward, but the effect of the DBC shows up, on the average, in the much more rapid fall experienced during contractions than during expansions of business.

In part the relatively loose relation of crude materials and foods prices to business activity may be explained by government regulation of these prices and by the impact of fluctuations in the supply of

agricultural goods which always reduces the conformity of agricultural prices to business cycles.[12]

But whether export prices follow the course of domestic business more or less closely, the main point is that they do not swim against the tide, that they all contribute to the positive conformity of export values to business cycles in 1921–61. The contribution is large for total exports and for manufactures, small for crude materials and foods.

3. *Confirmation of Preceding Findings by Amplitude Correlations*

Further information on the behavior of export prices in domestic business cycles can be gained by correlating the amplitudes of price changes with those of business expansions and contractions in the manner used above for quantities. Table 49 shows two sets of these coefficients using, respectively, the Moore index and the clearings index as indicators of domestic business. The following comments, however, refer only to the measures based on the clearings index. As a value series, this index is more relevant to price behavior than the Moore index which reflects largely physical quantities. Furthermore, the Moore index is trend-adjusted, while prices had a falling trend in the interwar period and a rising one in recent years. This contrast in long-run movements obscures the similarity of cyclical responses in the correlation measures. Clearings, on the contrary, resemble prices in their sharp climb after World War II.

This difference in trends is brought out by the following tabulation of deviations of average ranks of series in two subperiods from their mean rank in the full period for thirteen amplitudes in business cycle phases (plus sign designates above average rises and below average falls):

	1921–38	*1948–61*
Moore index	+0.2	−0.2
Clearings index	−0.7	+0.7
World imports	−0.8	+0.8
TEP	−1.8	+1.8
MEP	−2.3	+2.2

[12] "The rule (of positive conformity to business cycles) fails about as often as it holds with respect to farm products." Mitchell, *What Happens during Business Cycles*, p. 172. See also Russell C. Engberg, *Industrial Prosperity and the Farmer*, New York, 1927, p. 82: "We have seen that at least the main variations of agricultural prices are independent of business cycles."

TABLE 49

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

	U.S. Export Prices							Domestic Wholesale Prices	World Import Cycles
	Total		Finished Manufactures		Crude Materials				
	Coincident	Lagged	Coincident	Lagged	Coincident	Lagged	Foods		
					1882-1913				
Simple Kendall correlations:									
DBC (Moore index)	+.30*	+.63**	+.23	+.53**	+.39*	+.67**	+.20	+.51**	
DBC (clearings index)	+.27	+.63**	+.10	+.38**	+.35*	+.56**	+.21	+.44**	
WIC	+.32*	+.44**	+.25	+.43**	+.36*	+.41**	+.01	+.29*	
DBC (Moore index)									+.34*
DBC (clearings index)									+.36*
Partial Kendall correlations:									
DBC (Moore index) holding WIC constant	+.21	+.57	+.16	+.45	+.31	+.62	+.21	+.46	
DBC (clearings index) holding WIC constant	+.18	+.56	+.01	+.27	+.25	+.48	+.22	+.38	
WIC holding DBC (Moore index) constant	+.24	+.31	+.19	+.31	+.26	+.26	-.06	+.14	
WIC holding DBC (clearings index) constant	+.25	+.29	+.23	+.34	+.27	+.27	-.07	+.16	

(continued)

TABLE 49 (concluded)

	U.S. Export Prices						
	Total	Finished Manufactures	Semimanu-factures	Crude Materials	Foods	Domestic Wholesale Prices	World Import Cycles
				1921-1961			
Simple Kendall correlations:							
DBC (Moore index)	+.55**	+.23	+.72**	+.26	+.18*	+.58**	
DBC (clearings index)	+.71**	+.44*	+.87**	+.36*	+.23	+.63**	
WIC	+.65**	+.49*	+.67**	+.26	+.38*	+.53**	
DBC (Moore index)							+.49*
DBC (clearings index)							+.64**
Partial Kendall correlations:							
DBC (Moore index) holding WIC constant	+.35	−.01	+.61	+.16	−.01	+.43	
DBC (clearings index) holding WIC constant	+.50	+.19	+.77	+.26	−.02	+.45	
WIC holding DBC (Moore index) constant	+.52	+.44	+.52	+.16	+.34	+.35	
WIC holding DBC (clearings index) constant	+.36	+.30	+.30	+.04	+.31	+.21	

*Significant at the .05 level. **Significant at the .01 level. No tests of significance are known for partial coefficients. Except where indicated otherwise, analysis is based on coincident relationships.

The expansion amplitude of lagged prices is measured from their average standing in the middle third of business expansions to their average standing in the first third of business contractions. The price change from this standing to the middle of the following expansion is the contraction amplitude.

For sources and other notes, see Table 42.

The problem of shifting trends could be met, of course, by separate treatment of the interwar and the post-1948 periods, and such measures have been computed. But the number of observations becomes uncomfortably small in these subperiods. Therefore we rely mainly on the relations of price movements to clearings during the full period 1921–61.

Inspecting the simple coefficients, one notes the highly significant, positive relation of TEP and DBC amplitudes. This holds for the full period and for its subdivisions. After 1948 the correspondence was so close that we obtain a coefficient of +1.00.

Among the commodity classes, it is mainly manufactures' prices which move in correspondence with business cycles. For semimanufactures in particular, the correlation is strikingly high for the full period as well as for both subdivisions. The coefficient for MEP is lower than might have been expected, but still significant at the 5 per cent level. It averages a high correlation in 1948–61 and zero correlation in the interwar period, reflecting such discrepancies as a MEP fall in the U.S. expansion of 1921–23 exceeding the one in the following contraction, a MEP decline in the 1927–29 U.S. expansion, and a slight rise in MEP during the sharp U.S. contraction of 1937–38. These aberrations reflect largely small irregularities in the timing of price turns and also the mildness of price movements. The differences between price amplitudes are often minute and the results, therefore, easily swayed by slight timing differences.

The behavior of the prices of crude materials and foods resembles that of manufactures prices insofar as their amplitudes also are not related to those of the DBC during the interwar period but respond positively later on. However, the correlation of CEP and FEP with the DBC after 1948 is not as close as that of MEP and thus their coefficients for the full period are lower too, particularly that for FEP which is not significant at the 5 per cent level.

In sum, the simple correlations of amplitudes of export prices and business cycles lead to conclusions similar to those derived from the conformity indexes and ratios of rates of change—that variations in export prices were in general positively related to business fluctuations in 1921–61 and that the agreement was close for manufactures prices and looser for prices of crude materials and foods.

4. *Export Prices About as Closely Related to World Import Cycles as to U.S. Business Cycles, 1921–61*

We next want to determine how the agreement of export prices and domestic business cycles compares with that of export prices and world import cycles and to what extent one relation may account for the other.

Simple correlations of price and WIC amplitudes show that export prices tend to rise the faster the more rapidly world imports grow. The coefficients are positive for all commodity classes and for total exports; they are significant, except for CEP; and they are not too different from those measuring the relations between price and DBC amplitudes. Prices of finished manufactures and of foods show somewhat closer agreement with world then with domestic cycles by this standard, whereas the opposite is true for semimanufactures, crude materials, and for total export prices.

The influence of foreign cycles by no means accounts for the agreement between export prices and U.S. business swings. Partial correlation coefficients with constant world demand are quite high for total export prices: +.50 for 1921–61, +.44 even for the unruly interwar cycles, and a perfect +1.00 for the period after 1948. There is, thus, hardly any doubt about the impact of domestic business on total export prices.

Among the prices of commodity classes, only semimanufactures show a close net correlation with the DBC in 1921–61. The partial coefficients for MEP and CEP are positive but low; that for FEP is zero. However, closer examination shows that the low figures for MEP and FEP are due to the interwar period, when the former showed the aforementioned irregular behavior, and the extraordinary collapse of food prices in the wake of World War I, caused the negative relation of these prices to the DBC. For the cycles 1948–61, the partial coefficients of manufactures as well as food prices are fairly high. Thus, with some exceptions, domestic business fluctuations tended to affect export prices, raising them in expansions and lowering them in business recessions.

But if the DBC influenced export prices, so did the WIC. Correlations of the amplitudes of WIC and those of export prices with the DBC constant, are also positive for total exports and for all commodity classes, except crude materials for which it is zero. The coefficients for TEP, SEP, and CEP are lower than the corresponding ones for the relation to the DBC; those for MEP and FEP are higher.

As for total exports, the conclusions from amplitude correlations about the relative attachment of prices to domestic and world cycles are well supported by other measures. Thus, the rates of change of TEP in DBC and in WIC differ from each other in about the same fashion as the corresponding correlation coefficients (see Tables 48 and 49). Results for some commodity class prices are less reliable. MEP and CEP are tied more firmly to the DBC according to some measures and to the WIC according to others. SEP, on the other hand, clearly respond far more to the pull of the DBC than to that of foreign demand, while FEP show the opposite behavior and by all standards conform primarily to the WIC.

Altogether, it seems reasonable to conclude that there is no radical difference between allegiance of prices of export commodity classes to domestic versus foreign fluctuations in 1921–61, but that, for total export prices, the former relationship is closer than the latter, particularly in the most recent period. Thus, those who claim that export prices reflect domestic business fluctuations are partly right. But so are those who warn against treating such prices as largely independent of foreign influences.

Perhaps the reactions of export prices to world and domestic cycles stand out more clearly when they are compared with those of export quantities, as in the summary below.

The partial correlation coefficients for 1921–61 are as follows:

	DBC	*WIC*
TEQ	−.19	+.44
TEP	+.50	+.36

The percentage ratios of rates of change for the same period are as follows:

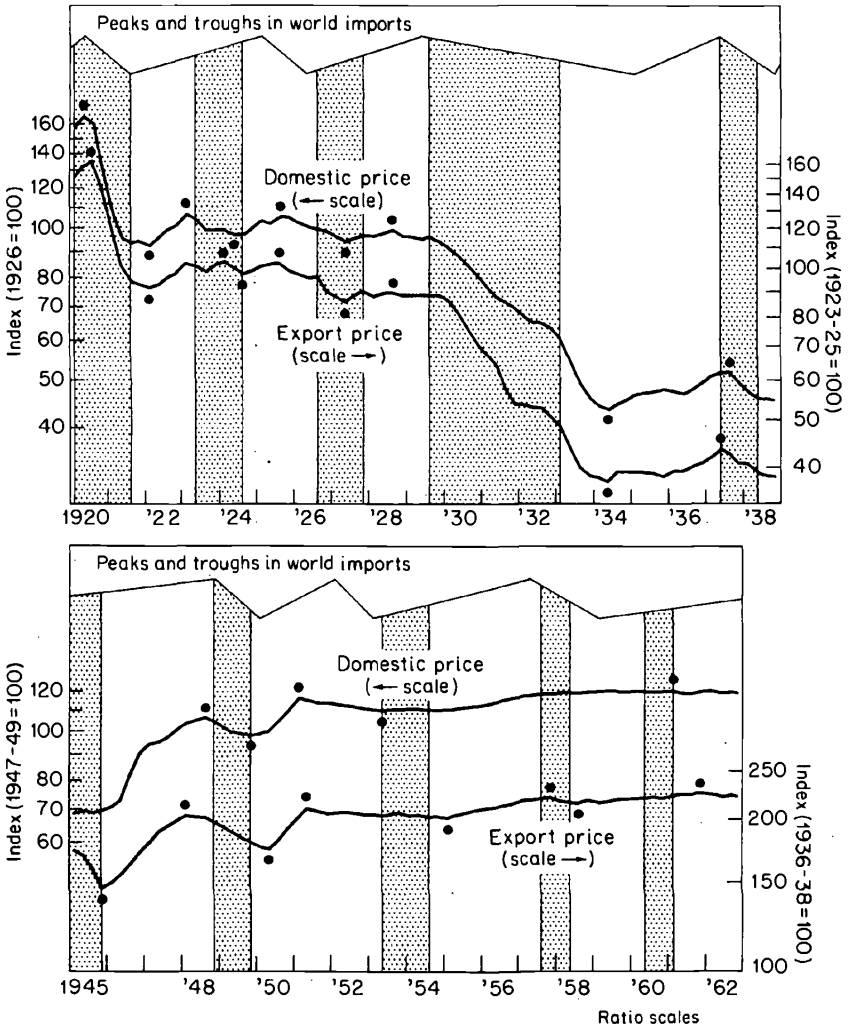
	DBC	*WIC*
TEQ	23	73
TEP	53	38

These figures show that world cycles pull export quantities and prices in the same direction, but the former more strongly than the latter. By contrast, domestic cycles depress quantities when they raise prices and affect the latter more strongly than the former.

It is of some interest to find out in what way the cyclical behavior of domestic price indexes differs from that of export prices (Chart 21). One might surmise that the former are more closely related to

CHART 21

U.S. Domestic Wholesale Prices and Total Export Prices, Quarterly, 1920–38, 1945–62



Export price data are seasonally adjusted. Domestic wholesale price data do not require seasonal adjustment.

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

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

Notes to Chart 21 (concluded)

Shaded areas represent business contractions, unshaded areas, expansions. Dots indicate peaks and troughs of series as shown also in Tables of Appendix A.

SOURCE: Domestic wholesale price index: 1920–38, BLS index from *Historical Statistics,* Bureau of the Census, 1948, p. 344; 1945–51, *Continuation to 1952 of Historical Statistics,* p. 47 (1947–49 = 100); 1952–62, *Business Statistics,* 1955, 1957, 1961, and 1963 (1962 figures converted to 1947–49 = 100 base by applying the ratio of the index for 1961 on that base to the index for the same year on a 1957–59 = 100 base); monthly data were converted into quarterly figures throughout. Export price index: Appendix A. Cycle chronologies: NBER.

the DBC and less closely to the WIC than export prices and would thus be more suitable indicators of the impact of the home economy on the volume of foreign sales. But the contrary is more nearly true. If there is any difference between the wholesale price index and export prices in this respect—and there is very little—it is the export price index which responds more and the wholesale price index which responds less to the domestic economy. The relation of both indexes to world cycles is about equal.

The strong representation of internationally traded goods in the U.S. wholesale price index is well known.[13] Still it is of some interest to find that the attachment of this index to world cycles is as close as that of the export price index, in which goods after all are represented in proportion to their role in exports. Evidently, replacing export by domestic wholesale prices would not help reveal the effects of the domestic economy on exports.

It may also be noted that the high correlation of amplitudes of wholesale prices and world cycles agrees with the Friedman and Schwartz finding: "Even though we are accustomed to regard the United States as nearly self-sufficient, the economic integration of the Western world has been sufficiently close to leave U.S. prices little leeway relative to external prices when both are expressed in a common currency." [14]

[13] It has been emphasized especially in connection with attempts at verifying the purchasing power parity theory. (See Gottfried Haberler, *A Survey of International Trade Theory,* Princeton, 1961, p. 49.)

[14] Milton Friedman and Anna J. Schwartz, *A Monetary History of the United States, 1867–1960,* Princeton for NBER, 1963, p. 679. The statement refers to the implicit GNP deflator, which is more independent of world markets than the wholesale price index, due to the greater weight given to nontraded goods and services. For evidence on this point, see Bela Balassa, "The Purchasing-Power Parity Doctrine: A Reappraisal," *Journal of Political Economy,* December 1964.

Similarity of cyclical patterns does not conflict, of course, with important discrepancies between long-run trends of export and domestic prices which have been discovered by Robert Lipsey. Export prices tend to fall relative to domestic ones represented by the implicit GNP deflator Lipsey finds. Evidently the weight of goods that have falling relative prices has increased more in exports than in

As for the contribution of export price to U.S. export value movements, the findings may be summarized as follows. Export prices certainly do not move counter to the DBC but tend to be raised by expanding and lowered by contracting domestic business. World import cycles work in the same direction and contribute to the positive conformity of prices to the DBC. However, there are also strong forces, e.g., crop conditions, governmental policies, etc., which reduce the systematic character of price movements and cause them to respond less regularly to cyclical forces than one might have expected.

5. *Lags of Export Prices at U.S. Business Cycle Turning Points, 1879–1913*

In one important respect, the behavior of prices (except food prices) was different before World War I than afterward. In the earlier cycles, the rise (or retardation of fall) did not get under way before midexpansion, as a rule, but lasted for a while when business had already turned downward.[15] This lagged relation is the relevant one for the analysis of the impact of business fluctuations on export prices in this period. As noted below, it is amazingly similar to that of coincident prices in later years. However, for the present purpose of interpreting export value movements, observations on price changes which are synchronous with the DBC are required, since value changes show no systematic lags behind the DBC and are treated on a synchronous basis. Both measures are given in Table 50, but, unless otherwise stated, the discussion below refers to price movements between turns in the DBC without allowance for lags.

The slowness of prices in reacting to a change in the course of business shows up in the conformity indexes. Export prices failed to rise consistently from business trough to business peak and to fall consistently between peak and trough. However, the tendency to rise more during an expansion than during a contraction in business clearly prevails over the opposite one.

The conformity index to full business cycles is only +22 for TEP.

the domestic economy. (See Lipsey, *Price and Quantity Trends*, p. 32 and Chart 7.)

Lipsey's findings are confirmed and extended by ours. Though the intercycle trend is removed in our analysis, the intracycle trend still exhibits the falling tendency of export prices compared with the domestic wholesale price index. During business expansions in 1921–61, the former rose somewhat less, and during contractions they fell somewhat more than domestic prices.

[15] Lags of the WIC behind the DBC account in part for the price lags which later disappear when the relative timing of WIC and DBC changes.

TABLE 50

Domestic Business Cycles:
Change in U.S. Export Prices and Domestic Wholesale Prices, 1879-1913

	Export Prices							Domestic Wholesale Prices (Coincident)
	Total		Finished Manufactures		Crude Materials		Foods (Coincident)	
	Coincident	Lagged	Coincident	Lagged	Coincident	Lagged		
Conformity index								
Expansion	+40	+60	+20	+20	+40	+40	+20	+50
Contraction	+11	+56	+33	+78	+33	+33	+11	+33
Full cycle	+22	+89	-17	+56	+22	+89	+22	+56
Average total percentage change								
Expansion	+4.9	+5.4	-0.2	+2.5	+6.3	+8.3	+5.5	+6.7
Contraction	-3.8	-5.7	-2.2	-5.7	-3.9	-8.1	-3.7	-5.6
Full cycle	+8.7	+11.1	+2.0	+8.2	+10.2	+16.4	+9.2	+12.3
Average annual percentage change								
Expansion	+2.3	+4.1	-0.1	+1.9	+3.0	+6.3	-2.7	+3.4
Contraction	-2.6	-2.6	-1.5	-2.6	-2.6	-3.7	-2.5	-3.5
Full cycle	+2.4	+3.2	+0.5	+2.3	+2.9	+4.7	+2.6	+3.5
Percentage ratio of rates of change in U.S. business cycles and:[a]								
Export price cycles	25.61	40.24	11.11	50 00	20.47	40.16	22.89	41.89
World import cycles	75.00	117.86	50.00	225.00	70.27	137.84	79.17	193.75

Coverage: Ten expansions and nine contractions. For sources and other notes, see Table 48.

[a]See notes to Table 12.

This may somewhat understate the agreement of price and business movements as suggested by the amplitude measures, which indicate that TEP rose on the average by 5 per cent during a business expansion and fell by about 4 per cent in contraction. Since price movements are moderate in general, these amplitudes represent about 26 per cent of the total variation in TEP.

The behavior of TEP during DBC in 1879–1913 is representative of the two large commodity classes. CEP and FEP behaved very similarly in this respect, rising by about 6 per cent on the average in expansions and falling by about 4 per cent in contraction. In both cases, these changes account for somewhat over 20 per cent of their total fluctuations. For both, the conformity index for full cycles is +22.

Prices of manufactures agree less well with the DBC than CEP and FEP, which is somewhat surprising. The substantial and consistent downward movement of these prices during the first halves of U.S. expansions reduced their rise during the full expansion so that it was sometimes smaller (or the fall larger) than in the adjacent contractions. Hence, the index of conformity to full cycles was slightly negative. The average amplitude is positive, however, though very small. MEP did fall slightly on the average during contractions (2 per cent), but showed no change in expansions. Their movement during the DBC is an insignificant fraction of their total cyclical variation.

Thus, in terms of conformity and amplitude measures, the contribution of export price to export value movements in 1879–1913 is mildly positive for TEP, CEP, and FEP, and very slightly positive for MEP.[16]

Correlations of the amplitudes of price and business cycle movements yield similar results. Before 1913, in contrast to the later period, the rise and fall of coincident export prices are a little more closely related to the movements of the Moore index than to those of clearings (Table 49). All coefficients are positive, but only those for TEP and CEP are significant at the 5 per cent level.

In order to determine to what extent the relatively loose relation of price and business movements is due to the influence of world demand, we correlated the amplitudes of world imports and of export prices. Again we obtained coefficients that are positive but low except

[16] That the latter does not contradict MEP's low negative index of conformity to full DBC is shown by the fact that the index for MEV is higher than that for MEQ (Tables 39 and 53).

for the zero coefficient for food prices. Since the relation between DBC and WIC was also positive, it thus was not pressure from foreign demand which prevented export prices from following the same path as the domestic economy. On the contrary, world import cycles had some influence in pulling export prices into line with the DBC. As can be seen from the partial coefficients, there remains only a very loose, though still positive, relation between coincident export prices and the DBC when the influence of the WIC is eliminated.[17]

Although these results are much affected by the lags of prices at DBC turns, they make sense, as can be seen when they are contrasted with the corresponding ones on export quantities. Most of our measures agree that fluctuations in world demand produced like changes in both export quantities and export prices, but that the effect on the former was far stronger than that on the latter. Growth in foreign demand was met primarily by larger shipments and, to a lesser extent, by higher prices. Domestic growth, on the other hand, brought higher prices and smaller shipments, except in finished manufactures. This contrast is obscured by the positive effect of the WIC on both series but stands out clearly in the following partial correlation coefficients for total exports for 1879–1913, showing each series in relation to the DBC and the WIC:

	DBC	*WIC*
TEQ	−.42	+.48
TEP	+.18	+.25
Lagged TEP	+.56	+.29

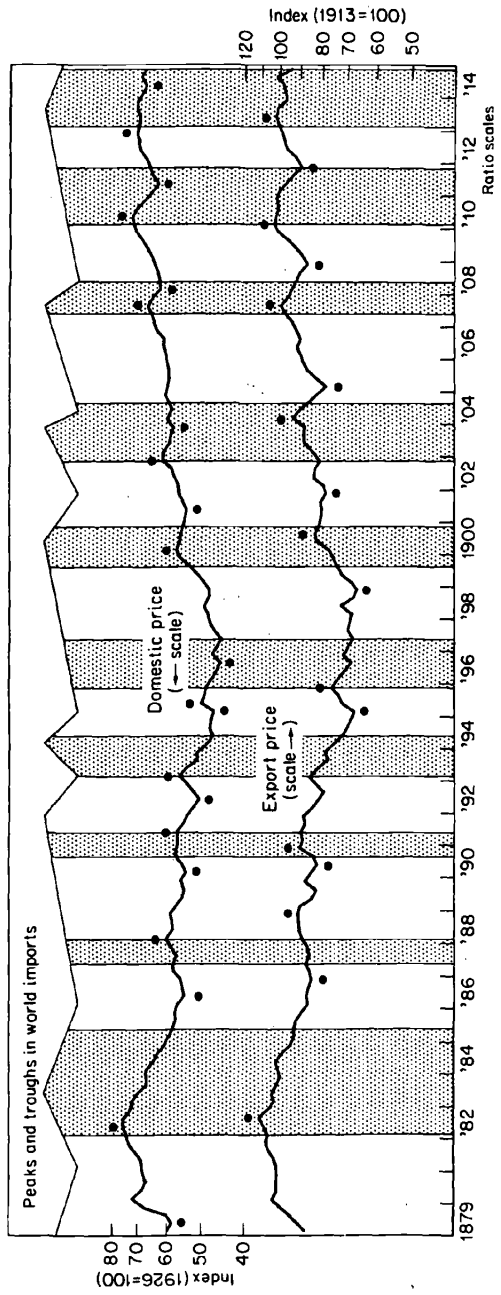
The contribution of export prices in 1879–1913 to export value movements was again in the direction of positive alignment with domestic business cycles, whether the impact of foreign demand is eliminated or not. However, this contribution was weaker than might have been expected due to the delayed effect of domestic fluctuations on export prices.

Whether export prices respond more to domestic or to foreign

[17] The results are different when time lags are allowed for. This is done by measuring price expansions from the middle of business expansions to the first third of business contractions, and price contractions from there through the first half of business expansion. In that case, nonfood export prices move in close agreement with business activity. Amplitudes of lagged export prices are also more closely related to world imports than are coincident prices, but the difference here is not as great as for the domestic cycle since it is the timing relation of prices to the latter, not to the world import cycle, that is being taken into account.

CHART 22

U.S. Domestic Wholesale Prices and Total Export Prices, Quarterly, 1879–1914



Notes to Chart 22

See note to Chart 21.

SOURCE: Domestic wholesale price index: 1897–89, Warren and Pearson index (*Historical Statistics*, 1949, p. 344), converted to a 1926 base by applying the ratio of the BLS index for 1890 (*ibid.*, 1926 = 100) to the Warren and Pearson index for that year (1910–14 = 100); 1890–1914: BLS index from *ibid.*; monthly data were converted into quarterly figures throughout. Export price index: Appendix A. Chronologies: NBER.

influences in the earlier years depends on whether the coincident or the lagged price movements are considered. Lagged export prices in 1879–1913 agree considerably better with domestic than with foreign cycles. This can be regarded as evidence of the impact of the domestic economy on export prices. But these prices cannot, of course, account for the export quantity movements which precede them.

As to coincident prices, there is, in the earlier period, as in the later cycles, not much difference between the two relations. Where there is a difference, the agreement between prices and foreign fluctuations has a slight edge over that between prices and domestic cycles. Thus the rate of change of TEP in the DBC is 75 per cent of that in the WIC. The partial coefficients are +.18 for the relation of TEP to the DBC, with the WIC constant, and +.25 for the relation of TEP to the WIC, with the DBC constant.

The findings for total export prices also hold for CEP and a little less clearly for MEP. Both are tied more closely to the world than to the domestic cycle when treated as coincident and more closely to the domestic than to the world cycle when treated as lagging domestic turns. On food prices, our measures yield conflicting results. Supply effects here seem to have blurred any regularities in response to demand changes.

The conclusions about the uses that can properly be made of observed export prices are the same as for the later period. They certainly cannot be treated as independent of foreign demand.

The relations of the domestic wholesale price index to domestic and foreign cycles may again be compared with those of total export prices (see Chart 22). In contrast to the later period, coincident export prices before 1913 are less closely related to the DBC than the domestic price index. However, this is a matter of timing differences. When these are allowed for, export prices react considerably more systematically to the DBC than the domestic index. Thus, what was found for the later period too—that the DBC had more influence on changes in the export price index than on those in the domestic one—also holds for the earlier years.

6. *Common Features in Behavior of U.S. Export Prices in Domestic Business Cycles Before and After World War I* [18]

Export prices react far more swiftly to U.S. business cycles after World War I than in earlier times, and this shift in their timing means a radical change in their contribution to the conformity of export values to business cycles. But having stressed the importance of this shift, we now want to direct attention also to the striking stability which the behavior of prices exhibits during business cycles of the whole long period under review when the long lags of the pre-1913 period are allowed for.

This stability is most pronounced in total export prices which behaved, on the average, before 1913 very much as they did later on, as Table 51 reveals. In either period they rose more when U.S. business expanded than when it contracted. Moreover, the movement also reflected the amplitude of the business swing with considerable regularity. This behavior of TEP refutes, of course, the dissident view on price-lowering effects of growth and expansion and confirms traditional expectations. What could hardly have been foreseen, however, is that the basic economic forces should be so strong as to bring about almost the same relation of export prices and the DBC in the two periods despite the vastly different composition of the two price indexes, the different structure of the economy, the different geographical destination of exports, etc.

The resemblance between price reactions in the two periods also extends to their relations to foreign demand. TEP rose more during WIC expansions than during contractions and also more during vigorous than during weak upswings in world imports, before as well as after World War I. Their attachment to the WIC was somewhat closer in the later than in the earlier period. But the difference was not so great as to prevent the correlation of TEP with the DBC from being closer than that with the WIC, after 1921 as well as before. The partial coefficients for TEP in relation to the WIC, with the effect of the DBC eliminated, are +.29 for 1879–1913 and +.36

[18] In this section we refer exclusively to the lagged prices of the pre-1913 period. The comparison of price behavior in the two periods should greatly increase confidence in our various measures. There is not one instance in which a price series conformed better to the DBC in the earlier than in the later period by one yardstick but not by another. Readers who realize the sensitivity of these measures to erratic influences of all sorts will appreciate this.

TABLE 51

Summary of Total Export Prices in Two Periods, 1879-1961

	1879-1913	1921-1961
Conformity index, full cycle	+.89	+.86
Percentage ratio of rates of change in DBC and TEP	40	53
Simple Kendall correlation coefficients, TEP and DBC (clearings index)	+.63	+.71
Partial Kendall correlation coefficients:		
TEP and DBC (clearings index) holding WIC constant	+.56	+.50
TEP and WIC holding DBC (clearings index) constant	+.29	+.36

Note: See notes to Tables 48-50.

for the later years. These figures should be compared with the coefficients for the relation to the DBC with the WIC constant, which are +.56 and +.50.

The conclusion is that there is a stable positive relation of U.S. export prices to domestic as well as to foreign fluctuations, the former being somewhat closer than the latter.

The common features in the price behavior in the two periods stand out even more clearly when they are contrasted with the corresponding measures for export quantities. In the summary tables in sections 4 and 5 of this chapter, the negative coefficients for TEQ in relation to the DBC, with WIC constant, contrast with the positive ones for TEP, while the correlation of TEQ to the WIC, with the DBC constant, is positive and higher than that of TEP in both periods. Quantities are negatively affected by the domestic economy and strongly and positively affected by foreign demand. Prices are positively related to domestic and to foreign cycles, but the effect of the latter is weaker than on quantities.

The stability of the components is, as usual, lower than that of

the aggregate. Of the different classes, only finished manufactures prices exhibit persistence over time in their relation to the DBC. During the full period, these prices tend to rise more when domestic business moves upward than when it slumps, and the amplitudes of their changes correspond rather regularly to the severity of the business swing (see Table 52). To this extent, MEP behave roughly according to traditional theory. Certainly there is no trace of an inverse relation of MEP to the DBC. However, in earlier as well as later years, part of the agreement of MEP and the DBC is due to the impact of the foreign demand cycles. Coefficients of the independent relation of manufactures' prices to U.S. business cycles, though positive, are lower than might have been expected.

In contrast to finished manufactures and to total export prices, the relations of foods and crude materials prices to U.S. business cycles have shifted over time. These prices were linked more closely to the home economy in earlier than in later cycles. This is a somewhat puzzling finding. One would expect U.S. export prices in these

TABLE 52

Summary of Finished Manufactures Exports Prices in Two Periods, 1879-1961

	1879-1913	1921-1961
Conformity index, full cycle	+.56	+.57
Percentage ratio of rates of change in DBC and MEP	50	72
Simple Kendall correlation coefficient, MEP and DBC (clearings index)	+.38	+.44
Partial Kendall correlation coefficients:		
MEP and DBC (clearings index) holding WIC constant	+.27	+.19
MEP and WIC holding DBC (clearings index) constant	+.34	+.30

Note: See notes to Tables 48-50.

categories to become more rather than less dependent on home demand as time went on. Why should the opposite be true?

In the case of food prices, the readjustment after World War I is an important factor. It caused some enormous price swings running counter to the direction of the DBC. This greatly reduces the positive relation of FEP to the DBC in the later period. In view of the general irregularity in the behavior of these prices and of the minor difference between their relations to the DBC in the two periods, the postwar readjustment may account for much of the puzzling result.

The situation is different for crude materials prices, where the contrast between the two periods is considerable. Before 1913 these prices moved in fairly high conformity with the DBC, while later on the relation becomes irregular. The main reasons for this are the movements of cotton prices which did not agree with the DBC in later years, partly due to government controls and partly due to some unusual events of the interwar period.[19]

Had it not been for these special factors disturbing the conformity of CEP and FEP to the DBC, total export prices would have been even more closely correlated with U.S. business cycles after 1921 than in earlier years.

7. *Values of U.S. Total Foreign and Domestic Sales Move Together, 1921–61*

To gain insights into the cyclical behavior of the strategic series—total export value—was the main purpose of the preceding analysis of quantities and prices. Before applying its results, however, we shall try to learn what we can from the behavior of export values themselves.

The task for 1921–61 is to explain why the total value of U.S. exports has grown more rapidly during business expansions than during contractions and thus has failed to reflect the inverse effects business fluctuations are supposed to exert on a country's exports.

To begin with the movements of total export value (TEV) in U.S. business cycles, the conformity indexes in Table 53 show the high degree of correspondence between TEV and the DBC. There

[19] Since SEP conform perfectly to the DBC, their inclusion in the index for crude materials in the early period and exclusion in the later one might be thought to be the cause of the shift in conformity of CEP to the DBC. However, the weight of SEP was not sufficient for such an influence. The conformity index for CEP in the interwar period is the same (+14) whether SEP is included or not.

TABLE 53

Domestic Business Cycles: Change in U.S. Export Values and World Imports, 1879-1961

	World Imports		U.S. Export Values								
			Total		Finished Manufactures		Semimanufactures	Crude Materials		Foods	
	1882-1913	1921-1961	1879-1913	1921-1961	1879-1913	1921-1961	1921-1961	1879-1913	1921-1961	1879-1913	1921-1961
Conformity index											
Expansion	+56	+100	+40	+100	+60	+100	+75	-20	+100	+20	0
Contraction	-56	0	-11	+50	-11	0	+25	-56	+25	+33	+25
Full cycle	+18	+54	+11	+86	+56	+100	+57	-67	+71	+22	+29
Average total percentage change											
Expansion	+7.9	+18.6	+7.2	+18.0	+17.1	+24.1	+29.4	-1.1	+14.8	+8.0	-9.6
Contraction	+2.9	-2.0	+4.9	-6.2	+5.6	-4.6	-11.0	+15.8	-9.1	-4.5	-5.5[a]
Full cycle	+5.0	+20.6	+2.3	+24.2	+11.5	+28.7	+40.4	-16.9	+23.9	+12.5	-4.1[a]
Average annual percentage change											
Expansion	+4.0	+8.1	+3.7	+7.8	+8.2	+10.4	+12.6	-0 5	+6.4	+3.8	-4.2
Contraction	+2.0	-2.0	+3.0	-6.0	+3.8	-4.6	-10.9	+10.7	-9.0	-3.1	-5.3[a]
Full cycle	+1.4	+6.0	+0.8	+7.2	+3.5	+8.4	+12.0	-4.5	+7.3	+3.5	+1.2[a]
Percentage ratio of rates of change in U.S. business cycles and:[b]											
Export value cycles			4.57	42.29	25.66	60.13	44.49	-24.87	23.17	18.38	3.27[a]
World import cycles	21.85	47.25	7.92	52.86	35.80	94.84	60.50	-54.65	39.79	41.75	9.70[a]

World Imports exclude U.S. imports.

Coverage: For 1879-1913, ten expansions and nine contractions; for 1921-61, eight expansions and eight contractions for conformity index, and six expansions and seven contractions for percentage change. For sources and other notes, see Table 48.

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

[b]See notes to Table 13.

has not been a single business expansion in 1921–61 in which TEV has not increased, and it fell in six out of the eight contractions covered. Even in the two instances of rising TEV during contractions, the rate of rise was lower than in the preceding and succeeding expansions in three out of the four comparisons.

The average amplitudes of TEV movements during domestic expansions and contractions also indicate considerable agreement with business fluctuations. On the average, TEV has risen 18 per cent in expansions and fallen 6 per cent in contractions, a sizable swing which accounts for 42 per cent of its total cyclical variation.

Correlations of individual export and business changes during domestic expansions and contractions reveal the consensus in a new fashion (Table 54). Based on the clearings index, the coefficient is +.58, which is highly significant and indicates that the total value of U.S. exports has, as a rule, grown more rapidly the more favorable the development of domestic business.

Thus, by all measures, there is a close positive relation between TEV and the DBC. The crucial question is whether this relationship is to be explained contrary to common views, by the positive influence of the DBC on TEV, or whether it is to be attributed to the positive relation between world demand and the DBC and the conformity of TEV to the former.

To explore the question whether the conformity of TEV to DBC can be attributed to the WIC, one may turn first to partial correlation analysis. A positive relation is found between the DBC and TEV independently of the WIC, on the basis of the clearings index. The result would be different with the Moore index, which yields a coefficient of zero for the relation of TEV to the DBC with WIC eliminated. However, as in the analysis of prices and for the same reasons, one should rely in the analysis of values mainly on the clearings index. Results with this indicator will be seen to agree considerably better with the showing of conformity indexes and other measures than do results based on the Moore index.

Next, one may ask whether the growth of TEV has ever slackened in a domestic business contraction without a simultaneous fall in the rate of change of world imports. But since such a fall occurred in all U.S. contractions except 1926–27, an independent decline of TEV could be observed at most in this single instance. Actually, TEV did conform positively to the 1924–27 cycle though world imports did not. Thus, foreign demand can account for most, but not all, of the positive conformity of TEV to the DBC by this standard.

TABLE 54

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

	U.S. Export Values					
	Total	Finished Manufactures	Semimanu-factures	Crude Materials	Foods	World Import Cycles
			1882-1913			
Simple Kendall correlations:						
DBC (Moore index)	+.11	+.43**		-.13	+.20	
DBC (clearings index)	+.16	+.37*		-.03	+.23	
WIC	+.52**	+.67**		+.50**	+.40*	
DBC (Moore index)						+.34*
DBC (clearings index)						+.36*
Partial Kendall correlations:						
DBC (Moore index) holding WIC constant	-.08	+.29		-.37	+.07	
DBC (clearings index) holding WIC constant	+.03	+.19		-.26	+.10	
WIC holding DBC (Moore index) constant	+.52	+.62		+.58	+.36	
WIC holding DBC (clearings index) constant	+.50	+.62		+.55	+.35	

(continued)

TABLE 54 (concluded)

	U.S. Export Values					World Import Cycles
	Total	Finished Manufactures	Semimanu-factures	Crude Materials	Foods	
			1921-1961			
Simple Kendall correlations:						
DBC (Moore index)	+.35	+.51**	+.51**	+.31	-.31	
DBC (clearings index)	+.58**	+.67**	+.46*	+.41*	-.10	
WIC	+.63**	+.62**	+.72**	+.62**	0	
DBC (Moore index)						+.49*
DBC (clearings index)						+.64**
Partial Kendall correlations:						
DBC (Moore index) holding WIC constant	+.06	+.30	+.26	+.01	-.36	
DBC (clearings index) holding WIC constant	+.30	+.45	-.00	+.02	-.13	
WIC holding DBC (Moore index) constant	+.56	+.49	+.63	+.56	-.18	
WIC holding DBC (clearings index) constant	+.41	+.34	+.62	+.51	+.08	

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

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

See notes to Table 49.

Movements in the share of U.S. exports in world imports also reveal these relations to a certain extent. If this share had not increased more often during domestic upswings than during downswings, the positive conformity of exports to the DBC could be attributed entirely to the WIC, assuming that the elasticity of TEV with respect to world imports is close to unity during DBC. Actually, however, this ratio has risen somewhat more often during expansions than during contractions (the conformity index of the ratio to DBC is +.31), which indicates a loose independent positive relation of TEV to DBC.[20]

Further information can be obtained by comparing the average rates of change of TEV during domestic and world cycles. According to Table 53, the average annual rate of change of TEV in the DBC was 7.2 per cent, or not much more than half their rate in world import cycles. This again points to the responsibility of the WIC for most of the agreement between TEV and DBC.

In sum, then, all our measures agree that U.S. total export value since 1921 follows closely the path of general business activity, rising when U.S. business expands and falling when it contracts, and even aping to some extent the amplitude of the domestic movement. Much of this agreement between TEV and business movements is explained by the agreement between foreign and U.S. business cycles, which causes the demand for our exports to rise when domestic business expands and to fall when it contracts.

But this is not the whole story. We are also reasonably certain that the net effect of the DBC on the total value of U.S. exports was not inverse, as a rule. Domestic expansion does not appear to have regularly stifled, nor contraction to have stimulated TEV. If policies had been aimed at repression of domestic demand with a view to promoting exports, they would not have succeeded, as a rule.

[20] The share of TEV in world exports is commonly used as an index of the United States' competitiveness in international trade. It has been argued that this share may well move inversely to U.S. business cycles because the rise in U.S. imports during business expansions and their fall during contractions raises or reduces other countries' exports. Hence "the U.S. share of exports will automatically rise" in U.S. recessions. (See Richard N. Cooper, "The Competitive Position of the United States," in *The Dollar in Crisis,* p. 143.) This expectation is not necessarily contradicted by the opposite finding mentioned in the text. The seeming contradiction could be due to our exclusion of U.S. imports from the world imports to which U.S. exports have been related. Our measure, in other words, refers to the share of U.S. exports in foreign imports; Cooper refers to their share in foreign exports.

8. *Cycles in Total Export Value Traced Back to Cycles in Total Quantity and Total Price, 1921–61*

To understand the behavior of total export value in business cycles, it must be viewed in terms of quantities and prices. This shows whether growing receipts from exports during business upswings represent higher prices overcompensating for a smaller volume of sales, moderating prices bringing an upsurge in quantities, or prices and quantities rising together.

The last type of behavior is characteristic of total export value, as appears clearly in amplitude measures. This does not by any means imply that export quantity and price always move together. There are quantity peaks where prices are lower than at neighboring quantity troughs so that the change in value in such instances is milder than in quantity. Therefore, the average amplitude of cycles in total export quantity (TEQ) is almost as large as that of cycles in TEV.

But during business cycles this is different. At DBC peaks both quantity and price were, as a rule, higher than at DBC troughs, causing value to change more during DBC phases than either component.

The 6 per cent annual decline of TEV during business downswings is, for the most part, a matter of price, while quantity falls by a mere 1 per cent, on the average. During the upswing, on the other hand, TEQ contributes 5 out of the 8 per cent by which TEV grows annually. This difference between the cycle phases reflects the upward trend in quantity, which is not matched by a similar one in price.

The contribution of prices to the conforming value changes is large considering the mildness of their fluctuations. It reflects their close agreement with business cycles. As much as 53 per cent of TEP rises and falls take place between domestic peaks and troughs. Quantities, on the other hand, fluctuate strongly but only a relatively small part of their movements agrees with that of the DBC. That a much larger part of value than of quantity variation (42 as against 23 per cent) is accounted for by U.S. business cycles reflects the contribution of prices (Tables 39, 48, and 53).

Conformity indexes also reflect the extent to which prices bring export values in line with the DBC. TEV rises more regularly in business expansions, falls more regularly in contractions, and conforms better to full cycles than TEQ. Similarly, the correlation of

TEV amplitudes with business amplitudes is much higher (positive) than that of TEQ but lower than that of TEP.

The meaning of these results can be put in this way. There is no support for the view that in times of expanding home demand in 1921–61 rising prices cause export value to shrink, nor for the contrary view that in such times greater efficiency lowers prices and thus promotes exports. In fact, export receipts behave much like those from domestic sales, responding primarily to the pull of demand, so that quantities sold surge upward together with prices.

Another similarity of exports and domestic sales seems to lie in the relative contribution of quantity and price to value amplitudes. Exactly comparable measures for domestic sales are lacking, but, commenting on somewhat earlier cycles, Mills found that in domestic production "the quantity factor is some 25 per cent again as variable as price, under peacetime conditions." [21] In exports the amplitude of TEQ in the DBC is about 44 per cent larger than that of TEP.[22] Thus the agreement between foreign and U.S. cycles was close enough in this period for U.S. exports to behave in some ways like a domestic series.

The similarity disappears immediately, however, when the influence of world demand on exports is eliminated. This reveals clearly the opposing effects of the DBC on the two components: quantity and price. Given constant world demand, domestic expansion tends to raise export prices and to depress export quantities. This is shown as clearly as possible in the negative partial coefficient for TEQ and the positive one for TEP (Tables 42 and 49). Thus economic theory maintaining that rising home demand should repress export *quantities* is supported by our findings. But it also turns out that the same does not apply to U.S. total export *value.*

9. *Cycles in Total Export Value Traced Back to Cycles in Commodity Classes, 1921–61*

The next question is how representative the characteristics of the total value of exports are of the values of commodity classes. Does the value of all classes rise and fall with the DBC, or are the con-

[21] Frederick C. Mills, *Price-Quantity Interactions in Business Cycles,* NBER, New York, 1946, p. 58, note 2.

[22] This contradicts Cowden's expectation: "Because values exported are in part a reflection of price changes, any apparent correlation between value of United States exports and domestic business conditions may be due to this price factor." (Cowden, *Measures of Exports,* p. 78.)

forming movements of the total the result of diverse class behavior?

Considering first the conformity indexes in Table 53, we find that during U.S. business expansions in 1921–61 the value of manufactures and crude materials exports rose every time with negligible exceptions while food export values behaved erratically. U.S. contractions, on the other hand, were not always characterized by falling values in all export classes. Still, not a single negative conformity index is found in this phase either. The low conformities in contractions are largely a matter of the rising trend of export values, as shown by the indexes for full-cycle conformity which are positive and high for all classes except foods. It is particularly noteworthy that MEV rose more during domestic expansion than during contraction without a single exception in fourteen comparisons. The perfect regularity, together with the large weight of this class, explains why the index for TEV is higher than the indexes for the other three classes.

The amplitude measures corroborate the story told by the conformity indexes, insofar as the average change of values of manufactures and crude materials exports was a sizable rise during expansion and a moderate decline in contraction. These measures provide the additional information, however, that food exports have, on the average, fallen by 10 per cent in U.S. expansions, lowering the average increase in TEV, and have risen during contractions, reducing the fall of TEV. Without these inverse movements of food exports, TEV amplitudes would be more nearly of the order of domestic sales value series.[23]

That the change in the values of all export classes except foods is positively related to the DBC is brought out further by correlations of export value amplitudes with amplitudes of domestic business activity. The tendency of export values (except foods) to develop more favorably the higher the growth in business activity is clear whether the comparison is based on the Moore index or on clearings. The positive relation is strongest in finished manufactures export value (MEV), weaker in crude materials export value (CEV), while semimanufactures export value (SEV) behaves like MEV according to one indicator and like CEV according to the other. The inverse amplitudes of FEV are confirmed by negative, if low, coefficients here (Table 54).

[23] The average increase in food export value (FEV) during contractions is largely due to the enormous rise in these exports in 1937–38 caused by poor European harvests and fear of war. But even when this exceptional episode is excluded, as in Table 53, the fall of food exports during contractions was still smaller than during expansions.

It now must be ascertained to what extent the relations of export class values to the DBC can be attributed to movements in world demand. Comparing first the conformity of values of the various export classes and of world imports to each individual U.S. business cycle, we find that each class moved with the DBC also in the only instance in which world imports moved against it—the business cycle of 1924–27. In this respect, the behavior of the total value is thus representative of that of all component classes: not all of the positive conformity to the DBC is in the classes and in the total accounted for by world demand according to this rough test.

Prominent distinctions among classes emerge, however, when the series' cyclical variations during domestic and world cycles are compared. On the one hand, fluctuations in the values of finished manufactures are nearly as large in the DBC as in the WIC, suggesting an independent positive relation of these exports to the DBC. On the other hand, movements of SEV and CEV in domestic business cycles are about 60 per cent and 40 per cent (see Table 53) of those in world cycles. Thus attribution of the agreement between exports and the DBC to the WIC is plausible here. For food exports, finally, this question does not arise since they do not agree with the DBC in the first place. Thus, by this standard, the positive relation of TEV to the DBC which is not accounted for by the WIC is due to finished manufactures exports only, not to other export classes. However, the independent relation of values of all classes to the DBC was more positive or less negative than that of the corresponding quantities. This shows up in the values' higher ratios of rates of change in DBC to those in WIC.

The preceding findings are confirmed and refined by correlation analysis (Table 54). For finished manufactures, the ratios of rates of change had suggested that world import cycles did not account for all of the positive relation to the DBC. According to the correlations, the consensus of amplitudes of MEV with amplitudes of U.S. cycles was considerably better than simultaneous change in world import cycles could explain. The partial coefficient for MEV is +.45, indicating an independent positive relation between MEV and the DBC.

For the values of crude materials exports, we inferred from the ratios of rates of change that there was no independent positive relation between this class of exports and the DBC. The zero coefficients of partial correlation with either indicator attest that this was correct. Semimanufactures, according to the ratios of rates of

change, occupied an intermediate position between finished manufactures and crude materials. The result of the correlations here depends on the indicator used. Judging by the Moore index, SEV behaves like MEV; judging by clearings, like CEV.

The consistency of results with different standards of measurement does not extend to food exports. Here the ratios of rates of change suggested a positive relation to the WIC and no relation to the DBC. Correlation of amplitudes, however, shows an inverse relation to the DBC and no relation to the WIC. The contradiction arises from the different weight given in the two measures to the interwar period, in which the process of readjustment after World War I caused food exports to move against both WIC and DBC at times. There is no conflict between the two measures, as neither one reveals a positive contribution of food exports to the positive relation between TEV and the DBC.

To summarize the findings of this section, the positive relation of total export value to U.S. business cycles (with constant world demand), shown by most measures, reflects opposing behavior of different types of commodities. While finished manufactures exports tend to fare better, food exports tend to fare worse the more prosperous the domestic economy. Crude materials exports show neither one tendency nor the other. These results emerge whether we compare relative rates of change in successive business cycle phases, average rates of change in different chronologies, or ranks of rise and fall in exports and the severity of domestic and world import cycles.

10. *Cycles in the Values of Export Commodity Classes Traced Back to Class Quantities and Prices, 1921–61*

As a final step, the factors treated in the preceding sections will be further decomposed and the fluctuations in total value viewed as the result of the behavior of class quantities and prices.

The unfailing rise of TEV during business expansions was seen above to be "real," i.e., due to total quantity rather than total price. It was also attributed to the growth in the values of all commodity classes except foods. Disaggregating further now, we find that the high frequency of TEV rises is mainly due to the quantities of finished manufactures and crude materials and to the prices of semimanufactures. Other components have not risen much more often in business expansions than they have fallen.

The same series which rose most regularly also display the highest

average rates of increase in domestic expansions. In addition, SEQ, although its conformity index is low, has a large average amplitude in business expansions. Hence the average 8 per cent annual rise in TEV represents 6 to 8 per cent annual rises in the quantities of the nonfood classes and a 5 per cent rise in the price of semimanufactures.

The decline of TEV in business contractions was found in preceding sections to be less regular and, on the average, smaller than the rise in expansions. It has also been seen as primarily a matter of falling prices rather than quantities exported and as being representative of the values of all commodity classes. Inspection of the class quantities and prices reveals that the two components which decline both frequently and, on the average, sizably are SEP and CEQ. The decline in MEP was regular but mild, while that in FEP was less frequent though considerable.

In short, the components of TEV which moved most regularly and also with sizable average amplitudes in the direction of both U.S. business cycle phases are crude materials export quantity (CEQ) and SEP. An additional and most important factor in expansions only is the regular and large increase in finished manufactures export quantity (MEQ), which reflects in part the upward trend of this series, as shows up in its failure to contribute to the TEV fall in U.S. contractions.

With regard to relative rates of change in successive business expansions and contractions, i.e., conformity to full business cycles, it was brought out previously that the systematic decline or retardation of TEV in business contractions relative to adjacent expansions was a matter of prices as well as quantities and reflected the values of all commodity classes. We can now add that such declines in rates of change predominated in all class quantities and prices. Exports in this respect behave like domestic activities: both quantities and prices contribute to the cyclical movements of values. The highest indexes by far (+100) are shown by MEQ and SEP. Both series grew more slowly or fell more rapidly in every single contraction than in either the preceding or the succeeding expansions.

This latter result is strikingly confirmed by the measures of correlation between export amplitudes and amplitudes of domestic business activity. Here too the highest coefficients by far are found for MEQ and SEP. These two series not only accelerated and retarded with each change in the direction of domestic business activity, but they also grew more rapidly the more vigorously business expanded

and conversely. Although all other prices and the quantity of semi-manufactures also are positively correlated with the DBC, the high correlations of MEQ and SEP are the main factors in the positive correlation of TEV with U.S. business cycles.

This positive correlation can be attributed primarily to the influence of world demand, we found. But when this influence was eliminated, TEV still showed a positive relation to the DBC according to most measures. In the preceding sections this finding was ascribed, first, to the positive relation of total export price to the DBC with world imports constant, which outweighed the negative relation of total export quantity, and second, to the net positive relation of manufactures values, which outweighed the net negative relation of food export value.

Disaggregating further, the fact that total export value does not move inversely to U.S. business cycles with the WIC constant can be traced to the two components which stood out above for their close positive agreement with the DBC: MEQ and SEP. Their independent positive relation outweighs the negative ones of CEQ and FEQ, while SEQ and the remaining price series have near zero coefficients. In other words, the higher the rate of growth of domestic business with constant world imports, the more rapid the rise in MEQ and SEP and the steeper the fall in CEQ and FEQ. The reasons for the various patterns of behavior of quantity and price series have been discussed in the preceding sections. The point here is merely to show how their interplay results in the characteristic movements of the total value of exports.

11. *Value of U.S. Exports in Expansions and Contractions, 1879–1913*

The cyclical behavior of U.S. exports underwent a decisive shift around the time of World War I.[24] Before 1914, the movements in total export value did not conform either positively or inversely to U.S. business cycles. Despite the rising trend which characterized the series during most of the period, it fell in seven out of the nineteen cycle phases covered. Three of these downward movements occurred during business expansions, four during contractions. The irregularity

[24] This shift was recognized by Mitchell on the record of the interwar period. He refers to "a notable shift in the cyclical behavior of exports. Prior to 1914 exports bore a decidedly irregular relation to business cycles; since then they have conformed well." (*What Happens during Business Cycles*, p. 275, note 18.)

stands out even more clearly when rates of growth in consecutive cycle phases are compared and the influence of trends thus eliminated. Business contractions, it turns out, were accompanied about as often by acceleration as by retardation of TEV (see Table 53).[25]

Amplitude measures agree with the conformity indexes in disclosing a very slight positive relation of export value changes to the DBC. The average movement was upward in both cycle phases, but it was more rapid in expansions than in contractions. The resulting small full-cycle amplitude is a negligible fraction of the total cyclical variation in TEV (Table 53).

The absence of a systematic relation between domestic business activity and the total value of exports in 1879–1913 is also brought out by correlations of the respective amplitudes. We obtain nearly the same very low positive coefficient whether the Moore index or clearings is used as an indicator of domestic activity. Even strong expansion or severe contraction in domestic business was not regularly accompanied by one type of TEV change or another (Table 54).

It might be plausibly surmised that the irregular behavior of TEV in business cycles is caused by timing differences between world and U.S. cycles. Rising world demand, coinciding sometimes with home expansion and sometimes with contraction, could lift TEV once in one phase and another time in the other one and thus erase the supposed systematic inverse effect of the DBC.

To appraise the role of world demand, one may look, first, at the partial correlations of TEV amplitudes with DBC and WIC amplitudes. They show that, with world imports constant, changes in TEV in 1879–1913 were not related to fluctuations in domestic business activity. Whether based on the Moore index or on clearings, the partial coefficients are near zero. This means that neither did TEV tend to develop less favorably during U.S. prosperous periods as they should according to the common inexact version of the standard theory, nor did they exhibit the stimulating effects of home prosperity that would be expected by the expansionist theory.

A similar conclusion is reached when differential rates of change in expansions and contractions are considered, as in measures of conformity to full business cycles. However, though the index for TEV is only a shade lower than that for world imports, there are considerable differences in individual cycle phases. Some of the falling rates of change of exports during business contractions were

[25] See my *American Exports*, p. 17.

accompanied by rising rates for world imports. Conversely, the latter fell in half of those contractions in which the performance of exports improved. This suggests that not all of the disorderly behavior of TEV is accounted for by world imports.[26]

Amplitude measures confirm this impression and indicate, in addition, that world imports were somewhat more positively related to the DBC than exports. The average increase during expansions was nearly the same for TEV and for world imports (7.6 and 7.9 per cent), but during contractions the average growth of exports far outdid that of world imports (4.9 against 2.9 per cent).[27]

The pattern of the share of U.S. exports in world imports during U.S. business cycles is also of interest in this connection. It was found above to be positively related to the DBC in later cycles. Before 1913, however, the share of U.S. exports increased about as often as it fell in U.S. recessions relative to preceding and following expansions. The index of conformity of the ratio to full business cycles is −6. Assuming unitary elasticity of TEV with respect to the WIC, this points again to a very slight inverse tendency of TEV in the DBC.

This tendency is again revealed more clearly by the average change in the share of exports in world imports during business expansions and contractions than by the conformity measures. Though the share of exports in world imports was, on the average, unchanged between a business cycle trough and the succeeding peak, it definitely rose from there to the following trough.[28]

The ratios of rates of change of exports between their own turning points and those in business activity and world imports point in the same direction (see Tables 13 and 53). A large part of variation in TEV is accounted for by the WIC, but the proportion (58 per cent) is much smaller than the 80 per cent of the later period and leaves room for independent movement. That this independent movement tended to be more inversely than positively related to the

[26] Considering the directions of movements in TEV and world imports during U.S. expansions and contractions, one finds that in fifteen out of eighteen instances the two series rose or fell together. In three instances only do the directions of their movements diverge, world imports rising and exports falling. (Since two of these exports declines come during U.S. contractions and one in expansion, the conformity index for expansions is somewhat higher for world imports than for exports and that for contractions is higher for exports than for world imports.)

[27] Omission of the 1879–82 expansion, which is not covered by the world import series, accounts for the difference between the expansion figures here and in Table 53.

[28] See my *American Exports,* Chart 7, p. 50.

DBC can be inferred from the respective proportions of TEV and WIC variations accounted for by the DBC. Though this proportion is small for world imports (22 per cent), it is much larger, hence more positive, than for TEV where it is practically nil.

In sum, the total value of U.S. exports during U.S. business cycles in 1879–1913 was more likely to grow than to decline, whether business activity expanded or contracted, and business recessions were not regularly accompanied either by a slowing down or by an improvement in foreign sales. The failure of TEV to conform to U.S. business cycles can be laid in part to the timing discrepancies between cycles abroad and in the United States. Due to their different timing, movements in world demand, as represented by world import cycles, had only a mild effect in the direction of a more positive relation of exports to the DBC.

Apart from the influence of world cycles, exports were still not regularly related to the DBC but a tendency to a slight inverse relation can be discerned.

The results confirm that a shift toward a more positive relation of total export value to U.S. business cycles occurred between the earlier and the later periods, a shift explained partly by the lessening disagreement between foreign and U.S. business cycles and partly by the changes in the commodity composition of exports. Though export value moved in both periods more positively with the DBC than quantity, the shifts in value and quantity were similar (see Chapter 6).[29]

12. *Cycles in Total Export Value Traced Back to Cycles in Total Quantity and Total Price, 1879–1913*

In this and the following sections, the behavior of total export value will be accounted for by that of its components. It is clear immediately that, unlike their behavior in the later period, TEQ and TEP in these early years do not show the cyclical patterns of domestic sales where prices and quantities sold move together. On the contrary, the countervailing tendencies of quantities and prices result in the nonconformity of TEV to business cycles. Though TEP changes were not very regular with respect to the DBC, as shown

[29] On the basis of the Moore index, almost the entire shift in TEV would appear to be due to world cycles since the partial coefficients for the later and earlier periods are nearly equal. But in view of the findings with other measures, we consider the results with the clearings index, which do show a shift with world demand constant, the more reliable ones.

above, they agreed sufficiently well to offset the inverse movements of TEQ. This is reflected in the conformity indexes, all three of which are more positive or less negative for TEV than for TEQ, and shows up even more clearly in the amplitude measures. The average rise in TEV during business expansions is a matter of rising prices and constant quantities, whereas the further rise during contractions results from larger quantities at lower prices. This means that receipts from foreign sales were, on the average, higher at business peaks than at the preceding troughs, as an unchanged volume of goods was sold at higher prices. Receipts were up again at the succeeding trough but this time because lower prices were offset by a much larger quantity of goods sold.

The same facts are reflected clearly in the simple correlation coefficients. The low positive coefficient for TEV lies between a negative one for TEQ and a positive one for TEP. This shows that the higher the growth rate of domestic business during cyclical expansion or contraction, the more rapidly TEP tended to rise and TEQ to decline, which explains the small, irregular movements of TEV during U.S. business cycle phases.

Cycles in world demand caused movements in both export quantities and export prices to be more positively related to the DBC than they would otherwise have been. When their influence is eliminated, the effects of the domestic fluctuations stand out more prominently. The partial correlation coefficients for the relations to the DBC, with the WIC constant, are −.42 for TEQ, +.18 for TEP, and −.08 for TEV. Clearly domestic growth had opposite effects on quantities and prices of exports before as well as after 1913. There is here too, as in the later period, support for the standard theory claiming that home expansion cuts into the quantity of exports; and there is even less support in the earlier period than in the later one for the view that a thriving home economy raises exports by reducing costs. In both periods the inverse effect of the DBC on export quantity did not result in inverse behavior of U.S. export value.

13. *Cycles in Total Export Value Traced Back to Cycles in the Values of Commodity Classes, 1879–1913*

The second way of decomposing total export value is by commodity classes to find out whether the irregular behavior of the total is representative of all types of exports or whether it results from contradictory class patterns.

The answer appears immediately in the conformity indexes. They show that during business expansions the value of crude materials exports falls somewhat more frequently than it rises while the majority of changes in food exports is upward. In business contractions the contrast is much sharper as CEV increases and FEV declines with regularity.

The nonconformity of TEV to full domestic business cycles results from the compensating effects of the inverse conformity of CEV and the positive conformities of MEV and FEV. Typically during business recessions at home, foreign sales of crude materials improved while those of foods and manufactures slowed down. Hence total exports reacted favorably in some instances, unfavorably in others.

Amplitude measures provide further evidence. The smallness of the cycle amplitude of TEV reflects their not too different average rise during U.S. expansions and contractions—a rise due to FEV during expansions, to CEV during contractions, and to MEV in either phase. Thus, what appears to be irregularity can be seen to be due to not irregular but diverse patterns of components.

This shows up further in the ratios of rates of change in export and business cycles, which are higher for each class than for the total. While the DBC accounts for less than 5 per cent of the variation in TEV, it accounts for about one-quarter of the fluctuations in MEV and CEV and for 18 per cent of those in FEV (Table 53).

The same point is made a little less clearly by the amplitude correlations. The signs of the coefficients for the relation of value classes to the DBC agree with conformity indexes and amplitude measures, but the negative correlation of CEV appears much weaker by this standard than otherwise. This means that CEV rose regularly more in contraction than in adjacent expansions, but the amplitude of DBC phases had no systematic effect on the CEV amplitude. Still, the result here too is that the low positive relation of TEV is similar to that of FEV, while a higher positive relation of MEV compensates for the negative one of CEV.

The next matter to be investigated is whether cycles in world demand have similar effects on the values of all commodity classes and how, with these effects removed, the independent relations of the classes to the DBC account for that of the total.

As for conformity to full business cycles, in two out of every three instances the values of the three commodity classes are found to move with the DBC when world demand moves with it and against the DBC when world demand moves against it. The divergencies in the

remaining third of the cases are characteristic of the differences between the classes. MEV and FEV move *with* the DBC in a few instances where the WIC moves *against* it, while CEV moves inversely in as many as seven cases in which the WIC moves with the DBC. This points to an independent positive relation of FEV and MEV and an inverse one of CEV.

That the influence of the WIC pushes all value classes into a more positive relation to the DBC than they would otherwise have is also shown by the ratios of rates of change, which are much higher for all classes with respect to the WIC than with respect to the DBC (Table 53).

It further shows up in the high positive correlations of amplitudes of all commodity classes and world import amplitudes (see Table 54).

When the positive effect of the WIC is removed, the differences between classes stand out more clearly than otherwise. The independent relation of MEV to the DBC is positive, that of FEV irregular, and that of CEV negative. The irregularity of TEV with constant WIC can thus be attributed to the offsetting behavior of MEV and CEV and the irregularity of FEV. MEV tended to rise, but CEV tended to fall more the stronger the growth in U.S. business activity, while FEV had no definite tendency.

The values of the three classes thus behaved much like the quantities except that all relations are somewhat more positive or less inverse for values than for quantities. The result is that TEV's independent relation to the DBC is neutral while that of TEQ is negative. Put differently, the independent relation of TEV to the DBC is not inverse but neutral because of the positive relation of MEV and the irregular one of FEV. Why manufactures and food exports behaved in this fashion has been discussed above in dealing with their quantities.

Comparing these findings with those for the later period, we note the common feature—that, with constant world demand, the relation of TEV to the DBC results from compensating ones in its components. In both periods, MEV movements were positively related to the DBC apart from the influence of the WIC. Even the degree of relationship hardly changes here. On the contrary, the relations of crude materials and foods exports to the DBC, with the WIC constant, are reversed from the earlier to the later periods. Before World War I, CEV moved more inversely than FEV; after 1921, the opposite was true.

The main causes of these shifts, which have been discussed in Chapter 6, are: the changed behavior and role of cotton exports, the disappearance of the positive effects of crops on U.S. business cycles, the special effects of the aftermath of World War I on food exports, and the effects of recent government programs on these exports.

In terms of the patterns of commodity classes, the more positive independent relation of TEV to the later U.S. business cycles is explained by the increased weight of manufactures exports and the changed behavior of crude materials exports.

14. *Cycles in the Values of Commodity Classes Traced Back to Class Quantities and Prices, 1879–1913*

The values of commodity classes, on the one hand, and total quantity and price, on the other, can be decomposed further into the quantities and prices of each class of commodities. This should disclose the interplay of price and quantity factors which caused the total value of exports to rise about as often in business expansions as in contractions in 1879–1913.

In the preceding sections it was brought out that the prevalence of rises in TEV during business expansions is due to the upward push of TEP as opposed to TEQ. Among commodity classes, the values of manufactures and foods contributed to the rise while the value of crude materials pulled in the opposite direction. Disaggregating further, we find that the preponderance of rises in TEV during expansions is due, first, to price rises being slightly more frequent in all classes than declines; and second, to the unfailing rise in the quantity of manufactures exports. That the average change in TEV during domestic expansions was upward despite the large decline in CEQ is similarly accounted for by the advance in prices of foods and crude materials and the enormous average growth in MEQ.

In business contractions, the weaker and more irregular tendency of TEV to grow was attributed above to an expanding volume of sales at weakening prices. In terms of the values of commodity classes, the rise here is due to the countercyclical expansion in the value of crude materials exports, partly offset by shrinking values of food exports. Similarly conflicting behavior is reflected in the quantities and prices of commodity classes. All quantities rise more often than they fall, and all prices fall more often than they rise. The average change is downward in all prices and upward in MEQ and CEQ.

In sum, the favorable development which characterized TEV in both phases of domestic business cycles represented very different changes in underlying factors. The upward push came from CEP and FEP in expansions, from CEQ in contractions. Only the persistent rise in MEQ is common to both cycle phases.

When trends are removed and the relation of TEV to full business cycles is analyzed in terms of price and quantity components, the latters' opposing patterns are again found to be the source of the nonconformity of TEV to the DBC (see Tables 39 and 50). More specifically, the strongly inverse movements of CEQ largely compensated for the regularly positive behavior of MEQ and the mildly positive responses of FEQ and of all prices. This means that during a typical business contraction, compared with the preceding and following expansions, the growth rate of CEQ tended to rise while those of MEQ, FEQ, and all prices tended to decline.

This result is fully confirmed by the correlations of amplitudes of export series and U.S. business activity. Again, the correlation is inverse for CEQ, positive for MEQ, and mildly positive for FEQ and all prices (see Tables 42 and 49).

Fluctuations in world demand, as we have seen, did not move in agreement with U.S. business cycles in 1879–1913 enough to account for a major part of the cyclical behavior of exports. The correlation of TEV and DBC amplitudes remains near zero when the effect of the WIC is eliminated (see Table 54). Only the change in the sign, from positive for the simple to negative for the partial coefficient, suggests the direction in which the WIC exerts its influence. Just like those for the total, partial correlation coefficients for component export series do not differ much from their simple counterparts. Holding the WIC constant causes the relation of quantities to the DBC to be somewhat more inverse or less positive than otherwise while having little effect on prices. The zero correlation of TEV to the DBC is, independently of the WIC, again the upshot of inverse CEQ and positive price relations.

These findings agree very well with the results obtained in Chapter 5 from analyzing turning points, and they can be interpreted in the same fashion. To review briefly, the irregular behavior of the total value of exports in U.S. business cycles in 1879–1913 was in the earlier chapter attributed to the following factors: (1) a moderately positive effect of world imports cycles on all export quantities; (2) a strongly inverse effect of domestic business cycles on the quantities of nonmanufactures exports; (3) an occasional positive effect of the

quantity of foods exports on domestic business activity; (4) a mild positive effect of domestic business cycles on all export prices.

Finally, the shift from an irregular to a positive relation of total export value to U.S. business cycles can be traced back to the prices and quantities of the component classes. Quantities of manufactures and of crude materials exports showed more procyclical or less countercyclical tendencies in later years, and movements of manufactures prices also came to agree more closely with the DBC. Due to this contribution of prices, the shift in value is even sharper than the one in quantities.

The main factors responsible for the shifts in export behavior are as described in Chapter 6: the declining disparity of foreign and U.S. business cycles, and the change in the type of commodities exported toward goods whose export supply is not much affected by countercyclical pressures of domestic demand.