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Fluctuations in World Imports and
Their Effects on U.S. Exports

1. *Export Quantities*

The complex relations between exports and U.S. business cycles result in large part from the impact of fluctuations in foreign demand. Hence a description of the relatively simple relations between foreign demand cycles and U.S. exports is a useful introduction to the discussion of the more complicated relation. It is also interesting in its own right since it reveals not only the great importance but also the limits of this factor. Foreign demand cycles will be represented here, and throughout the study, by cycles in the dollar value of total imports of the world outside the United States (see Chapter 2 for the period covered and other detail). For brevity, these world import cycles (WIC) and their phases will sometimes be referred to as world or foreign cycles, expansions, and contractions. These terms are not meant to imply that world import cycles represent "true" world cycles. As of 1965, the latest turning point in world imports occurred in 1959. Hence the period covered in this chapter ends in 1959.

How closely the quantity of U.S. exports can be expected to follow the course of the outside world's imports depends on the evaluation of several factors: the accuracy with which total foreign imports depict the demand for U.S. export goods; the elasticity of the supply of these goods; and the degree of interference of fluctuations in competing home demand for exportable goods.[1]

The actual relation of world imports to U.S. exports will be meas-

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[1] To regard changes in foreign imports as changes in demand for U.S. exports is not strictly correct, since changes in U.S. export supply could also cause changes in foreign imports. However, such supply effects are likely to be rare and small and may therefore be neglected.

The reason for not using a more refined measure of foreign demand is the lack of data, as explained in Chapter 2. Such a measure as, for instance, quarterly foreign imports weighted by the commodity composition of U.S. exports is not obtainable.

ured in several ways. First we ascertain how often exports have risen during expansions and fallen during contractions in world trade. This is indicated by the conformity indexes in Table 7.

It can be seen immediately that, with one exception, all the indexes for expansions and contractions have positive signs, showing that in general export quantities rise in world expansions and fall in world contractions. When all commodity classes and all cycles are combined, export quantities and world imports are found to move in the same direction in sixty-six out of a total of eighty-three instances.[2] Lapses are more frequent in the earlier than in the later period. They are partly due to divergent secular trends. Thus exports of manufactures continue their growth even in the face of falling world trade in the earlier cycles, and food exports sometimes shrink despite world expansion in the later cycles.[3]

The effects of the trends are eliminated in the indexes for conformity to full world import cycles, which are based on *relative* rates of change in successive expansions and contractions. These indexes reveal a near perfect score for the later years. With the single exception of food exports, the total and all classes rise less or fall more in every world contraction than in the preceding and succeeding expansion. The indexes for the earlier period are considerably lower. Total exports fail to conform twice here, owing in both instances mainly to steep declines in food exports during world expansions (1881–85 and 1901–03). However, even in 1881–1913 there are only eight defections from conformity among thirty-six comparisons for the three commodity classes.

What emerges is the striking fact that the growth rate of export quantities of all commodity classes varied with world import cycles in sixty-three out of seventy-two observations during the full period, 1881–1959, despite the mildness of some world cycles and despite the numerous, strong other forces affecting exports.[4]

Table 7 gives another measure designed to indicate the correspondence between movements in exports and in world cycles: the

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

[3] For a study of the effects of a large fall in world demand on export quantities and prices of individual commodities, see S. G. Triantis, "Cyclical Changes in the Balance of Merchandise Trade of Countries Exporting Chiefly Primary Products," *American Economic Review*, March 1952.

[4] Allowing for leads and lags of export quantities at WIC turns would not raise conformity indexes or conforming amplitudes. These timing differences were too short and/or irregular to have such effects. They are, however, taken into account in Table 9 and are extensively discussed in the following chapter.

TABLE 7

World Import Cycles: Change in U.S. Export Quantities, 1881-1959

	Total	Finished Manu- factures	Semi- manu- factures	Crude Materials	Foods
		1881-1913			
Conformity index					
Expansion	+43	+100	— —	+43	+43
Contraction	+33	−33	— —	+33	+67
Full cycle	+67	+50	— —	+33	+83
Average total per- centage change					
Expansion	+19.8	+31.5	— —	+17.6	+13.0
Contraction	−6.8	−0.1	— —	−1.8	−17.2
Full cycle	26.6	31.6	— —	19.4	30.2
Average annual per- centage change					
Expansion	+5.6	+8.9	— —	+5.0	+3.7
Contraction	−5.2	−0.1	— —	−1.4	−13.4
Full cycle	5.5	6.8	— —	4.1	6.0
		1921-1959			
Conformity index					
Expansion	+100	+100	+100	+60	+20
Contraction	+100	+67	+100	+67	+67
Full cycle	+100	+100	+100	+100	+78
Average total per- centage change					
Expansion	+33.6	+34.8	+40.9	+38.4	+25.7
Contraction	−16.0	−9.6	−21.5	−29.1	−10.2
Full cycle	49.6	44.4	62.4	67.5	35.9
Average annual per- centage change					
Expansion	+10.7	+11.2	+13.1	+12.3	+8.2
Contraction	−11.9	−7.1	−15.9	−21.5	−7.5
Full cycle	11.1	9.7	14.1	15.5	8.0

Notes to Table 7

Based on seasonally adjusted quarterly series.

World imports exclude U.S. imports.

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 1929-37 cycle is included in the conformity indexes but excluded otherwise.

Coverage: For 1881-1913, seven expansions and six contractions; for 1921-59, five expansions and six contractions for conformity index, and four expansions and five contractions for percentage changes.

Source: Exports and world imports; Appendixes A and C; domestic wholesale prices, U.S. Department of Labor, Bureau of Labor Statistics; cycle chronologies; NBER. These sources and notes apply to all tables in this chapter.

average rates of change in exports during expansions and contractions in world trade. These rates confirm the story told by the conformity indexes: in both periods and in all classes the average change in exports is upward during the rising and downward during the falling phase of the world cycles. But while the direction is the same, the degree of movement differs considerably among classes, periods, and cycle phases. In the earlier cycles, average rates are in general lower than in the later ones. In the expansions 1881–1913, export quantity grows by 4 to 9 per cent a year, while the range in 1921–59 is 8 to 13 per cent. In contractions dispersion is much greater than in expansions, reaching from practically no change in manufactures during pre-1913 cycles to an average fall of 22 per cent in crude materials after 1921. The variation of total export quantity during world cycles is just about twice as large after World War I as before: 11 as against 5.5 per cent, when expansions and contractions are combined.

The measures of change described in the preceding paragraph depend, of course, not only on the closeness of the relationship between exports and world imports, but also on the total cyclical variability of the series. If the peaks and troughs in exports invariably coincided with those in world imports, then their full cyclical ampli-

tude would be equal to their amplitude in the world import frame-
work. But such a one-to-one correspondence is not found either be-
tween domestic activities and U.S. business cycles or between exports
and WIC. Therefore, export amplitudes in WIC are lower than those
in export cycles. The degree to which the former approach the latter
indicates the closeness of the relationship between the two sets of
cycles.

Measures of this degree of closeness are shown in Table 8. Line c
gives the average annual percentage rise and fall in a given export
quantity series between its own turning points. Line b is based on
the change in the same series taken from troughs to peaks to troughs
of world imports. The ratio of line b to line c thus can be inter-
preted as measuring the degree to which the total cyclical variation
in export quantity is accounted for by its variation during world
cycles.

The ratios reveal a good deal not brought out by the conformity
indexes and serve to supplement and qualify the conclusions drawn
from the latter. First, the low ratios for food exports in both periods
are in contrast to the high conformity indexes for these series. The
inference is that, although these exports were usually larger at WIC
peaks than at WIC troughs, they also experienced large swings not
directly related to the WIC. On the contrary, as much as two-thirds
of the change in finished manufactures before World War I oc-
curred within the framework of the WIC. Independent swings in
this type of exports thus were relatively mild. The conformity index
here tends to understate the closeness of the relationship since it
is lowered by a few instances in which growth rates in world con-
tractions were just a trifle less than rates in adjacent expansions.

While conformity indexes in full cycles in 1921–59 are +100 for all
series except foods, the ratios reveal differences. Almost three-quarters
of the cyclical movements of manufactures take place between WIC
turns, but only about half of those of semimanufactures and crude
materials. This result makes a good deal of sense. One expects move-
ments of finished manufactures export quantity (MEQ) to be more
strongly demand-determined than those in crude materials export
quantity (CEQ) and foods export quantity (FEQ) since the supply of
the former is more elastic in the short run. The relatively low ratios
for FEQ reflect the erratic influence of good and bad domestic and
foreign harvests. Those for CEQ for 1881–1913 are partly caused by
the same factor, but mainly they are due, as will be shown in subse-
quent chapters, to the home market's competition for export supply.

TABLE 8

U.S. Export Quantities: Comparison of Rates of Change During Domestic U.S. Business Cycles, World Import Cycles, and Quantity Cycles, 1880-1961

	Total	Finished Manu- factures	Semi- manu- factures	Crude Materials	Foods
Average annual percentage change during full cycles, 1880-1913					
a. Domestic business cycles	-1.8	3.0	--	-7.2	2.6
b. World import cycles	6.6	6.9	--	4.9	8.3
c. Quantity cycles	14.1	10.5	--	23.7	24.6
d. Ratio of a to c (per cent)	-12.77	28.57	--	-30.38	10.57
e. Ratio of b to c (per cent)	46.81	65.71	--	20.68	33.74
Average annual percentage change during full cycles, 1921-61					
a. Domestic business cycles	3.7	6.1	3.7	6.0	-2.7
b. World import cycles	11.7	9.7	14.1	15.7	12.2
c. Quantity cycles	16.1	13.3	25.0	31.2	36.6
d. Ratio of a to c (per cent)	22.98	45.86	14.80	19.23	-7.38
e. Ratio of b to c (per cent)	72.67	72.93	56.40	50.32	33.33

Note: Measures for different series cover different time periods depending on each series' cyclical turns in the years 1880-1913, 1921-29, 1937-38, and 1947-59. Measures for U.S. business cycles and world import cycles cover whatever period is closest to that delimited by each series' turns. They may thus differ from corresponding measures given in other tables.

See notes to Table 7.

As the role of this competition subsides in later cycles, CEQ come to be more closely correlated with world cycles.

Nearly half of the average cyclical change in the total quantity of U.S. exports in 1881–1913 is accounted for by the rise and fall in foreign demand, and the proportion increases to almost three-fourths in 1921–59.[5] These ratios may appear high in comparison with those of the component classes. In the earlier period when exports consisted mainly of crude materials and foods, the figure for the total is 47 per cent against only 21 and 34 per cent for these two classes. In the later period the ratio for the total is so high that classes other than finished manufactures appear to have hardly any weight at all. The explanation of this puzzle will emerge from the analysis in later chapters. It lies in the fact that the timing of movements which are independent of world cycles tends to differ among commodity classes and thus these movements partly offset each other. Those changes, on the other hand, which are responses to the pull of world demand tend to occur simultaneously in two or more export classes, reinforcing each other. Hence the agreement of total exports and WIC is better than the average agreement of their parts.

Another feature brought out by the comparison of rates of change is the shift in the relation of exports to world imports from before to after World War I. This shift toward closer agreement is manifest in conformity indexes and amplitudes of manufactures as well as crude material exports, and it stands out clearly in the ratios of rates of change. The shift is largest by far in the quantity of crude material exports, where the ratio rises from 21 to as much as 50 per cent.

The rise between the two periods in the proportion of variation in total export quantity accounted for by world cycles (from 47 to 73 per cent) is thus due in part to the closer agreement of crude materials with world trade in more recent years and to the rising weight of manufactures exports, which follow the movements in foreign demand more faithfully than other types of goods. In other words, the growing agreement of movements in the total quantity of U.S. exports with those of foreign imports is due mainly to the change in the commodity composition of these exports to more demand-determined goods and to the reduced interference of U.S. business cycles with exports of crude materials.[6]

[5] Rank correlation of total export quantity (TEQ) and world import amplitudes in world expansions and contractions yield coefficients (Kendall's) of +.45 for the earlier and +.50 for the later period.

[6] The shift toward closer relation between U.S. exports and world imports in the later cycles cannot be explained by the increased weight of U.S. exports in

The measures considered so far take into account only the change in exports between turning points. They are supported, and further insight is gained, by observation of changes in export quantities from stage to stage of world import cycles. Table 9 shows the percentage of the four stage-to-stage movements in each world expansion in which exports rise; the percentage of the four stage-to-stage intervals of contraction in which exports fall; and the average percentage for expansions and contractions combined. In contrast to the ratios in Table 8, these figures are thus independent of the amplitudes of the export movements and independent of our selection of export peaks and troughs. They depend entirely on the direction of the short steps in exports between stages in world import cycles.

Comparison between percentages of conforming changes and ratios of rates of change shows that the two sets of measures support each other (Table 9, last column, and Table 8). Both reveal similar interperiod and interclass differences in the impact of world cycles on U.S. exports. As before, conformity is lowest for crude materials in the earlier period, and this class experiences the sharpest shift over time. Again export changes in all commodity classes are considerably more independent of world demand in 1881–1913 than in 1921–59. The percentages of stage-to-stage conformity further agree with the amplitude ratios in showing a greater difference in behavior between the earlier and later cycles in total exports than might be expected from the figures for the classes; and the reasons are the same: the larger weight of manufactures in the later period plus the increased dependence of crude materials on world cycles.

Glancing back at the conformity indexes of Table 7, we note similar evidence of trends in both measures. Exports of manufactures grow almost without exception between any two stages of world expansion in both periods, but decline only in about half of the contraction intervals. Food exports, on the other hand, tend to move with world imports in contractions but not in expansions.

The percentage of conforming stage-to-stage movements is, of course, very sensitive to leads and lags of exports at world peaks and

world imports. When these exports are excluded from world imports, the turning points in the remaining imports of foreign countries from each other are found to be the same as those in our WIC. Hence measures which are based on these turning points would not be affected by the exclusion of U.S. exports.

The shift could be accentuated by errors in the data for the earlier period which could reduce agreement between U.S. exports and world imports. However, this factor plays a minor role, at most, as shown by the fact that some of the export series are already very closely related to world imports before 1913.

TABLE 9

World Import Cycles: Direction of Stage-to-Stage Change in U.S.
Exports and in Domestic Wholesale Prices, 1881-1959
(number of conforming changes as per cent of
total number of changes)

	Expansion	Contraction	Full Cycle
	1881-1913		
Export quantities			
Total	68	58	63
Finished manufactures	89 (85)	42 (58)	67 (79)
Crude materials	57 (71)	58	58 (62)
Foods	54 (57)	83 (77)	67 (69)
Export values			
Total	71	83	77
Finished manufactures	86	67	77
Crude materials	68	62	65
Foods	64	88	75
Export prices			
Total	64	83	73
Finished manufactures	39 (57)	75 (76)	56 (71)
Crude materials	61	75	67
Foods	61	62	62
Domestic wholesale prices	57	67	62
	1921-1959		
Export quantities			
Total	95	71	82
Finished manufactures	100 (92)	56 (64)	76 (81)
Semimanufactures	85	71	77
Crude materials	70	71	70
Foods	65	75	70
Export values			
Total	90	75	82
Finished manufactures	100	67	82
Semimanufactures	90	75	82
Crude materials	80	83	82
Foods	60	79	70
Export prices			
Total	62 (70)	81 (78)	73 (75)
Finished manufactures	50 (57)	50 (57)	50 (57)
Semimanufactures	70	83	77·
Crude materials	55 (70)	88 (79)	73 (77)
Foods	50 (70)	79 (76)	66 (75)
Domestic wholesale prices	65	79	73

Notes to Table 9

Measures allowing for leads and lags when different from measures for coincident timing are given in parentheses. A lead or lag is defined here as a majority of nonconforming movements during stages before or after cyclical turns.

Coverage: There are four stage-to-stage changes in each expansion and contraction. Seven expansions and six contractions are covered in 1881-1913; five expansions and six contractions in 1921-59.

See notes to Table 7.

troughs. To determine the extent of the influence of this factor, we have computed a second set of figures showing the highest percentage of conforming stage-to-stage movements which can be obtained by allowing for each series' average leads or lags at world peaks and troughs.[7] In this way slightly higher percentages are obtained in some instances, but in full cycles a major difference appears in only one case: finished manufactures during the period before 1913.[8] If allowance is made for a lead of this series by one-half of the contraction phase before world import troughs, the percentage of conforming changes during full cycles rises from 67 to 79. This shows the considerable effect of the rising trend of this type of exports in reducing their conformity to world cycles, as was noted above for the conformity indexes.[9]

2. Export Prices and Values

The next question is whether the movements of U.S. export values agree with the swings in world imports as well as, or even better than, those of export quantities, or whether divergent price changes reduce the conformity of values below that of quantities. Apart from the general importance of the behavior of the dollar values of exports, this question is also of interest in our interpretation of the parallelism between exports and world imports. The hypothesis

[7] See note to Table 9.

[8] This does not conflict with the high frequency of leads and lags noted in Chapter 5. Many of these timing differences are too short to affect the direction of stage-to-stage changes.

[9] It should be noted that the column headed full cycle in Table 9 presents merely averages of expansions and contractions and thus is affected by trends as much as its components. This is in contrast to the conformity indexes for full cycles in Table 7 which are based on relative rates of change and hence are independent of trends.

that the fluctuations in export quantities are caused by those in world demand is strongly supported if prices are found to move in a similar fashion.

Our observations on export prices indicate that in general their behavior does accord with the hypothesis. Prices of all export classes rise in world expansions and fall in contractions in about three out of every four instances during the full period 1881–1959. Table 10 shows that exceptions are rare in the declining phase but fairly frequent in the rising phase of the WIC. The average conformity index for all classes, phases, and periods combined is +53 for prices compared with +59 for quantities, indicating that export prices are by this standard about as closely related to the WIC as export quantities.[10]

Secular trends in export quantities greatly resemble world import trends, while trends in export prices follow a different course. Hence elimination of trend effects should improve the conformity of prices more than that of quantities. That this is not the case (see the full-cycle conformity indexes) suggests that forces other than trends interfere with the conformity of prices. Export prices failed to rise more or fall less in expansions of world trade than in preceding and succeeding contractions in twelve out of the seventy-two instances observed against nine such lapses in export quantities. The poorest agreement with WIC was shown by food export prices, which failed to react to two mild WIC cycles in the early years. This also accounts for the low index of total export prices for 1881–1913.

However, these discrepancies should not blind us to the striking fact that export prices as well as quantities follow the pull of world demand in the great majority of instances. It is particularly noteworthy that the rate of growth of total export prices fell without exception in world contractions in 1921–59, despite timing disparities between U.S. and foreign cycles and the small share of exports in total U.S. output.

That prices and quantities both conform well to world imports suggests that the WIC is, on the whole, representative of the foreign demand for the various classes of exports. Its influence thus resembles that of the domestic business cycle on domestic output and prices, which also have been found to respond with about equal regularity.[11]

[10] What was said above about leads and lags of export quantities applies also to export prices and values.

[11] For U.S. business cycles, see Wesley C. Mitchell, *What Happens During Business Cycles*, NBER, New York, 1951, p. 173.

TABLE 10

World Import Cycles: Change in U.S. Export Prices and Domestic Wholesale Prices, 1881-1959

	U.S. Export Prices					Domestic Whole sale Prices
	Total	Finished Manu- factures	Semi- manu- fac- tures	Crude Mate- rials	Foods	
			1881-1913			
Conformity index						
Expansion	+71	-14	--	+14	+71	+43
Contraction	+67	+83	--	+33	+67	0
Full cycle	+33	+83	--	+50	+33	+50
Average total per- centage change						
Expansion	+5.9	+0.2	--	+7.9	+6.4	+3.6
Contraction	-6.8	-4.4	--	-8.0	-5.4	-3.8
Full cycle	12.7	4.6	--	15.9	11.8	7.4
Average annual per- centage change						
Expansion	+1.7	+0.1	--	+2.2	+1.8	+1.0
Contraction	-5.3	-3.4	--	-6.2	-4.1	-2.9
Full cycle	2.5	0.9	--	3.2	2.4	1.5
			1921-1959			
Conformity index						
Expansion	+60	+20	+100	+60	+20	+60
Contraction	+100	0	+100	+100	+100	+67
Full cycle	+100	+56	+100	+100	+56	+100
Average total per- centage change						
Expansion	+4.9	+0.4	+11.5	+7.9	0	+5.7
Contraction	-6.4	-0.1	-9.3	-12.4	-12.9	-4.4
Full cycle	11.3	0.5	20.8	20.3	12.9	10.1
Average annual per- centage change						
Expansion	+1.6	+0.1	+3.7	+2.5	0	+1.8
Contraction	-4.7	-0.1	-6.9	-9.2	-9.5	-3.3
Full cycle	2.7	0.1	4.8	4.9	3.3	2.3

Note: See notes to Table 7.

The role of the WIC can be further clarified by combining the individual observations on prices and quantities. A simultaneous fall in the rate of change in both prices and quantities of a class of export goods in an individual world contraction signifies that foreign demand for this type of goods actually did fall with world imports. Conversely, the WIC could not be regarded as representative of foreign demand in a case where the rates of change of both prices and quantities of a class of exports increased during a given world contraction. That there is not a single instance of this type in the whole long period covered, despite the marginal character of some world cycles, testifies to the suitability of the WIC as an indicator of the foreign demand for U.S. goods.

Those instances, occurring mostly in the earlier period, in which either the quantity or the price of a class of exports failed to conform to the WIC, indicate the influence of forces on the supply side and/or the impact of domestic demand. In such cases, we cannot be certain that foreign demand for that class of exports moved with the WIC, but it may well have done so. For instance, if prices of crude materials decline during a world contraction but the quantity exported does not, this may be due to a simultaneous fall in the domestic and foreign demand for these goods and thus may reflect the effect of both the domestic and the world import cycle.

With prices and quantities moving in general in the same direction as world imports, export values, of course, conform even better to the WIC than quantities (see the conformity indexes, Table 11). There are only eleven instances among eighty-three observations during both periods covered when the value of one commodity class or another moves in the opposite direction to world imports. The average conformity index for export values is +73 as against +59 for quantities and +53 for prices. Lapses are due almost exclusively to quantities, while aberrant price changes are not large enough, with one exception, to cause export values to deviate from world imports.[12]

When the effects of trends are removed (full-cycle index of conformity), the high degree of agreement between movements of U.S. export values and world demand appears even more striking. There are only five instances among seventy-two observations when the rate of change of the value of a class of exports rises less or falls

[12] The close relation of the total value of U.S. exports to total world imports during the interwar period has been noted and commented on by Hal B. Lary in *The United States in the World Economy, Dept. of Commerce,* Economic Series No. 23, Washington, 1943.

TABLE 11

World Import Cycles: Change in U.S. Export Values and World Imports, 1881-1959

| | U.S. Export Values | | | | | |
	Total	Finished Manu-factures	Semi-manu-fac-tures	Crude Mate-rials	Foods	World Imports
			1881-1913			
Conformity index						
Expansion	+71	+100	––	+71	+43	––
Contraction	+100	+33	––	+67	+100	––
Full cycle	+100	+83.	––	+100	+83	––
Average total per-centage change						
Expansion	+30.5	+32.4	––	+26.9	+19.4	+25.0
Contraction	−19.3	−5.1	––	−10.0	−22.3	−8.3
Full cycle	49.8	37.5	––	36.9	41.7	33.3
Average annual per-centage change						
Expansion	+8.6	+9.2	––	+7.6	+5.5	+6.7
Contraction	−15.0	−4.0	––	−7.7	−17.2	−6.4
Full cycle	10.1	7.9	––	7.6	⸜ 8.3	6.6
			1921-1959			
Conformity index						
Expansion	+100	+100	+100	+60	+60	––
Contraction	+100	+67	+100	+67	+67	––
Full cycle	+100	+56[a]	+100 .	+100	+78	––
Average total per-centage change						
Expansion	+38.9	+35.7	+54.6	+40.9	+24.2	+38.9
Contraction	−23.0	−8.7	−33.2	−40.7	−21.0	−17.6
Full cycle	61.9	41.4	87.8	81.6	45.2	56.5
Average annual per-centage change						
Expansion	+12.5	+11.4	+17.5	+13.1	+7.7	+12.5
Contraction	−17.0	−6.4	−24.6	−30.2	−15.5	−13.1
Full cycle	14.0	9.7	20.0	19.1	10.5	12.7

Notes to Table 11

Coverage: Exports: For 1881-1913, seven expansions and six contractions; for 1921-59, five expansions and five contractions for conformity index, and four expansions and six contractions for percentage changes. World imports: For 1883-1913, six expansions and six contractions; for 1921-59, four expansions and five contractions.

See notes to Table 7.

aIf a one-stage lag of exports at business cycle peaks is allowed for, the index is +78.

more in a world expansion than in an adjacent world contraction. The agreement is perfect in crude materials and semi-manufactures exports. The few lapses in foods and manufactures do not prevent 100 per cent conformity of the total export value.[13]

In other words, we have found that the close agreement of the changes in the total value of U.S. exports with those in world imports reflects, in the first place, the fact that its components—prices and quantities of each major export class—move essentially in the same direction as world imports. The second factor behind the high conformity of export values is that even when the rate of change of prices of a class of exports does rise during world contraction, this is often outweighed by a larger fall in the rate of change of quantities sold. In nine out of twelve instances, the value movement is kept in line with world imports in this fashion. *Mutatis mutandis,* the same holds true in seven out of nine cases, when an export quantity moves against the WIC. Finally, on those rare occasions when the value of a class of exports does manage to rise more or fall less in a world contraction than in an adjacent world expansion, these movements are always outweighed by the conforming ones of other export classes so that total export value never deviates. This is the counterpart of the behavior of aggregates and their components in the domes-

[13] Of the five instances in which an export value failed to conform to the WIC, three occurred in the value of finished manufactures. Two of these are due to the fact that in 1925–26 finished manufactures export values (MEV) rose a little more during the world contraction than in the preceding and following expansions, which in turn reflects the rise in finished manufactures export prices (MEP) during 1925–26 largely as a consequence of the British coal strike. The third case is also due to the nonconformity of MEP to the mild world cycle of 1893–95. These lapses of prices also account for the fact that the conformity of MEQ is higher than that of MEV.

The remaining two instances of nonconformity of an export value to WIC took place in foods and are due to quantity, not to price. They are caused by the exceptional harvests here and abroad, first in 1881 and second in 1937 and 1938. In the latter years, preparations for World War II also played a role.

tic economy where, as Mitchell found, the former also conform more closely to business cycles than the latter. Mitchell's explanation that "the wider the variety of activities included in a series, the more mutual offsetting will occur among irregular movements of less than economy-wide incidence," also holds for exports in their relations to the world economy.[14]

That export values fluctuate in closer agreement with world cycles than quantities can be seen even more clearly by measures of amplitudes of rise and fall than by conformity indexes. The average increase in the value of a given commodity class of exports during world expansions is found to exceed, as a rule, the corresponding quantity increase and the same holds for the decline in contractions. The average total up-and-down swing in export values during a cycle in world imports ranges from about 37 to about 88 per cent of the level of these exports, depending on the commodity class and the period covered (Table 11). This is considerably more than the 19 to 67 per cent range of quantity amplitudes. It represents a fairly high degree of cyclical instability, particularly in view of the fact that the 1929–37 cycle has been excluded from these measures.[15]

Export prices move upward, on the average, during world expansions and downward in contractions, as the signs in Table 10 indicate. Their rise and fall, of course, accounts for the difference between value and quantity amplitudes. But export prices change, in general, far less during world cycles than export quantities. Prices of finished manufactures show almost no response in the later cycles by this standard, and their amplitude in the earlier ones is small. Variation in other export classes and total exports does not exceed about 40 per cent of that in quantity, except for crude materials in the earlier period where the rate of change of prices reached nearly 80 per cent of the quantity rate.[16]

These results shed additional light on the issues discussed in Chapter 3. It was shown there that the quantities of U.S. primary goods exports fluctuate far more strongly than the prices, contradicting the common view that prices, not quantities, of such goods bear the brunt of adjustments. Now the present findings show that not only

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[14] *What Happens During Business Cycles*, p. 98.

[15] For measures of cyclical amplitudes of domestic business in domestic business cycles, see *ibid.*, p. 103.

[16] Movements of domestic wholesale prices between turns in WIC tended to be even milder than those of total export prices. The difference between the amplitudes of the two price indexes is pronounced before 1913, but slight in later years. (See Chapter 7.)

the total instability but also that part of it which represents reaction
to movements in foreign demand is greater in quantity than in price
of primary exports. Thus the accepted view is in error in under-
estimating the role of supply shifts and, more importantly, in under-
estimating the extent to which primary goods exports vary in response
to price changes (export supply elasticities).

But the measures also uncover an element of truth in the common
view: the ratio of quantity to price changes during world import
cycles is, indeed, very much higher in manufactures exports than in
primary goods. In the former, price changes are negligible and
adjustment occurs almost only in quantity, while changes in crude
materials and foods prices, though smaller than corresponding quan-
tity changes, are considerable. The effect of a change in world demand
is in all export classes mainly a change in quantities exported, but in
crude materials and foods exports it is also, to a lesser extent, a
change in prices.

During domestic business cycles domestic prices also vary less than
physical output, but the difference is not as great as in exports. This
is a sensible result. It suggests that in the United States, at least, a
change in foreign demand is likely to be met primarily by increased
or reduced shipments abroad and to have a relatively slight effect
on prices. A swing in the vastly larger domestic demand, however,
is less easily absorbed by supply and thus causes considerable adjust-
ments of domestic prices.[17]

The greater independence of export prices from WIC compared
with export quantities is revealed even more clearly by the measures
in Table 12. They show that the change in prices between world
peaks and troughs is only a moderate part of their change between
price peaks and troughs. The ratio for total export price (TEP) is only
34 per cent in 1881–1913 and 38 per cent in 1921–59.[18] As one would
guess, finished manufactures export prices (MEP) are more inde-
pendent of WIC than prices of other types of goods and more inde-
pendent in the later than in the earlier period. The low ratio of 14

[17] The relative shift in total demand for a good which is caused by a given
shift in world demand must be greater the higher the ratio of world to domestic
demand. Hence, with any given supply elasticity, prices of goods a large part of
which is exported should vary more with world cycles than prices of goods of which
little is exported. This may contribute to higher ratios of rates of change for crude
materials and foods compared with manufactures. (On this point, see also Chapter
7, Section 4).

[18] The ratios in line e of Table 12 are based on rates of change in price cycles
during whatever period is closest to that of the WIC. The period covered by the
WIC ends in 1959.

TABLE 12

U.S. Export Prices and Domestic Wholesale Prices: Comparison of Rates of Change During Domestic Business Cycles, World Import Cycles, and Price Cycles, 1880-1961

	U.S. Export Prices					Domestic Wholesale Prices
	Total	Finished Manu-factures	Semi-manu-factures	Crude Materials	Foods	
Average annual percentage change during full cycles, 1880-1913						
a. Domestic business cycles	2.1 (3.3)	0.6 (2.7)	—	2.6 (5.1)	1.9	3.1
b. World import cycles	2.8	1.2	—	3.7	2.4	1.6
c. Price cycles	8.2	5.4	—	12.7	8.3	7.4
d. Ratio of a to c (per cent)	25.61 (40.24)	11.11 (50.00)	—	20.47 (40.16)	22.89	41.89
e. Ratio of b to c (per cent)	34.15	22.22	—	29.13	28.92	20.27
Average annual percentage change during full cycles, 1921-61						
a. Domestic business cycles	2.6	2.8	5.9	0.0	0.7	2.3
b. World import cycles	2.1	0.6	4.2	4.0	2.0	2.4
c. Price cycles	4.9	3.9	8.2	12.5	10.6	4.7
d. Ratio of a to c (per cent)	53.06	71.79	71.95	0.16	6.60	48.94
e. Ratio of b to c (per cent)	38.18	13.64	48.83	32.00	18.87	51.06

Note: Measures in parentheses refer to lagged prices. 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 midst of the following expansion is the contraction amplitude.

See notes to Tables 7, and 13.

per cent in 1921–59 indicates that most of the change in MEP is not related to world cycles, as is reflected also in the fact that the ratio of rates of change in 1921–59 is higher for MEQ than for finished manufactures export values (MEV). It is also not surprising, in view of the role of governmental policies in their determination, that foods export prices (FEP) in more recent cycles undergo considerable variation not accounted for by the WIC. On the other hand, about 30 per cent of the fluctuations in FEP during the early period and of crude materials export prices (CEP) throughout take place between turning points in WIC and the ratio is still higher for semimanufactures export prices (SEP). In one instance only, i.e., crude materials in the early period, is a larger part of export price than of export quantity movements explained by the world cycles according to this standard. Comparison of the conformity indexes of CEQ and CEP confirms this result.[19]

The percentage of the total cyclical fluctuation in export value which is accounted for by the world import cycles is higher than the corresponding percentages for quantities and prices in all instances but one (Table 13). This tells us that it is not so much the greater cyclical instability of values which causes their amplitudes in WIC to exceed those of quantities and prices, but their closer agreement with movements in world cycles. This closer agreement is revealed more clearly by the ratios than it was above by the conformity indexes. It should be noted how large a proportion of the variation in export values is accounted for by the cycles in world demand. Among the commodity classes, the highest percentage is obtained for semimanufactures and finished manufactures, where roughly two-thirds of the total movement is explained by the WIC in either of the periods. For the total value of exports, the ratio for 1921–59 rises to a striking 80 per cent. The difference between value and quantity ratios is largest, of course, when prices conform better

[19] Domestic prices were, according to Tables 10 and 12 about as closely related to the WIC as total export prices in either period. This is the most plausible conclusion to be drawn from our measures, some of which show domestic prices and others show export prices to agree somewhat more closely with WIC. (See Chapter 7, Sections 4 and 5.)

The figures in Tables 10 and 12 suggest that our price series are reasonable. Thus the rate of change of the weakest series—prices of finished manufactures in the later period—is 3.9 per cent in MEP cycles. This does not seem too low in view of a rate of 4.7 per cent for domestic wholesale prices. Further, as much as 72 per cent of the change in MEP in the later and 50 per cent in the earlier period is accounted for by the domestic business cycle, a result that would hardly be obtained if there were large random elements in the series.

TABLE 13

U.S. Export Values: Comparison of Rates of Change During Domestic Business Cycles, World Import Cycles, and Value Cycles, 1880-1961

	Total	Finished Manu-factures	Semi-manu-factures	Crude Materials	Foods
Average annual percentage change during full cycles, 1880-1913					
a. Domestic business cycles	0.8	2.9	—	-4.7	4.3
b. World import cycles	10.1	8.1	—	8.6	10.3
c. Value cycles	17.5	11.3	—	18.9	23.4
d. Ratio of a to c (per cent)	4.57	25.66	—	-24.87	18.38
e. Ratio of b tc c (per cent)	57.71	71.68	—	45.50	44.02
Average annual percentage change during full cycles, 1921-61					
a. Domestic business cycles	7.4	9.2	12.1	7.6	1.3
b. World import cycles	14.0	9.7	20.0	19.1	13.4
c. Value cycles	17.5	15.3	27.2	32.8	39.8
d. Ratio of a to c (per cent)	42.29	60.13	44.49	23.17	3.27
e. Ratio of b to c (per cent)	80.00	63.40	71.94	58.23	33.67

Note: Measures for different series cover different time periods depending on each series' cyclical turns in the years 1880-1913, 1921-29, 1937-38, and 1947-59. Measures for U.S. business cycles and world cycles cover whatever period is closest to that delimited by each series' turns. They may thus differ from corresponding measures given in other tables.

See notes to Table 7.

than quantities. This is the case with crude materials in the earlier period where the ratio rises from 21 per cent for quantity to 46 per cent for value.[20]

Above it was found that export quantities are tied more closely to world cycles after World War I than before. It is of interest to find out to what extent this shift in the behavior of "real" trade volume is also to be found in its dollar value.

The conformity indexes do not disclose any such shift. They are, for values, too high already in the earlier period to leave much room for improvement. The index for finished manufactures is even somewhat lower in the later period than in the earlier one. The shift does appear, however, in measures of amplitudes of rise and fall of export values during WIC. These movements are decidedly larger after than before World War I. But the shift in values is considerably smaller than that in quantities. It is reduced by the behavior of prices which are, if anything, tied less closely to WIC by this standard in the later period than in the earlier one, despite the better agreement between domestic business cycles and WIC in more recent cycles.

The ratios of rates of change in WIC to rates of change in value cycles point to similar conclusions. The greater independence from world demand shown by the prices of finished manufactures and foods in later years explains the fall in the ratios of rates of change of MEV and FEV. Only in crude materials exports is the better agreement (higher ratio) in the later period not offset by a looser relation (lower ratio) in prices, so that the percentage of CEV variations accounted for by the WIC is higher in 1921–59 than in 1881–1913.

That as much as 80 per cent of the changes in the total value of exports in 1921–59 occur between peaks and troughs of world cycles, compared with 58 per cent in 1881–1913, can be attributed mainly to two factors. First is the greater weight of finished manufactures in the total. Although the value of this class of exports conformed less well to WIC in the later than in the earlier period, it still conformed better than the values of crude materials and foods even then and thus raised the ratio of total exports. The second factor is the changed behavior of the quantity of crude materials exports, which causes the percentage of movements of CEV in WIC to rise from 46 in the earlier cycles to 58 in the later cycles.

In short, the closer agreement between total export value and WIC in the later period is due, as in the case of total export quantity,

[20] For a comparison of amplitudes of TEV with those of world imports, see my *American Exports During Business Cycles, 1879–1958,* Occasional Paper 76, New York, NBER, 1951.

to the greater weight of manufactures and the increased response of the quantity of crude materials exports to world cycles. Export prices, on the other hand, play a more important role in the earlier years, when they contribute more to the agreement between export value movements and world import movements than they do later on.

All these findings, which have relied on the rise and fall of export prices and values between cycle turning points, can be checked by observations of behavior within cycle phases in the fashion applied above to export quantities. Again, the measures in Table 9 confirm in general those in Tables 12 and 13. The responsiveness of the various price indexes in the two periods to fluctuations in world imports shows a very similar pattern whether measured by the number of conforming stage-to-stage movements or by the ratio of rates of change.

The percentage of stage-to-stage movements in the direction of the WIC is lowest for prices of manufactures among the commodity classes. Food prices take an intermediate position, while semimanufactures and crude materials prices rise and fall in more than two-thirds of all instances with world demand. As between the two periods, we note again that MEP conform even less well in the later than in the earlier one. In fact, only one-half of their movements in 1921–59 are upward in world expansion or downward in contraction, which agrees well with the very low ratio of 14 per cent in Table 12.

The percentage of conforming movements in total export prices is the same (73) in the later as in the earlier period. In either one it is higher than a weighted average for the component classes would be. This again is consistent with the information obtained from the rate of change ratios, namely, that the aggregate tends to conform better than its parts.

The previous finding that export prices are less closely related to WIC than quantities are not quite as clear in the stage-to-stage percentages (Table 9) as in the rate of change ratios (Tables 8 and 12). While only one of the ratios, that for crude materials in the early period, was higher for price than for quantity, the stage-to-stage movements agree better with the WIC for price than for quantity also for crude materials in the later cycles and for total exports in the early period. These discrepancies signify that some of the nonconforming changes in CEP and TEP were very large, affecting the ratios more than the number of interstage changes.

When allowance is made for leads and lags of prices at turns in world imports in the same fashion as above for export quantities, the percentage of conforming interstage movements becomes considerably

higher in some instances.[21] Since similarly adjusted percentages for quantities are also higher, however, comparisons between price and quantity figures yield the same results as without the timing adjustment, with the single exception of food exports in the later period.

Altogether, the comparison of intracycle patterns of export quantities and prices indicates that, in manufactures exports, quantity responded far more strongly to world demand than prices; that the same relation prevailed in foods exports but with a much smaller margin in favor of quantity; that the opposite is true of crude materials in the early period, where prices are more closely tied to WIC than the quantity exported, while the evidence is mixed with respect to CEQ in the later period.

Examination of the stage-to-stage movements in export values shows them to accord with the preceding findings. The short-run intracycle fluctuations in export value are, for the most part, in agreement with the WIC. Despite some differing trends, as much as 82 per cent of the movements in total exports and in all commodity classes except foods in 1921–59 are in the direction of the world cycles. Values again agree better, by this standard, in most instances than do quantities or prices.

Differences among commodity classes are somewhat blurred in Table 9 due to trend effects, but the relatively poor agreement of CEV in the earlier and FEV in the later period stands out again. Also confirmed is the fact the TEV responds more regularly to WIC than the average of the component classes.

The shift toward closer conformity to WIC in the later period stands out clearly in Table 9 and is again largest for crude materials. Food exports, however, followed the course of world imports more faithfully before than after World War I, as was also shown by the rate of change ratios. Their divergent behavior explains the relatively mild shift in the conformity of total export value from the earlier to the later period.

The timing of export values agrees too well with that of WIC for adjustments to have any effect on the results.

3. *Summary*

The investigation of the relation of U.S. exports to the rest of the world's imports reveals, first of all, that the real volume as well as

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[21] The difference is largest in MEP in 1881–1913, which began to rise in mid-expansion only. Allowing for lags at troughs also increases the figure for FEP considerably in 1921–59.

the prices, and consequently the dollar value, of all commodity classes of exports rise and fall in most instances together with world imports during the full period, 1881–1959. Not only are export quantities, prices, and values typically higher at world import peaks than at world import troughs, but they also typically grow from stage to stage during world expansions and shrink from stage to stage of world contractions. In those instances in which a strong secular trend offsets a cyclical swing, the influence of world cycles appears as a retardation of export increase or decline.

The amplitudes of rise and fall between turning points in world imports are large in export values, smaller in quantities, and much smaller in prices in all commodity classes during the full period. This means that the response to a change in foreign demand is, as a rule, primarily a change in quantities shipped and to a lesser extent only a change in prices, in crude materials and food exports as well as in exports of manufactures.

This substantiates and extends what was shown in Chapter 3: that quantities fluctuate more than prices in primary goods exports too, widely held views to the contrary notwithstanding. The present chapter finds that not only the total instability but also the part of it which is demand-determined is substantially greater in quantities than in prices of primary goods exports. The common view evidently underestimates not only the role played by shifts in supply but also the supply elasticities of primary goods exports.

In domestic business cycles, the response of output is in general larger than that of prices. But the difference is smaller than that between reactions of export quantities and prices to the WIC. The plausible conclusion is that swings in foreign demand can be more easily met by increased or reduced shipments abroad than changes in the vastly larger domestic demand can be absorbed by adjustments of output. Hence the price effects of the latter are relatively larger than those of the former.

Factors other than world cycles play, with one important exception, a greater role in fluctuations of export prices than in those of quantities. This can be seen in the fact that quantity movements are not only larger during world cycles than price movements are, but also constitute a higher proportion of the total variation in export quantities than the corresponding price movements do of the total variation in export prices. These prices are, of course, closely linked to domestic prices, and hence are subject to strong influences from the domestic business cycle, as will be disclosed in subsequent chapters.

World cycles, on the contrary, account for a large slice of the total cyclical variation in export quantities.[22]

Export value movements may be expected to differ even less from WIC than quantity movements because the forces which at one time or another cause export quantities to diverge from the path of world imports often affect export prices in the opposite fashion, and conditions which prevent prices from conforming to world cycles need not interfere with export quantities. World demand, on the other hand, pulls quantities and prices in the same direction and therefore produces large changes in corresponding values. Hence the share of variations in value accounted for by world cycles exceeds even that for quantities.[23] For total export value, in 1921–59, the ratio reaches a high mark of 80 per cent.

So far features common to all types of exports have been summarized. When the differences among commodity classes are examined, we find the element of truth contained in the common views on export instability. Though quantity responds more strongly than price to shifts in demand in all export classes, the ratios of quantity to price changes during world cycles *are* substantially higher for manufactures than for primary goods. In quantities of manufactures exports a larger part of variations is due to world demand than in crude materials or foods. Prices of manufactures exports, on the contrary, are more independent of foreign cycles than other export prices. The opposite is true for crude materials exports, where more of the price and less of the quantity variations are related to world import cycles than in other classes. Food exports occupy, in general, an intermediate position. Thus, adjustments in manufactures exports occur almost entirely in quantities with negligible price changes, while in crude materials and foods, price changes, although smaller than quantity changes, amount to from one-third to three-fourths of the latter.

The contrasts in quantity and price reactions according to type of commodity reflect different supply situations and the different impact of domestic business cycles. Supply of finished manufactures is evidently highly elastic, and domestic demand does not interfere with the free reaction of quantities shipped to changes in foreign demand.

[22] There is one important exception to the rule that a larger proportion of the change in quantities than of prices is accounted for by the WIC: the change in CEQ during WIC in 1881–1913 was only 21 per cent of its total cyclical change, while the ratio for CEP was 29 per cent.

[23] The exception is MEV in 1921–59, with a ratio below that for MEQ.

For the same reason, manufactures prices remain relatively unaffected. Supply of crude materials, on the other hand, is less elastic. In addition, domestic demand for such goods has larger fluctuations and competes more strongly with exports, as will be shown in later chapters. Hence export quantities here conform less well and prices better to variations in foreign demand than in other commodity classes.

In view of the relatively inelastic supply of foods, it may be puzzling that the quantity of foods exports should, at least in the earlier period, be more closely and their prices, during the full period, less closely related to world cycles than those of crude materials. The explanation for the cycles before World War I lies largely in the much stronger influence of fluctuations in home demand on exports of crude materials than on food exports. The greater independence of food prices in more recent years, however, may be attributed to government intervention.

It follows from the preceding analysis that the behavior of the different types of export commodities during world import cycles is more uniform in terms of dollar values than in terms of quantities and prices. In the case of finished manufactures, high conformity reflects mainly quantity movements tracing the swings of world cycles, while in the case of crude materials and of foods in the earlier years the conformity of values owes a good deal to prices moving with the tides of world trade.

The agreement of total exports and world imports is better than the average agreement of export classes. This holds for prices, quantities, and values. It is due to the fact that fluctuations which are not caused by foreign demand tend to occur in one class at a time and thus to be outweighed by changes in other classes. Responses to the pull of world demand, on the other hand, occur as a rule simultaneously in more than one class, thus reinforcing each other. In this way the cyclical change in total export value accounted for by the world cycles climbs to a high of 80 per cent during 1921–59.

Finally there is the question whether the relation of exports to world cycles has shifted over time. Fluctuations in the quantities of all classes of exports goods are found to agree decidedly better with those of world trade after than before World War I. The sharpest shift of this sort took place in the quantity of crude materials exports.

Evidence for this shift is found in each one of our measures. Export quantities move more regularly in the direction of world imports in the later period, their swings in world cycles have wider amplitudes,

and these swings account for a higher proportion of their total varia-
tion.

In contrast to the volume of shipments, the prices of the various
classes of exports are not, in general, tied more closely to later than
to earlier world cycles. Though the findings differ somewhat in this
case depending on the yardstick we apply, the over-all impression is
that prices of manufactures exports are even more independent of
foreign fluctuations in the later period than in the earlier one, that
food prices too are less closely related, and that only prices of crude
materials seem to agree slightly better than before.

The aforementioned shifts were not to be expected from the rela-
tion of world to domestic cycles. On the contrary, if the domestic
business cycle exerts a countervailing influence on export quantities
and a reinforcing one on export prices, the closer parallelism of
foreign and domestic fluctuations in the later period should reduce,
not improve, the conformity of export quantities and improve, not
reduce, the conformity of export prices. This conflict between obser-
vations and expectations will be explained, in part at least, by findings
of later chapters. We shall find that the weakening of the impact
of U.S. business cycles on exports outweighs the effects of closer agree-
ment between U.S. and foreign fluctuations.

Due to the counteracting influence of prices, the shift toward closer
conformity is much less pronounced in export values than in export
quantities. Crude materials is the only one of the commodity classes
which clearly also agrees better in value terms with world cycles in
the later than in the earlier period.

This does not prevent movements in total export value, however,
from agreeing better with movements in foreign demand after World
War I than before. The seeming contradiction is due to the much
larger role of finished manufactures in the more recent period. Even
if this class conforms a little less well in the later than in the earlier
cycles, it conforms far better than other classes, and thus its greater
weight pulls total exports toward greater conformity. In other words,
the immediate causes of the shift toward closer association between
the total value of U.S. exports and world imports are twofold: first,
the shift in commodity composition in favor of goods with more
controllable supply which move more readily with foreign demand;
second, the change in the behavior of the quantity of all export
classes, but primarily of crude materials which is in turn due largely
to the reduced role and changed behavior of cotton exports.