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Instability of U.S. Exports: Comparison of Prices, Quantities, and Values

Before starting the main analysis, in this chapter we shall extract from the data all possible information on the general nature of export instability. Interest is centered here, unlike in the rest of the book, on the cyclical instability of U.S. exports, regardless of whether or not it is associated with U.S. business cycles.

For their effects on general economic stability and growth, fluctuations in earnings from exports have long been of concern to policy makers. Yet very little is known about the sources and nature of these fluctuations; proposals for stabilization thus rest on shaky foundations and are highly controversial. The problem has not "received even a tiny fraction of the amount of professional talent that has gone into the study of the domestic aspects of the problem of economic instability. . . ." [1]

For instance, are the often made assertions true that instability is a problem confronting mainly exporters of primary goods and not sellers of industrial goods or that the fluctuations of receipts from primary goods are due to their prices rather than to their volume?

Recently several important studies have thrown some light on these questions. But, as will be seen later, their results partly contradict each other. Some of them also conflict with widely accepted views which have not as yet been reconsidered. Although this study is confined to the United States, comparison with those for other countries helps to resolve some of the contradictions and to obtain a clearer picture. The analysis is based on the rates of change in Tables 3, 4, and 5. We begin, however, with a brief glance at the other measures in these tables and at Charts 2–15.

Pronounced cyclical swings in values, quantities, and prices of exports stand out clearly in Charts 2–15 during most of the nearly seventy years covered. The average length of these swings in most series is the same as that of domestic economic series—three to four

[1] Joseph D. Coppock, *International Economic Instability*, New York, 1962, p. 15.

and a half years. Thus, the fact that exports are subject to foreign *and* domestic influences does not cause them to change their course more often than domestic branches of the economy do. Deviations from the rule are on the long rather than the short side. Duration of cycles in values and quantities of finished manufactures exports ranged from five and a half to seven and a half years, on the average, and food price cycles before 1913 lasted about five years. These higher averages are due to steep trends which at times submerge cyclical movements. Export cycles also are no more periodic than cycles in other economic activities. Their length varies considerably and ranges for all series together from one and a quarter to nearly nine years.[2]

The strength of the cyclical fluctuations can be judged from the cyclical amplitudes in Tables 3, 4, and 5. In evaluating these measures, one must keep in mind that the exceptional 1929–37 cycle has been excluded so that the averages reflect only "normal" cyclical swings. Rises and declines in quantities and values amounting to between 53 and 128 per cent of the cyclical level during an average cycle must then be considered rather large.

Of greater interest than the total amplitudes, however, are the annual rates of change of the series between their peaks and troughs. Though both these measures lead to similar conclusions in many instances, there are also important divergencies. The total amplitudes are very sensitive to the number of cycles recognized in a series. This makes it difficult to compare series with different numbers of cycles during a given span of time. The fewer the cycles, the larger the average amplitude will tend to be. When there is only one cycle in series A over a stretch of time covering two cycles of different amplitudes in series B, the amplitude of A will be larger even when the movement of B between its terminal troughs and the higher of the two peaks is as large as the cycle in A. The second, milder cycle in B reduces its average amplitude. This difficulty is avoided by the annual rates of change. Here the large movement in a long cycle is divided by more years than the mild changes of shorter cycles. We, therefore, rely primarily on this measure.

From the relative degrees of instability of value, quantity, and price of exports in a given commodity class and from comparisons among classes, some inferences can be drawn about the causes of export

[2] The average durations of cycles in annual world exports of eighteen individual primary commodities for 1901–51 are reported as 3.5 years for quantities, 3.7 years for values, and 4.5 years for prices (United Nations, *Instability in Export Markets of Under-Developed Countries,* New York, 1952, pp. 34, 46, and 5).

TABLE 3

Cycles in U.S. Export Quantities: Duration and Amplitude, 1880-1961

	Total	Finished Manufactures	Semimanufactures	Crude Materials	Foods
			Number of Cycles		
1880-1913	8.0	5.0	--	11.0	10.0
1921-1961	5.5	3.5	6.0	5.0	6.0
			Average Duration (years)		
1880-1913	3.81	5.95	--	2.82	3.02
1921-1961	3.32	5.64	3.21	4.00	3.25
			Amplitude (per cent)		
1880-1913	53.6	62.4	--	66.9	74.4
1921-1961	53.5	75.1	80.2	124.9	118.8
			Annual Change (per cent)		
1880-1913	14.1	10.5	--	23.7	24.6
1921-1961	16.1	13.3	25.0	31.2	36.6
			Years and Quarters Covered		
1880-1913	1883 I- 1913 III	1883 II- 1913 I		1882 I- 1913 I	1883 I- 1913 II
	1921 IV- 1929 I	1922 I- 1929 I	1921 II- 1928 I	1921 III- 1928 II	1921 III- 1929 I
1921-1961	1937 IV- 1938 IV	1937 III- 1938 III	1937 III- 1938 III	1938 I- 1938 IV	1936 IV- 1938 II
	1949 I- 1959 I	1947 II- 1959 I	1949 I- 1960 III	1948 II- 1960 IV	1947 III- 1958 I

Note: Sources and notes to this table follow Table 5.

TABLE 4

Cycles In U.S. Export Prices: Duration and Amplitude, 1880-1961

	Total	Finished Manufactures	Semi-manufactures	Crude Materials	Foods	Domestic Wholesale Prices
			Number of Cycles			
1880-1913	8.0	7.0	--	9.0	5.5	9.0
1921-1961	5.5	4.5	5.5	4.0	4.0	4.5
			Average Duration (years)			
1880-1913	3.84	4.68	--	3.39	5.23	3.35
1921-1961	3.68	3.72	3.32	4.50	3.75	4.27
			Amplitude (per cent)			
1880-1913	31.3	25.4	--	42.9	43.3	24.7
1921-1961	17.9	14.6	27.2	56.1	39.7	19.9
			Annual Change (per cent)			
1880-1913	8.2	5.4	--	12.7	8.3	7.4
1921-1961	4.9	3.9	8.2	12.5	10.6	4.7
			Years and Quarters Covered			
1880-1913	1882 III-1913 II	1880 III-1913 II		1882 III-1913 I	1882 III-1911 II	1882 III-1912 IV
1921-1961	1922 I-1928 III -- 1948 I-1961 IV	1925 I-1928 III -- 1948 III-1961 IV	1922 II-1929 II -- 1948 III-1959 IV	1921 III-1927 IV -- 1948 II-1960 I	1922 I-1925 I -- 1948 I-1960 I	1922 I-1928 III -- 1948 III-1961 I

Note: Sources and notes to this table follow Table 5.

TABLE 5

Cycles in U.S. Export Values: Duration and Amplitude, 1880-1961

	Total	Finished Manufactures	Semimanufactures	Crude Materials	Foods
			Number of Cycles		
1880-1913	9.0	4.0	--	8.5	10.0
1921-1961	5.5	3.5	5.0	5.5	6.0
			Average Duration (years)		
1880-1913	3.40	7.50	--	3.74	3.02
1921-1961	3.40	5.57	4.10	3.68	3.21
			Amplitude (per cent)		
1880-1913	53.4	84.4	--	70.8	70.8
1921-1961	58.7	85.5	111.4	120.6	127.8
			Annual Change (per cent)		
1880-1913	17.5	11.3	--	18.9	23.4
1921-1961	17.5	15.3	27.2	32.8	39.8
			Years and Quarters Covered		
1880-1913	1883 I-1913 III	1883 II-1913 II		1882 I-1913 IV	1883 I-1913 II
	1921 IV-1929 I	1922 I-1929 I	1921 II-1929 I	1922 I-1928 II	1921 IV-1929 I
1921-1961	1937 III-1938 IV	1937 III-1938 III	1937 II-1938 III	1937 II-1938 IV	1936 IV-1938 II
	1949 I-1959 I	1947 III-1959 I	1949 I-1960 III	1948 II-1960 IV	1947 III-1958 I

Notes to Tables 3, 4 and 5

Based on seasonally adjusted quarterly series.

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

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

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

Measures for different series cover different time periods depending on each series' cyclical turns between 1880 and 1913, 1921 and 1929, 1937 and 1938, and 1947 and 1961.

Source: Exports, Appendix A; domestic wholesale prices, U.S. Department of Labor, Bureau of Labor Statistics; cycle chronologies, NBER.

changes and about demand and supply elasticities. When demand pulls export prices and quantities in the same direction, value amplitudes will exceed quantity amplitudes. Conversely, when quantity movements are largely supply-determined and thus inverse to prices, values will be more stable than quantities. Furthermore, mild price fluctuations relative to quantity swings denote elastic supply when the change originates on the demand side and elastic demand when supply is the source of the disturbance.

1. *General Views on Export Instability*

Widely held views on export elasticities and the role of demand and supply in export fluctuations can thus be checked against the rates of change in the tables. For instance, the supply of primary goods is commonly regarded as relatively inelastic and that of manufactures as elastic. Hence the main source of trouble with primary goods exports is considered to be in prices, while the instability of manufactures exports is deemed to be largely a matter of quantities. These views, which have important implications for the terms of trade, may be illustrated by the following passage from a recent empirical study of exports on which we shall draw heavily in the following analysis. "As is well known, the prices of most primary products in international trade vary more sharply from year to year than those of most industrial products. . . . the reason for the differences in price behavior between primary and manufactured products lies not so much in any special instability of import demand or export supply for the former as in the fact that in the case of primary products both demand and supply are as a rule less

responsive to changes in price than in the case of manufactures. With the exception of a few commodities, whose prices are stabilized by understandings between producing firms or by governmental action, primary products are supplied to world markets under much more competitive conditions than are industrial products. *Thus, whereas manufacturers, as a rule, seek to maintain fairly steady prices in the face of variations in demand, allowing the quantities they supply to vary, primary producers are more likely to maintain the quantities supplied, leaving prices to vary.*" [3]

Another example can be found in Lipsey's work on U.S. exports: "Supply elasticities are lower for agricultural than for manufactured products. As a result, the effects of changes in demand will appear mainly in prices for primary products, but in quantities for manufactured goods. Thus, in both world wars prices of agricultural products far outdistanced those of manufactured goods, but quantities lagged behind. In the early 1930's, prices of manufactured goods fell much less than agricultural prices but quantities dropped more sharply." [4]

The various authors usually refer to four comparisons of the instability of export quantities and prices: manufactures and primary goods quantities; manufactures and primary goods prices; quantities and prices of manufactures; and quantities and prices of primary goods. The variations in the quantity of manufactures and in the prices of primary goods are both expected to be larger than either that of manufactured prices or that of quantity of primary goods. Furthermore, the values of primary goods exports are considered to be much more volatile than those of manufactures exports.

There seems to be more hesitation and less general agreement on whether quantities and prices move typically in the same or in opposite directions, and hence whether value or quantity of exports should be expected to fluctuate more widely. The view that in both commodity classes cyclical quantity and price changes are reinforcing rather than offsetting appears to predominate, however.

The following sections discuss, first, our own findings on primary and manufactures exports and then results reported by a few other investigators. Finally the instability of total exports and its shift over time will be analyzed.

[3] J. Marcus Fleming and Gertrud Lovasy, "Fund Policies and Procedures in Relation to the Compensatory Financing of Commodity Fluctuations," *Staff Papers*, International Monetary Fund, November 1960, pp. 4–5, my italics.

[4] Robert E. Lipsey, *Price and Quantity Trends in the Foreign Trade of the United States*, Princeton for NBER, 1963, p. 65.

2. *Instability of Manufactures and Primary Goods Exports: Our Findings*

We begin by citing those of our findings that do meet expectations.[5] The first category of this type deals with the instability of quantities, prices, and values of manufactures exports. In agreement with the idea that changes in manufactures exports are mainly demand-determined and that the supply of these goods is highly elastic, we find that quantities vary on the average two or three times as much as prices, and values fluctuate even more than quantities. This can be seen in the following annual percentage changes in U.S. exports of finished manufactures:

	Price	*Quantity*	*Value*
1880–1913	5.4	10.5	11.3
1921–1961	3.9	13.3	15.3

Further, in accord with common views is the relative instability of prices of different commodity classes. In both periods prices of finished manufactures are more stable than foods prices, which again are more stable than crude materials prices. Semimanufactures ran —as they ought to—after manufactures prices.

Measures of instability of export values also conform to expectations, with manufactures far less volatile than crude materials or foods exports.

But here the agreement ends. The pattern of the rates of change of the quantity, price, and value of primary goods is the opposite of the postulated one, in which price and value would vary more than quantity. The actual relations can be seen in the charts and tables and in the summary of the annual percentage changes in U.S. exports of primary goods below:

	Price	*Quantity*	*Value*
	CRUDE MATERIALS		
1880–1913	12.7	23.7	18.9
1921–1961	12.5	31.2	32.8
	FOODS		
1880–1913	8.3	24.6	23.4
1921–1961	10.6	36.6	39.8

[5] Our findings referred to in the remainder of this chapter are the annual percentage changes in Tables 3, 4, and 5. Primary goods are assumed to be represented by crude materials and foods.

The average rates of change of quantities are from two to three times as high as those for prices. Clearly fluctuations in primary exports are *not* "largely fluctuations in prices." [6]

Also the severity of fluctuations in the values of primary goods exports was roughly of the same order as that of the fluctuations in their quantities. In the earlier period, quantities were even more unstable than values; in the later one, quantity variations are only a trifle milder than value movements. It follows that prices and quantities of primary goods exports must have moved in opposite directions much of the time, thus offsetting the larger amplitudes of values characteristic of periods with parallel price-quantity movements.

Furthermore, it turns out that—again contrary to established views—the quantities and values of semimanufactures, crude materials, and foods are not less but far more volatile than those of manufactures. Although the latter are by no means stable, their movements of 10 to 15 per cent a year do not match the 19 to 40 per cent variations in the remaining classes. That semimanufactures moved nearly twice as much as finished manufactures but still not as much as crude materials shows the internal consistency of the measures.

We are thus faced with the question why our findings (and those of some others) conflict with plausible views and with some facts on export instability, why the swings in export quantities are far larger than those in prices in all commodity classes according to our measures, and why manufactures quantities fluctuate less, not more, than those of other classes.[7]

Two factors may account for many of the discrepancies. One is that the contrary evidence is based on the extraordinary cycles caused by the world wars and the great depression but does not hold for normal, short business cycles. When these extraordinary cycles are included, they dominate the picture, particularly when the role of mild swings is reduced by the use of annual data. In our measures from which the extraordinary cycles are excluded, these mild swings have much weight, however. The difference appears clearly in the charts. It can be seen that the greater instability of the quantity of crude materials relative to that of finished manufactures is not due to the former's larger amplitude in a few major cycles but to the frequency of sharp reversals.

[6] R. C. O. Matthews, *The Business Cycle*, Chicago, 1959, p. 190.

[7] Our measures cover total variations, whether demand or supply induced. In the literature reference is sometimes to demand-induced changes only, sometimes to total changes, and most often it is not clear whether one or the other is the case. We shall present measures on demand-induced changes in the following chapter.

It is quite plausible that the behavior of exports should differ between normal and unusual business cycles. Not only do shifts in supply play a greater role in normal than in extraordinary cycles, but the supply of crude materials also keeps up more nearly with mild changes in foreign demand than with enormous ones. It cannot expand in proportion to tremendous war demands nor plunge as deeply as demand did in the 1930's. The fact that these demand changes were expected to be transitory may also have contributed to the unresponsiveness of supply. But this does not mean that normal fluctuations in foreign demand for primary goods cannot be met by sufficient adjustment in supply for large variations in export quantities to occur. Stocks can be built up or drawn down, and domestic consumption of export goods can be expanded or contracted. This last point is particularly important in the United States, but would not hold for countries which consume only a minor portion of the kind of goods they export.

Short-run elasticity of export supply can explain why adjustments in all commodity classes occur to a far greater extent in quantities than in prices, but it cannot account for the fact that export quantities of manufactures are less unstable than quantities of other classes. The reason for this must be that variations in exports of primary, but not of manufactured, goods are frequently caused by forces on the supply side. Total supply of agricultural goods varies with the vagaries of crops, and export supply varies, furthermore, due to the large fluctuations in the domestic demand for primary goods. Given the fairly elastic demand which exists for U.S. primary exports, such supply shifts result in quantity changes exceeding those in manufactures export quantity *and* those in primary prices.

The second fact that may be responsible for differences among findings is the effect of aggregation on the degree of instability. Since quantities and prices of exports are likely to reach their peaks and troughs at different times in different exporting countries, the amplitudes of swings in world totals will be smaller than those of individual countries.[8]

What matters here is whether this effect differs between quantities and prices. There is, unfortunately, no empirical evidence on

[8] In the same way, diversification of an individual country's exports contributes to their stability, as Michaely has shown. He obtained rank correlation coefficients of .404 and .374 for the commodity concentration of the exports of thirty-six countries, on the one hand, and their price or quantity fluctuations in 1948–58, on the other. (Michael Michaely, *Concentration in International Trade,* Amsterdam, 1962, pp. 72 and 100.)

the degrees of dispersion among export quantity and export price movements in different countries. But a priori it seems likely that quantity changes vary more among exporting countries than price changes do. Though prices of different commodities need not move together, of course, prices of specific goods exported from different countries cannot diverge much, particularly primary goods. Export prices, in other words, are world prices and this limits the possibilities of divergence among countries.

Movements of export quantities, on the other hand, are quite likely to differ among countries, even for a given commodity. This may be due to disparities in the timing of national business cycles or to weather and other supply factors.

If the international dispersion of quantity movements is larger than that of price movements, combining countries into a world total reduces the quantity amplitude more than the price amplitude. Hence studies of world trade should find the quantity of primary exports more stable relative to price than studies of individual countries or individual commodities. The results of several investigations will be seen below to support this hypothesis.

Finally, it is possible that certain aspects of U.S. exports may accentuate the discrepancies between our findings and expected behavior. The small share of U.S. exports in the U.S. output of most goods means that shifts in foreign demand can be absorbed to a greater extent by changes in export quantities—and thus affect export prices less—than they would in exporting countries which consume a small fraction of their own goods. In other words, the export supply in the United States may be more elastic than in other countries, which would increase the instability of quantity relative to that of price. In recent times the low costs of financing inventories which serve as buffers for foreign or domestic demand changes also may enlarge quantity versus price changes.[9]

However, the importance of these features of U.S. exports should not be overestimated. In the following section it will be shown that price-quantity relations in other countries do not differ basically from those in the United States according to the findings of several other investigators.

[9] Our division of U.S. primary goods exports into crude materials and foods may also raise quantity change relative to price change. However, the effect cannot be large, since total export quantity in 1879–1913, which roughly represents the sum of the two classes, also exhibits far larger swings than the corresponding prices.

3. *Instability of Manufactures and Primary Goods Exports: Findings of Others*

The scarcity of work on export instability is such that the studies most comparable to this one deal with different countries, goods, periods, time units, and apply different yardsticks of instability. But in spite of these dissimilarities, comparisons between the various findings are instructive, given the embryonic state of our knowledge.

To start with, there are two studies whose results agree more nearly with our "unexpected" findings than with standard views. One is the previously cited empirical analysis by Marcus Fleming and Gertrud Lovasy.[10] The primary purpose of this study was to provide information on which to base International Monetary Fund policies, and the analysis of export instability was incidental to that end.

Fleming and Lovasy's measure of export instability is the unweighted arithmetic mean of year-to-year changes expressed as percentages of the higher of the two annual figures. For 1948–58, they have measured in this way the instability of values, quantities, and prices of exports of forty-eight primary producing countries and thirteen industrial countries. In addition, measures for individual primary products are provided for the years 1900–39 (see Table 6).

About relative variations in quantities and prices of primary goods exports, Fleming and Lovasy conclude: "*The volume of exports from the average primary producing country varies from year to year as much as, if not more than, the price.* This is true of individual primary products exported from individual countries in the interwar period and also for the over-all exports of individual countries in the postwar period." And they comment: "For most of these countries, taken individually, the elasticity of world demand for their exports is high, the elasticity of home supply low. Export prices vary in the main with market conditions abroad, and only in a few cases do home supplies have a significant influence on price. Export quantities, however, vary mainly with supply conditions at home and are only slightly responsive to price changes." [11]

On the relative instability of the quantities of manufactures and primary exports, the Fleming and Lovasy measures also agree with ours in that the former are smaller than the latter, but the difference is not as great as in U.S. exports.

On a third point—whether value or quantity of primary goods is

[10] *Staff Papers,* IMF, November 1960. [11] *Ibid.,* pp. 5–7 (my italics).

TABLE 6

Fluctuations in Exports of Primary Producing Countries and Industrial Countries, 1900-58

(average year-to-year percentage changes in value, price, and volume of exports)[a]

	Average Primary Product Exported from Individual Country[b]	All Exports of Average Primary Producing Country[c]	All Exports of Average Industrial Country[d]
1900-13			
Value	19	9.7	7.7
Price	11		
Volume	20		
1920-39			
Value	22	18.1	14.0
Price	15		
Volume	16		
1948-58			
Value		13.3	10.8
Price	11	10.1	6.4
Volume		10.4	9.1

Source: Reproduced from Fleming and Lovasy, *Staff Papers*, IMF, November 1960, p. 6, Table 1A.

[a]Value and price are expressed in current U.S. dollars.

[b]Unweighted arithmetic mean of year-to-year changes for 25-32 individual commodities.

[c]Unweighted arithmetic mean of average year-to-year changes for 17, 42, and 48 countries in the periods 1900-13, 1920-39, and 1948-58, respectively.

[d]Unweighted arithmetic mean of year-to-year changes for 13 countries.

more unstable—their findings are half way between ours and commonly held views. In agreement with the latter, value is found to be somewhat more unstable than quantity, but the difference is not large. The authors note: "The proceeds accruing to individual countries from exports of primary commodities have on the average varied more, but not very much more, from year to year than have either export price or export volume. This is true both for exports of individual primary products from individual countries in the interwar period and for over-all exports of individual primary producing countries in the postwar period." They attribute this to the fact that "changes in the quantity of exports [of primary goods] tend more often to offset than to reinforce the effects on proceeds of changes in export prices." In a footnote they remark further that "for the postwar period, there is a negative correlation of 0.5 between changes in export prices and changes in export quantities in the average primary producing country." [12]

Another investigation with findings partly similar to ours was conducted by the United Nations in 1952. Its subject is fluctuations in exports of primary commodities from underdeveloped countries. Eighteen important commodities are analyzed during the period 1901–50, including the war years. The indicator of cyclical instability is the average percentage fluctuation per year between high and low points in each series, measured from peak standings.

The main finding is: "Price fluctuations were not the major factor in the instability of export proceeds; on the whole, the volume of exports has fluctuated even more than the price. . . . Price stabilization without stabilization in volume would have reduced fluctuations in proceeds by only one-sixth." The average annual change in prices was 13 per cent, that in quantity 17 per cent.[13]

The United Nations measures, however, diverge from ours and support the common views on the matter of value versus quantity variability in primary goods exports. They show an average value movement of 22 per cent per year and quantity movement of only 17 per cent. The authors summarize: "All types of fluctuations in proceeds . . . were in each case higher than those in volume or in price alone. This indicates that changes in price and in quantity had a destabilizing effect on each other." But later on they add: "Some of the movements appeared to be compensatory, however, since

[12] *Ibid.*, pp. 7–8.

[13] United Nations, *Instability in Export Markets*, pp. 3 and 57, and Tables 11 and 23.

fluctuations in proceeds, though greater than those in price or volume alone, were less than they might have been if prices and quantities had always moved in the same direction. Cyclical fluctuations in price and volume reinforced each other to the extent that about half the gross variation in volume was in the same direction as that of price, and so added to the instability of proceeds." [14]

As noted above, our exclusion of the large war and depression cycles probably reduces the role of variations of quantities and prices in the same direction and accounts for the relative mildness of instability in the export value of primary goods in our measures.

Very different results from those discussed so far are reported in the main work on international instability—Coppock's recent pioneering study. In this book Coppock analyzes value, quantity, and prices of total world exports and of world exports of manufactures and primary commodities for 1946–58. His yardstick is the " 'instability index' [which] is a close approximation of the average year-to-year percentage variation, adjusted for trend."

In sharp contrast to the findings of Fleming and Lovasy, the United Nations, and this study, Coppock's indexes confirm the view that fluctuations in the quantity of primary goods (4.7 per cent) are much smaller than those in their prices (8.4 per cent) and also smaller than changes in the quantity of manufactures exports (7.1 per cent).[15]

Similar to Coppock's are the findings reported in a GATT study which covers world trade in 1928–38 and 1950–56. It also uses annual data and measures in terms of percentage changes. The authors begin their summary of conclusions about short-term fluctuations with this statement: "Fluctuations in the world trade in primary production, and therefore the export proceeds of the non-industrial countries, taken as a whole, mainly reflect changes in prices rather than changes in volume."

On the question whether the value or quantity of primary goods exports is more unstable, GATT inclines to the prevalent view: "for both manufactures and primary products, the movements of prices and volume have been in the same direction." [16]

[14] *Ibid.*, pp. 7 and 62, and Tables 3 and 23.

[15] Coppock, *Economic Instability,* pp. 24, 34. Coppock has also investigated the instability of total exports of eighty-three individual countries. Since this part of his book does not distinguish between commodity classes, it will be taken up later in the section on total exports.

[16] General Agreement on Tariffs and Trade, *Trends in International Trade,* Geneva, October 1958, pp. 3 and 15.

Coppock, on the contrary, obtains an instability index of 3.8 for value and of 4.7 for quantity of primary goods exports and concludes that the low value index "is clearly the result of compensatory relations between price and quantity changes: higher prices were partly offset by lower quantities and lower prices were partly offset by higher quantities." [17]

In view of the different coverage and different methods used in the studies cited, discrepancies among results can, of course, have many sources. We have mentioned above those we generally consider the most important: the weight of extraordinary cycles in the total and the degree of aggregation. The latter point is in line with the fact that measures of world trade (in the studies of Coppock and GATT) show results opposite to those from measures of trade of individual countries or commodities. The authors of the GATT study refer to this when they qualify their conclusion as follows: "However, the changes in the export proceeds that individual countries derive from specific commodities do vary as a result of volume as well as price fluctuations. The volume changes reflect not only the general business cycle but also, *inter alia,* the particular conditions of supply prevailing in the exporting country and changes in the competitiveness of its production." [18]

There is also substantial support for this hypothesis in the fact that Coppock's findings for total quantity and total price of exports of individual countries are the opposite of his findings on world exports. This will be discussed below in the section on total exports.

The influence of extraordinary cycles is also prominent in the GATT study where observations are heavily weighted by the 1930's and the Korean War.

The two war-related movements, 1950–51 and 1951–52, also have great weight in the eleven year-to-year changes covered by Coppock's index. In those two years, prices of primary exports exhibit enormous swings while quantity movements are moderate. Coppock himself warns that the indexes should be treated with caution "because of the large influence of one or two years of relatively large change." But he seems to attribute the difference between his and the United Nations findings to the different statistical methods used rather than to the coverage.

Coppock's results on the relative instability of value and quantity of primary goods exports are hard to evaluate because the two

[17] Coppock, *Economic Instability,* p. 35.
[18] GATT, *Trends,* p. 3.

series are not consistent with each other, as he himself notes. For instance, from 1950 to 1951 value rises no more than quantity, although prices shoot up by 20 points.[19]

We shall now turn to points where our findings agree with the commonly held views and compare them with results of other investigators.

On the manufactures exports, the finding that export value is more unstable than quantity and quantity more unstable than price accords broadly with Fleming and Lovasy's conclusion about the exports of industrial countries and with Lipsey's on U.S. exports (both cited above). The GATT study deviates somewhat in finding quantity movements not larger but only "on the whole . . . of the same magnitude" as price changes. They agree that price and quantity move in the same direction and hence that value is more unstable than quantity.[20]

Results on manufactures which contradict not only those of others but also prevailing views are reported by Coppock, however. According to his indexes, the order of instability is reversed, with prices of manufactures the least stable, quantities next, and values the most stable. Coppock believes that this is probably due to the deficiencies of his data. Considering that his value can rise by 10 points at a time when prices fall by 11 points and quantity remains constant, this attribution is plausible.[21]

Next are the relations *among* commodity classes. Here the relative instability of prices is of great importance because of its implications for the terms of trade. For this reason it has been thoroughly investigated in Michaely's recent excellent study and we now know a great deal more about this aspect of export instability than about most others.

Michaely's conclusion is as follows:

> It has often been contended that fluctuations of export prices are particularly large in countries which specialize in the export of primary goods due to the nature of these goods. In fact, this is probably an optical illusion created by the close association between specialization in primary goods and a high degree of commodity concentration of exports. There is a great deal of variation among primary goods in the extent of fluctuations of their prices in the world market. But the available evidence for the post-war period does not support the contention that world prices of primary goods

[19] Coppock, *Economic Instability*, pp. 26, 28, note 2, 34, 35.
[20] GATT, *Trends*, p. 15.
[21] Coppock, *Economic Instability*, pp. 34, 39.

tend to fluctuate more, in general, than prices of manufactured products. The particularly large fluctuations of the price level of exports in countries which specialize in primary goods are apparently explained by the high degree of commodity concentration of exports prevailing in these countries.[22]

Michaely's interpretation does not conflict with our finding that primary prices are more unstable than manufactures prices, since U.S. exports of primary goods are more concentrated than manufactures exports. It also fits in with Coppock's finding that in world exports prices of primary goods were "only slightly more unstable than prices of manufactures." That concentration can entirely explain the results reported by Fleming and Lovasy appears more doubtful, however: "in each of the two periods [1929–38, 1950–58], average year-to-year changes in the prices of primary products as a group were some 50–55 per cent greater than those of manufactures as a group." [23]

Finally, on the last point, the variability of the values of primary and manufactures exports, Fleming and Lovasy go along with expectations and with our findings with this qualification: "Table 1A [reproduced as Table 6 above] also reveals that percentage changes from year-to-year in export proceeds, though greater for the average primary producing country than for the average industrial country, were less than 30 per cent greater for the interwar period, and less than 25 per cent greater for the postwar period—a smaller difference than is frequently assumed."

Coppock, on the other hand, arrives at the following conclusion: "Contrary to widely held views, *export proceeds were decidedly more stable for primary goods than for manufactured goods.*" This result has aroused the interest of his reviewers, one of whom terms it "startling." Coppock himself notes: "Although the export instability index for primary goods (3.8) is lower than that for manufactured goods (6.8), both are quite low, so too much should not be inferred from their relations, despite the fact that the opposite relation would generally be expected." [24] We have commented above on the several possible reasons for this result.

[22] Michaely, *Concentration,* p. 130.

[23] Fleming and Lovasy, *Staff Paper,* IMF, November 1960, p. 5; Coppock, *Economic Instability,* p. 36.

[24] *Ibid.,* p. 7. Coppock, *Economic Instability,* pp. 35–36 (italics in original).

4. *Instability of Total Exports: Our Findings*

Turning now to total exports, we shall first compare the size of their fluctuations with those of component classes. Since cycles in subdivisions reach peaks and troughs at different times, cycles in aggregates are, as a rule, milder than the average of the former. This is true for U.S. export prices, quantities, and values. Thus the typical rise and fall of total export prices is relatively moderate: about 8 per cent a year before 1913 and about 5 per cent since 1921.[25]

Expectations are also met in the instability of total quantity and value of exports. As in prices, rates of change for the aggregates are low compared with the average of those for the component classes.[26] The stabilizing effect commonly attributed to diversification is evident here.

But despite their diversity, the quantity of total U.S. exports still rose or fell, on the average, by 14 per cent a year before 1913 and by 16 per cent thereafter. These swings are two to three times as large as those in total prices. Thus the instability of export value is in the United States mainly a matter of quantities, not of prices, during both periods. As noted above, however, this result need not hold for every country. Where exports consist of goods not consumed at home to any great extent, where the over-all supply of such goods is more stable, or where they cannot be stored for technical or financial reasons, export quantities will move more mildly, while prices

[25] One should note in passing the similarity between rates of change in export and in domestic wholesale prices referred to in the preceding chapter. Since the export index represents partly (to 1923), or entirely, unit values, while the domestic index represents quoted prices and since they are constructed by different methods and include different commodity mixes, one would perhaps not expect their movements to be as similar as they appear in our measures and on Charts 21 and 22. The relations of export prices to the domestic economy and to the world economy will be discussed in Chapter 7, but it may be noted here that international markets exert about as much influence on domestic wholesale prices as on export prices, whereas the impact of the domestic economy on export prices is stronger than on domestic wholesale prices.

[26] In terms of full-cycle amplitudes as opposed to annual rates of change, total exports are even more stable than the most stable class.

Coppock's results for quantity and price agree with ours. But he finds instability of total value of world exports to be far greater than that of value of either manufactures or primary goods. He attributes this, like other puzzling results, in part to the deficiencies of the data but also notes: "The observed relation may also be explained by the series themselves, since it is possible for the aggregation of the components, especially if they have different weights, to make the aggregate more volatile than the components. The measure of instability may also contribute to this result." (*Ibid.*, p. 39.)

bear the burden of adjustment. The greater instability of total export quantity compared with total export price has become more pronounced in more recent cycles. This reflects partly the increased weight of manufactures, where the ratio of quantity to price change is highest, but partly also the increase in this ratio within each commodity class.

The total value of U.S. exports was more unstable than the total quantity during the full period observed, which shows the reinforcing pattern of price and quantity fluctuations. In later years the preponderance of manufactures easily accounts for this result. For the years before 1913, however, it may appear strange since the values of the two important classes—crude materials and foods—are not more unstable than the corresponding quantities. What happened was that the quantities of these two classes moved more independently from each other than their prices and hence than their values. Thus the rate of change of total value was not reduced as much and was, therefore, higher than that of total quantity.

5. *Instability of Total Exports: Findings of Others*

Coppock has conducted two analyses of total exports: one on the world aggregate and a second one dealing with a large number of individual countries. Comparison of his findings on total exports and ours is, therefore, particularly informative. The conflicting results he obtains provide support for our interpretations of export instability.

Coppock's instability indexes for world exports indicate that "the fluctuations in physical volume of exports were quite small" and that "price fluctuations" (instability index: 7.6) were a more important source of instability in export receipts than quantity fluctuations (instability index: 4.2)."

But the opposite result emerges when the instability indexes for export value are correlated for sixty-seven countries, first with those for quantity, then with those for prices. The coefficient for the price-value correlation is only +.13, and Coppock comments:

> This variable deserves a bit more comment, since so many schemes for stabilization of export proceeds generally or of trade in particular commodities consider stabilization of prices the principal method of achieving stabilization of export proceeds for countries or for particular producer-groups. *The evidence here falls far short of demonstrating a strong con-*

nection between instability of export prices and instability of export proceeds. The quantum of exports, with a correlation coefficient of +.58, is a much more influential factor. If the ratio of the correlation coefficients may be used as a rough indication of relative importance, export quantum instability is clearly much more important than export price instability in determining export proceeds instability.[27]

There is no attempt at reconciling this conclusion with that on world exports.

The contrast between world exports and exports of individual countries is also reflected in a comparison of relevant instability indexes. Mean and median indexes for sixty-seven to eighty-three countries are given in Coppock's appendix tables. The average instability of export prices of these countries turns out to be twice as high as that of world exports, but for quantity the ratio is four to one, as can be seen from the following tabulation of instability indexes: [28]

	Total Export Value	*Total Export Quantity*	*Total Export Price*
World	9.1	4.2	7.6
Median, 67 to 83 countries	19.4	14.3	14.0
Mean, 67 to 83 countries	21.8	17.1	15.4
United States	16.8	16.7	7.0

It is probable that the differential effect of aggregating on export quantity and export price, which is reflected in these results for total exports, would also be found in primary goods exports if the data were available and that this accounts in large part for the contrast between Coppock's and the GATT findings on world trade in primary goods, on the one hand, and those of Fleming and Lovasy, the United Nations, and our own (all for individual countries), on the other.[29]

[27] *Ibid.*, pp. 28 and 111 (italics in original).

[28] *Ibid.*, p. 27 and Appendix Table A-2, columns 1, 8, and 9.

[29] It should be noted, however, that Michaely's results do not support this hypothesis. Contrary to Coppock, he finds that in thirty-six countries in 1946–58, "the average intensity of fluctuations, and variations among countries in this intensity, are somewhat lower for the volume of exports than they are for export prices." The respective mean percentage changes are 9.1 for volume and 10.4 for price. According to the tables, volume change was larger than price change in only sixteen out of the thirty-six countries. I suspect that this divergent result is attributable to the fact that Michaely has corrected export volume movements for

This conclusion is also supported by the fact that, according to Coppock's Table A-2, export quantity was more unstable than price in thirty-nine out of the sixty-seven countries and that Coppock's index for the United States is like our rate of change, i.e., much higher for total export quantity than for price.

As for the relative instability of value and quantity of total world exports, Coppock's results agree with ours for the United States. Although he does not find a reinforcing quantity-price pattern in either primary or manufactured goods, such a pattern does appear in the total. "The main fact is that [the instability index for total value of world exports exceeds the indexes for total price and total quantity], which shows that the changes in demand-supply conditions serve to increase the instability of export proceeds (import outlays) rather than to reduce them." This also holds for the average instability of individual countries. The percentage of countries with reinforcing price-quantity patterns is as high as 70.[30]

The divergent results for value and quantity of primary exports reported above are thus not repeated in total exports. Here all findings show that fluctuations in export value exceed those in export quantity.

6. *Rise in Export Instability*

The most striking fact about the various interrelations of export instability is their persistence over time. In the entire discussion no distinction had to be made between the cycles before 1913 and those afterward, with one minor exception.

The levels of the rates of change are not the same in the two periods, however. The rates for prices of foods and manufactures moved in opposite directions, the former becoming more volatile and the latter more stable in the later cycles, while crude materials prices fluctuated as much after World War I as before. The marked decline in the scope of fluctuations of total export prices in more recent cycles results from the prominent role attained by the stable prices of manufactures.

trends, while price movements are deemed to have no trends and are left unadjusted. This reduces the amplitude of volume relative to price changes. Coppock, on the other hand, adjusts prices as well as quantities for trend.

As mentioned above, Michaely's result for the United States agrees broadly with Coppock's and with ours. His index for quantity is 11.0, that for price only 3.6. (Michaely, *Concentration,* pp. 71, 98–99.)

[30] Coppock, *Economic Instability,* pp. 29, 30, and Table A-2. The words in brackets in the quotation replace symbols in Coppock's text.

More important is the shift which occurred in the behavior of export quantity and value. In each commodity class, variations became much larger in the later cycles despite exclusion of the early 1930's. This shift is certainly in striking contrast to the dampening of the domestic business cycle and suggests that policies for international stabilization have been far less successful to date than those for national stability.[31] One may speculate on whether the achievement of greater domestic stability could have aggravated the international problem.

In total exports, the much greater instability of component classes is offset by the simultaneous change in their relative importance. Since manufactures exports were in each period far more stable than other types, their increased role in 1921–61 exerted a powerful influence toward stability in total exports. This influence was strong enough to compensate entirely for the rise in fluctuations in the values of all classes and to compensate to a large extent for that in their quantities. Hence the rate of change of total export value is the same in 1921–61 as it had been in 1880–1913, and the rate of total quantity is only moderately higher. The trend toward instability is not revealed by the aggregates for the two periods.

In the most recent cycles, however, after World War II, the shift in composition has not sufficed to offset the increase in instability of each export class, and in this latest period even total export value has been more unstable than at earlier times. In other words, the United States suffers as much (or more) instability of total export proceeds today, selling mainly highly diversified manufactures, as she did in earlier times when her exports consisted mainly of primary goods.[32]

[31] See A. Lamfalussy, "International Trade and Trade Cycles, 1950–60," in *International Trade Theory in a Developing World,* Roy Harrod, ed., London, 1963, p. 270: "There is no built-in stabilizer for the world."

[32] A trend toward greater export instability has been found for other countries too. Thus the Fleming and Lovasy figures (Table 6) show more instability in 1948–58 than in 1900–13 for industrial as well as for primary producing countries.

Increasing instability relative to domestic output was noted by Angus Maddison ("Growth and Fluctuations in the World Economy, 1870–1960," *Banca Nazionale del Lavoro Quarterly Review,* June 1962, p. 31). See also my *American Exports During Business Cycles, 1879–1958,* Occasional Paper 76, New York, NBER, 1961, p. 11.

On the progress toward domestic stability, see Julius Shiskin, "The Current Expansion in Historical Perspective," *Business Cycle Developments,* January 1965, p. 61.

The findings are not in contradiction with the emphasis of some authors on *improved* export stability. Such comparisons are with the extraordinary swings of the 1930's which, of course, make the present ones appear quite mild. (See, e.g. Coppock, *Economic Instability,* pp. 2–3.)

7. *Summary of Findings on Export Instability*

Our measures reveal several new facts on export instability which agree in some respects, but disagree in other important ones, with common notions. The most widely accepted view seems to be that fluctuations in export proceeds of primary producers are largely fluctuations in prices, while exports of manufactures are characterized by rigid prices and large swings in quantities. Furthermore, quantities and prices of all export classes are thought to move predominantly in the same direction, and values hence to fluctuate more than quantities. Empirical evidence presented in a few studies is contradictory and no attempts have yet been made to reconcile the differing results.

Some of the aforementioned views are supported by our findings. For instance, exports of manufactures behave as expected, in that quantity changes far more than price and both move together so that value is more unstable than quantity. That prices of primary goods have wider swings than prices of manufactures is also confirmed. But the agreement ends when we turn to the measures of instability of the quantities of semimanufactures, crude materials, and foods exported from the United States. Quantities of all classes are found to be a great deal more variable than the corresponding prices. (The average annual rates of change of the former are two or three times as high as those of the latter.) Further, the quantities and values of nonmanufactures are not less, but far more, volatile than those of manufactures. Although the latter also swing widely, their movements of 10 to 15 per cent a year, on the average, do not match the 19 to 40 per cent a year variations in the remaining classes.

The explanation of the difference between these results, on the one hand, and accepted views as well as the findings of some investigators, on the other, may be sought in two factors. First, there are differences in coverage. The view about the relative stability of primary goods export quantities seems to draw heavily on the experience of the extraordinary cycles occurring during major wars and in the great depression of the 1930's. It is plausible that fluctuations in quantities shipped can absorb a larger part of changes in normal demand than of exceptional and extreme ones.

The second factor explaining differences among findings is the contrast between instability of total world trade and instability of the trade of an individual country. Quantities of exports from the

various countries often reach their peaks and troughs at different times, which reduces the amplitude of swings in the world aggregate. Price movements of specific export goods, on the other hand, cannot differ much among countries and thus their amplitudes are less affected by aggregation. Hence studies of world trade find the quantity of primary exports more stable relative to price than studies of individual countries, and the prevailing view may hold for total world exports, but not for exports of most individual countries. These matters will be pursued further in the next chapter where export fluctuations caused by cycles in foreign demand are separated from the rest.