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## CHAPTER 2

### Trends in Values and Quantities

THE foreign trade of the United States, like almost every other aspect of its economic life, has been characterized by persistent growth (Chart 9 shows the data since 1869). There were, it is true, periods of retardation and decline as well as sudden spurts and reversals that marked war and reconstruction periods. But the only major peacetime interruption of the climb was the great depression of the 1930's which cut into international trade even more deeply than into other areas of the economy. The interwar experience was unique in at least two respects. The severity of the decline in both export and import values and quantities had never been approached in peacetime, even in the depression of the 1890's. The failure to recover previous peak levels after ten or fifteen years was also unprecedented.

In the postwar years the amplitude of fluctuations and the length of recovery periods have returned to prewar levels.

#### *Trends in the Ratio of Total Trade to Output*

##### BACKGROUND OF THE PROBLEM

It has often been said that the economic development of a country reduces its dependence on foreign trade and that the spread of industrialization throughout the world tends to diminish the importance of international trade by reducing those differences in economic structure and skill which are the basis for profitable exchange.

Pervading this discussion has been the belief that international trade consists mainly of the exchange of manufactured goods from the developed countries for crude materials and foods produced by the undeveloped areas. The importance of international trade in the nineteenth century was therefore considered to be a temporary phenomenon. The eventual industrialization of the backward areas would result in the diversion of their export staples to domestic uses and in the replacement of imported by domestically produced manufactured goods.

This line of reasoning is related to classical theorizing regarding the future terms of trade between agricultural and manufactured products. The link between them is exemplified by a frequently quoted statement from Torrens to the effect that the price of crude products relative to manufactured goods would eventually rise within developing countries, as

it already had in the older countries, thus destroying the basis for the most profitable trade between them.<sup>1</sup> These predictions were echoed more than a century later by D. H. Robertson, who considered it evident that "we must learn to accommodate ourselves permanently to a smaller relative volume of international trade. . . ." The fact that "the scope for advantageous exchange between nations is narrowing" would not only diminish the relative volume of international trade but also encourage trade restrictions because the "narrowing of the gap of Comparative Advantage" would make the welfare loss from a reduction in imports less important compared to advantages in terms of, for example, stability.<sup>3</sup>

Similar pessimism about the future scope of international exchange had been expressed by German economists around the turn of the century, and for much the same reasons.<sup>3</sup> Sombart, for example, stated that over a period of fifty or hundred years, civilized nations had become less interconnected through trade relationships, and less involved in world markets. Actually his evidence—very dubious estimates for Germany in 1830 and 1895—indicated no more than an unchanging trade-income ratio.<sup>4</sup>

<sup>1</sup> "As the several nations of the world advance in wealth and population, the commercial intercourse between them must gradually become less important and beneficial. . . . The species of foreign trade which has the most powerful influence in raising profits and increasing wealth, is that which is carried on between an old country in which raw produce bears a high value in relation to wrought goods, and a new country where wrought goods possess a high exchangeable power with respect to raw produce. Now, as new countries advance in population the cultivation of inferior soils must increase the cost of raising raw produce, and the division of labor reduce the expense of working it up. Hence, in all new settlements, the increasing value of raw produce must gradually check its exportation, and the falling value of wrought goods progressively prevent their importation; until at length the commercial intercourse between nations shall be confined to those peculiar articles, in the production of which the immutable circumstances of soil and climate give one country a permanent advantage over another." Robert Torrens, *Essay on the Production of Wealth*, London, 1821, pp. 288–289.

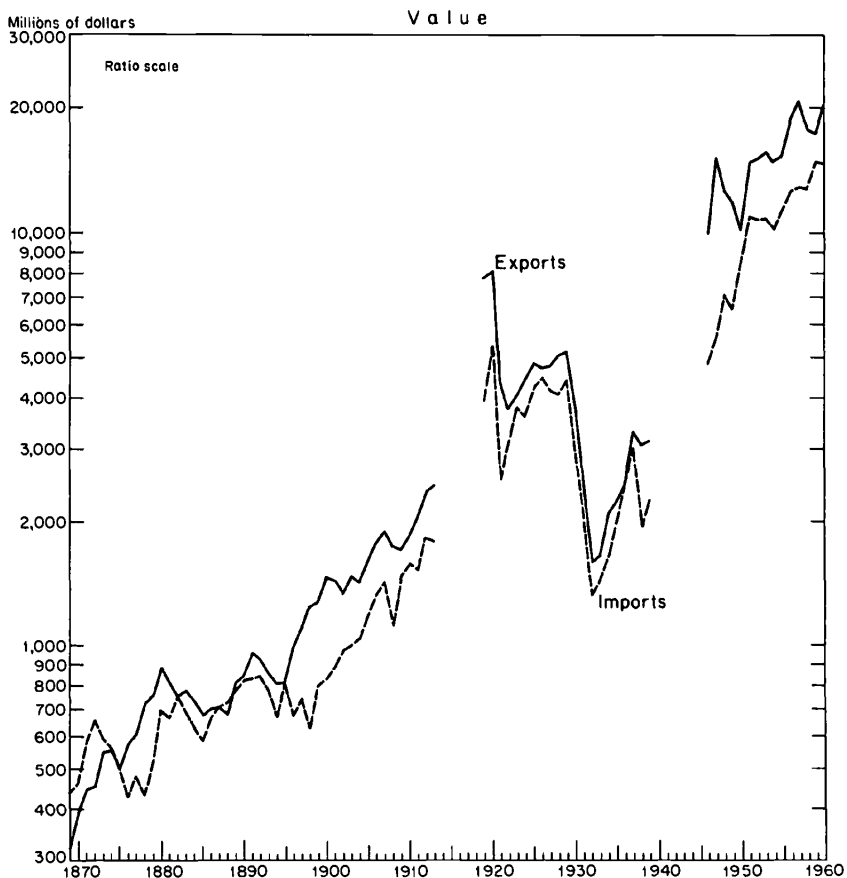
<sup>2</sup> "A narrowing of the gap of Comparative Advantage will not only diminish the volume of advantageous foreign trade, but will tend to produce a state of affairs in which there is a relatively large volume of foreign trade trembling, as it were, on the margin of advantageousness, and liable to be blown to one side or the other of that margin by small changes in the wind of circumstance. If, having been for some time just outside the range of profitableness, it is suddenly blown just within that range, great dislocation and distress will be caused to those who have laid their plans on the expectation of its remaining outside that range; and at the same time the benefit conferred on the community as a whole will be relatively small." D. H. Robertson "The Future of International Trade," *Economic Journal*, March 1938, pp. 7–8.

<sup>3</sup> See Jacob Viner, "The Prospects for Foreign Trade in the Postwar World," *Transactions of the Manchester Statistical Society*, Annual Meeting, June 19, 1946, reprinted in Viner, *International Economics*, Glencoe, 1951, and in American Economic Association, *Readings in the Theory of International Trade*, 1949. These arguments are more extensively discussed in Albert O. Hirschman, *National Power and the Structure of Foreign Trade*, Berkeley, University of California Press, 1945.

<sup>4</sup> Werner Sombart, *Die Deutsche Volkswirtschaft im Neunzehnten Jahrhundert*, 7th ed., Berlin, 1927.

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CHART 9  
Value and Quantity of U.S. Exports and Imports, 1869-1960

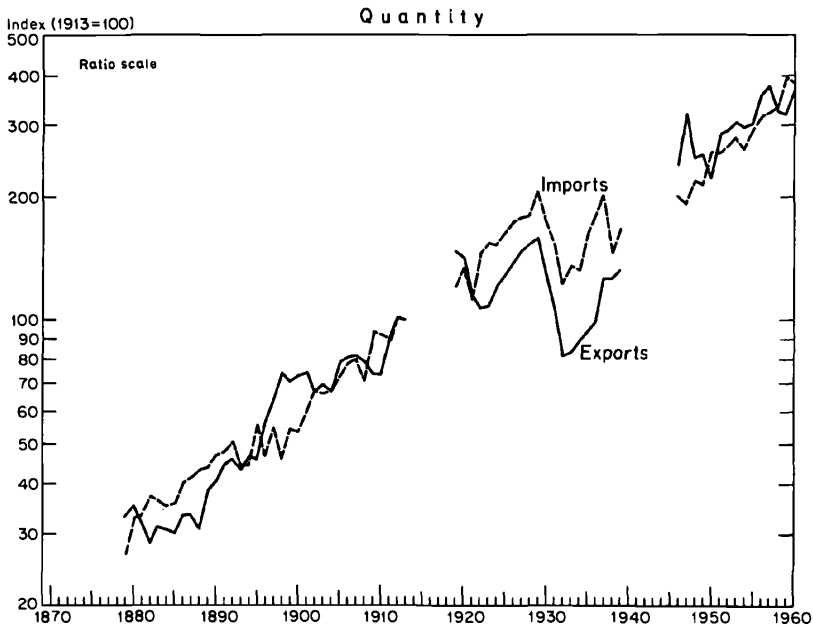


This line of argument has been attacked on several grounds. Viner attributed any fall in the importance of international trade since the 1870's to the effect of increased tariffs, import quotas, and other "deliberate obstacles to international trade" rather than to any "natural factors."<sup>5</sup> Other writers argued that the role of the "traditional" type of exchange—manufactured goods from industrial countries for foods and raw materials from undeveloped ones—had been exaggerated. They pointed to the importance of the exchange of agricultural products against other agricultural products and of manufactures against manufactures, or to the major importance of trade among industrial countries as compared to that between

<sup>5</sup> *International Economics*, pp. 316-317.

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CHART 9 (Concluded)



Source: Appendix Tables A-2, A-4, and A-6.

industrial and nonindustrial ones.<sup>6</sup> Eugene Staley presented national income and trade data (in current dollars) for several countries which showed little clear change in trade-income ratios before the 1930's.<sup>7</sup> Mainly interested in proving that there had been no absolute decline in trade, he accepted relative decline as a fact, attributing it to the shift in consumer demand from goods to services as income increases. But he may have been influenced in this by the data for the 1930's, the last period he covered.

In a recent article, Deutsch and Eckstein<sup>8</sup> reported that an increase in trade-output ratios during early stages of economic development, followed by a decrease in the later stages, has been a typical pattern. But their data for individual countries showed very diverse patterns. It is true that the

<sup>6</sup> For example, Hirschman, *National Power*, p. 146; League of Nations, *Industrialization and Foreign Trade* [by Folke Hilgerdt], New York, 1945; Eugene Staley, *World Economic Development*, Montreal, International Labor Office, 1945.

<sup>7</sup> *World Economic Development*, pp. 137-143.

<sup>8</sup> Karl W. Deutsch and Alexander Eckstein, "National Industrialization and the Declining Share of the International Economic Sector, 1890-1959," *World Politics*, January 1961.

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latest years were not the highest of the whole period, but in several cases they were close to it. There was no rising period in the trade-output ratios for the U.S., and the rise for Germany rested on the virtually worthless Sombart figures mentioned earlier. In any case, a considerable effort of the imagination is required to discern among the violent war and interwar fluctuations and the rapid postwar increases in the ratio, a consistent pattern of a gradually rising trend followed by a declining one.

The same article attempts to assess trends in constant-dollar trade ratios between 1890 and 1954, but the results are vitiated by the use of a single (unexplained) deflator for the exports of all the countries listed. In the case of the United States, for example, Deutsch and Eckstein show a growth rate of 31.9 per cent per decade in the volume of exports, as compared with one of 33.8 per cent for national income. The NBER index, however, shows a growth in exports of 36.6 per cent per decade—higher than domestic output rather than lower.

The new NBER price and quantity indexes enable us to investigate the relations between trade and output in the United States for the last eighty years in real terms, as is done in the theoretical literature, rather than purely in money terms—the only possibility up to now.

We shall also glance at the period before 1879 by taking advantage of some recently constructed estimates of U.S. commodity output since 1839.

### U.S. TRADE-OUTPUT RATIOS

When the export and import trade of the United States is compared with current-value gross national product or commodity output, the expansion that was so evident in Chart 9 vanishes completely. Instead, the data seem to confirm the pessimistic predictions about the course of world trade discussed earlier. Ratios of exports to GNP<sup>9</sup> (Table 5 and Chart 10), after fluctuating between 6 and 7 per cent during most years before World War I (slightly higher during the 1870's), dropped as low as half that

<sup>9</sup> Absolute levels of trade-output ratios cannot easily be translated into measures of the importance of foreign trade to the economy. There are differences in valuation, for example—foreign trade prices probably lying somewhere between the producers' prices of the Shaw data and the purchasers' prices of the Kuznets data. And there are difficulties in choosing a concept of output: for individual commodities and narrowly defined industries, gross output is the closest to exports and imports, but becomes inflated by duplication as these are combined into larger industries or total output. Exports and imports are free of duplication in the sense that a product exported in crude form will not be exported again as a manufactured item, although it is true that a product imported as a crude material may be exported in processed form. The use of an unduplicated total such as finished manufactures is an imperfect solution because many exports and imports are in a crude or semimanufactured state. Value added, another possible denominator, is an attribute of industries rather than commodities.

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level during the 1930's and then recovered only to an average of about 5 per cent after World War II.

For imports the decline was even greater; the ratio to GNP in the 1870's ranged between 5½ and 9 per cent, averaging about 7 per cent. It fell in two sharp drops after 1871 and again after 1895, to a level of between 4½ and 5 per cent just prior to World War I. Another sharp drop after 1929 brought the ratio down to around 3 per cent, and the postwar recovery did not carry it much above 3½ per cent.

Values of international trade have been compared in the literature with several measures of output. Table 5 indicates that the conclusions drawn would not be substantially affected if any of three common measures were used. The ratios of trade to GNP (column 2) show the steepest decline, partly because GNP includes services, which were growing more rapidly than commodity output. From 1869-89 to 1930-39 the ratio of exports to GNP fell 47 per cent and that of imports 53 per cent.

TABLE 5  
RATIOS OF EXPORTS AND IMPORTS TO DOMESTIC OUTPUT,  
CURRENT DOLLARS

	Output of Finished Commodities and Con- struction Materials, Producers' Prices (Shaw)	GNP (Kuznets)	Flow of Commodities to Consumers plus Gross Producers' Durables, Purchasers' Prices (Kuznets)
RATIO OF EXPORTS			
1869-1889	14.8 <sup>a</sup>	7.0	11.0
1879-1889	15.3 <sup>b</sup>	6.9	10.9
1889-1913	14.2	6.8	11.5
1922-1929	12.0	5.3	9.3
1930-1939	8.8	3.7	6.2
1948-1957		5.1	8.2
1958-1960		4.7	
RATIO OF IMPORTS			
1869-1889	13.8 <sup>a</sup>	6.6	10.3
1879-1889	13.6 <sup>b</sup>	6.2	9.8
1889-1913	10.7	5.1	8.6
1922-1929	10.4	4.6	8.0
1930-1939	7.3	3.1	5.1
1948-1957		3.5	5.5
1958-1960		3.6	

SOURCES: See Table 6. Shaw data are total output through 1913 and "output destined for domestic consumption" thereafter. The 1869-89 ratio comparable to later years is 14.7.

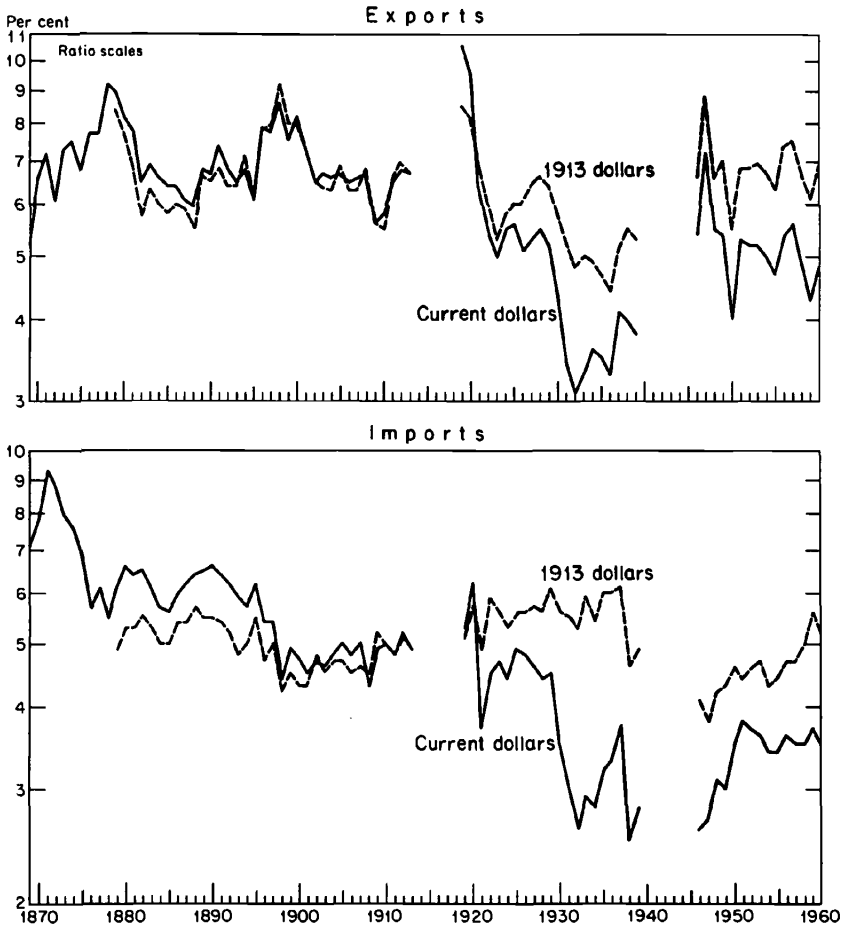
<sup>a</sup> Exports and imports are average of 1869-89. Output data are average of 1869, 1879 and 1889.

<sup>b</sup> Exports and imports are average of 1879-89. Output data are average of 1879 and 1889.

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CHART 10

Exports and Imports as a Percentage of Gross National Product,  
Current and 1913 Dollars



Source: Appendix Table G-11.

Ratios to the Kuznets commodity flow series (column 3) declined less rapidly—by 44 and 50 per cent during the same period—but by 1948-57 they had virtually caught up with the GNP percentages. Trade declined least when measured against the Shaw series, 41 per cent for exports and 47 per cent for imports from 1869-89 to 1930-39.

In the twenty years before the Civil War, export ratios (based on Gall-



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man's recently published estimates of commodity output),<sup>10</sup> were somewhat lower on the average than in the rest of the years before World War I. Import ratios were, however, slightly higher before 1860 than after.

We may say, then, that there seems to have been a large and consistent decline, extending over a period of more than a century, in the ratio of the value of imports to the value of American domestic production. This decline has taken place mainly in several large jumps. Export ratios, comparatively stable before World War I, have been considerably lower ever since.<sup>11</sup>

When the effect of price change is removed, a very different picture emerges of the relation between the quantity of trade and output since 1879.<sup>12</sup> Export ratios in 1913 dollars were at approximately the same level during the 1920's as before World War I; they were cut sharply after 1929, but regained their earlier levels after World War II (Chart 10 and Table 6). The postwar ratios have been above those of the 1880's and approximately equal to those of the 1890-1913 period; no downward trend is evident.

The behavior of the import ratio, too, was strikingly different when constant-price figures were used. After some decline between the 1880's and the 1890's, the import ratio rose and maintained, during the 1920's, a higher level than in the whole prewar period (in sharp contrast to the current-dollar figures).<sup>13</sup> During the 1930's, when the current-dollar import

<sup>10</sup> Robert E. Gallman, "Commodity Output, 1839-1899," *Trends in the American Economy in the Nineteenth Century*, Studies in Income and Wealth, Vol. 24, Princeton University Press for NBER, 1960.

<sup>11</sup> The difference in trend between export and import ratios is a reflection of the shift in the international capital position of the United States.

<sup>12</sup> Lacking export and import price indexes for earlier years, we cannot study quantity relationships before 1879. Douglass C. North has recently published new export and import price indexes for the period 1790 to 1860 in *The Economic Growth of the United States, 1790-1860*, Englewood Cliffs, N.J., 1961. But the tasks of linking these to indexes for later years and filling the gap between 1860 and 1879 still remain. The existing indexes for these years, discussed in the Introduction, appear too weak to support any conclusions regarding long-term trends.

<sup>13</sup> This seems to contradict the general impression. For example, in Don D. Humphrey, *American Imports*, New York, 1955, a chart on p. 19 and a table in Appendix 1, p. 527, show a fall of 38 per cent between 1890 and 1919 in the ratio of imports to finished commodity output in constant dollars (Shaw's data). Our figures indicate virtually no change in this interval. The difference between the two findings arises mainly from Humphrey's use of the U.S. Wholesale Price Index to deflate imports. The Wholesale Price Index rose 147 per cent during these years, considerably more than the implicit index underlying his denominator (Shaw's series for finished commodity output destined for domestic consumption), which rose only 119 per cent. Our import price index, in contrast, rose less than the implicit deflator—only 85 per cent. Humphrey was aware of the possibility of bias in his deflator but apparently felt that the Kreps index (T. J. Kreps, "Import and Export Prices in the United States and the Terms of International Trade, 1880-1914," *Quarterly Journal of Economics*, August 1926), which was the only one available at the time he wrote, was overly dominated by coffee, sugar, and wool (see Humphrey, *American Imports*, note p. 20 and p. 99).

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ratio fell to half the level of the 1880's, the quantity ratios were the highest since 1879. Only after 1937 did the constant-dollar import ratios drop sharply, falling by a third within five years, to the lowest levels in our record. After World War II, they began to climb sharply until, in the years 1958-60, they again reached a level similar to that of the 1880's.

Over the whole period, then, the only suggestions of a downward trend in the ratios of the quantity of trade to output were the low interwar export and postwar import ratios. Both now appear to have been temporary. It is clear, therefore, that the well-known decline in the value ratios has been largely a price phenomenon. It is a reflection of the fact, pointed out in Chapter 1, that both import and export prices have fallen, in the long run, compared with domestic prices.

Thus, although current value export ratios have followed roughly the pattern expected by Sombart (and others mentioned earlier), ratios for

TABLE 6  
RATIO OF EXPORTS AND IMPORTS TO DOMESTIC OUTPUT,  
1913 DOLLARS

	Output of Finished Commodities and Con- struction Materials, Producers' Prices (Shaw)	GNP (Kuznets)	Flow of Commodities to Consumers plus Gross Producers' Durables, Purchasers' Prices (Kuznets)
		RATIO OF EXPORTS	
1879-1889	14.3 <sup>a</sup>	6.4	10.4
1889-1913	14.7	6.8	11.5
1922-1929	12.0	6.1	10.6
1930-1939	10.2	5.1	8.2
1948-1957		6.7	10.8
1958-1960		6.5	
		RATIO OF IMPORTS	
1879-1889	12.0 <sup>a</sup>	5.3	8.7
1889-1913	10.5	4.8	8.2
1922-1929	11.2	5.7	9.9
1930-1939	11.1	5.5	8.9
1948-1957		4.5	7.2
1958-1960		5.3	

SOURCES: Kuznets data: Simon Kuznets, *Capital in the United States: Its Formation and Financing*, Princeton for NBER, 1961, and unpublished worksheets underlying that study. Shaw data: William H. Shaw, *Value of Commodity Output Since 1869*, New York, NBER, 1947, series entitled "Output destined for domestic consumption." Exports and imports are from Table A-6.

<sup>a</sup>Exports and imports are average of 1879-89. Output is average of 1879 and 1889.

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current-dollar imports and constant-dollar exports and imports for the United States appear to contradict his thesis. It is in real terms that the pessimistic outlook for the future of international trade has usually been stated and theoretically justified.

### *Agricultural Trade and Output*

#### BACKGROUND OF THE PREWAR AGRICULTURAL EXPORT TRADE

Despite increasing industrialization after the Civil War, agricultural exports were predominant in U.S. trade throughout the nineteenth century. For almost 100 years, until the early 1890's, agricultural products were 73 to 83 per cent of total exports,<sup>14</sup> and even at the beginning of World War I they still accounted for almost half. Thus, agricultural exports virtually kept pace with the rapid growth of industrial exports almost to the end of the nineteenth century. At that time, their share of total exports began a fifty-year decline, leveling off only during the last few years at a little over 20 per cent.

Since agricultural exports played so large a role, the development of American trade during this period must be studied against the background of shifting and interacting supply and demand conditions for agricultural production in the United States and her chief market—Europe. These supply and demand changes were interrelated; long-term shifts in supply conditions encouraged and yet depended on the changes in demand.

The changes on the demand side were such familiar economic events of the nineteenth century as the growth of cotton textile manufacturing, the urbanization and industrialization of Europe with the attendant growth of income and the decline of European agriculture.<sup>15</sup> The Eastern seaboard of the United States played the same role vis-à-vis the West that Europe played in relation to the United States as its population shifted from rural to urban areas and from agriculture into manufacturing.

On the supply side, the second half of the nineteenth century represented the climax in the development of American agriculture and the agricultural export trade. Farm output grew at a rapid and fairly constant rate throughout the nineteenth century,<sup>16</sup> but it slowed down at the

<sup>14</sup> *Foreign Commerce and Navigation of the United States*, 1902, p. 73.

<sup>15</sup> Some of these developments are summarized in Edwin G. Nourse, *American Agriculture and the European Market*, New York, 1924, pp. 8-42 and 239-276.

<sup>16</sup> Marvin W. Towne and Wayne D. Rasmussen, "Farm Gross Product and Gross Investment in the 19th Century," *Trends in the American Economy in the Nineteenth Century*, Studies in Income and Wealth, Vol. 24, Princeton University Press for NBER, 1960. Some of the constancy in the rate of growth may have been imparted by the estimating procedure.

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beginning of the twentieth century and never regained its earlier rate.<sup>17</sup> Agricultural productivity and output per capita increased faster in the second half of the century than in the first; per capita output reached levels that were never attained again.<sup>18</sup>

The growth of farm output was associated with great expansions in the farming area of the United States. The land added to farms in the fifty years ending in 1900 was almost twice the 1850 acreage, and almost equaled that added in all other years. After 1900, growth in the farming area slowed considerably.<sup>19</sup>

The major increases in farm output, and particularly those in the major export products, involved not only expansions in the farming area but also large-scale migrations of production to new areas. In the first half of the century the major migration was that of cotton production from Georgia and South Carolina (the original producers and still responsible for more than half of the output in 1820), to Mississippi, Louisiana, Texas, and Arkansas, which accounted for most of the increase in output after the 1830's.<sup>20</sup>

The migration of grain and meat production was the outstanding feature of the second half of the century. In 1850 the North and South Atlantic states accounted for more than half the wheat and oats, almost half the cattle (other than dairy cattle) and over 30 per cent of corn output and swine. Only 14 per cent of the swine, 15 per cent of the cattle, and 12, 6, and 5 per cent of the corn, oats, and wheat, respectively, were accounted for by the states west of the Mississippi. By 1900 the share of the Atlantic states in all of these products had fallen to 10-13 per cent; west of the Mississippi it ranged from 48 per cent for oats to 65 per cent for wheat and 70 per cent for cattle.<sup>21</sup>

Accompanying the westward expansion of agriculture was the growth of railroad mileage, which more than doubled between the end of the Civil War and 1879, more than redoubled by 1899, but increased much more slowly thereafter.<sup>22</sup> With the forging of railroad connections both the eastern United States and Europe were brought economically closer to the

<sup>17</sup> Appendix Table G-9.

<sup>18</sup> Appendix Table G-6, and Towne and Rasmussen, "Farm Gross Product."

<sup>19</sup> U.S. Department of Agriculture, *Agricultural Statistics, 1957*, p. 520.

<sup>20</sup> U.S. Statistics Bureau, Treasury Department, "The Cotton Trade of the United States and the World's Cotton Supply and Trade," *Monthly Summary of Commerce and Finance of the U.S.*, March 1900, pp. 2545-2552.

<sup>21</sup> U.S. Census Office, *12th Census of the United States: 1900*, Vols. V and VI, and U.S. Bureau of the Census, *13th Census of the United States: 1910*, Vol. V.

<sup>22</sup> U.S. Bureau of the Census, *Historical Statistics of the United States, 1949*, pp. 200, 202.

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West by falling freight rates. For example, rates for the shipment of wheat from Chicago to New York by lake and canal fell by more than 50 per cent between 1860 and 1879 and by another 50 per cent from 1879-1899; rail rates for the same product fell by 50 per cent between 1869 and 1879 and about 30 per cent more by 1899.<sup>23</sup> Ocean freight rates for American exports also fell drastically during the nineteenth century, particularly before 1850 and after 1870.<sup>24</sup>

With rapidly increasing production and falling prices and transportation costs, American grain and meat products invaded European markets. American wheat, for example, drove both German and Russian wheat from the English market during the 1860's and 1870's, and supplied more than half of British wheat imports to the end of the 1800's.<sup>25</sup> In a similar way American meat products captured the British market from European suppliers who had dominated it before the 1870's, although the newer exporting areas, such as Argentina and Australia, began to challenge the American position toward the end of the century.<sup>26</sup>

After the 1890's there was a sharp reversal in the agricultural situation. The expansion in the farming area slowed, and the increase of farm production, which had raced ahead of the growth of population in the 1870's and more than kept pace with it during the 1880's and 1890's, began to lag behind. The quantity of agricultural exports, which had multiplied several times since the Civil War, began to fall slightly, while agricultural prices recovered from their long post-Civil War decline and began to rise more rapidly than other prices. European countries turned to new sources of food: Canadian, Indian, and Australian wheat; Argentine beef; and Canadian and Danish bacon, for example, all began to supplant American products in the British market.

### TRENDS IN U.S. EXPORTS AND OUTPUT OF AGRICULTURAL PRODUCTS

Values of U.S. agricultural exports after World War II were ten times those of the post-Civil War period and triple those of the years just before World War I (Chart 11). Only the depression of the 1930's reversed the

<sup>23</sup> U.S. Bureau of Statistics, Treasury Department, "The Grain Trade of the United States and the World's Wheat Supply and Trade," *Monthly Summary of Commerce and Finance of the U.S.*, January 1900, p. 1973.

<sup>24</sup> Douglass North, "Ocean Freight Rates and Economic Development, 1750-1913," *The Journal of Economic History*, December 1958.

<sup>25</sup> U.S. Bureau of Statistics, Treasury Department, *Monthly Summary of Commerce and Finance of the U.S.*, January 1900, p. 2058.

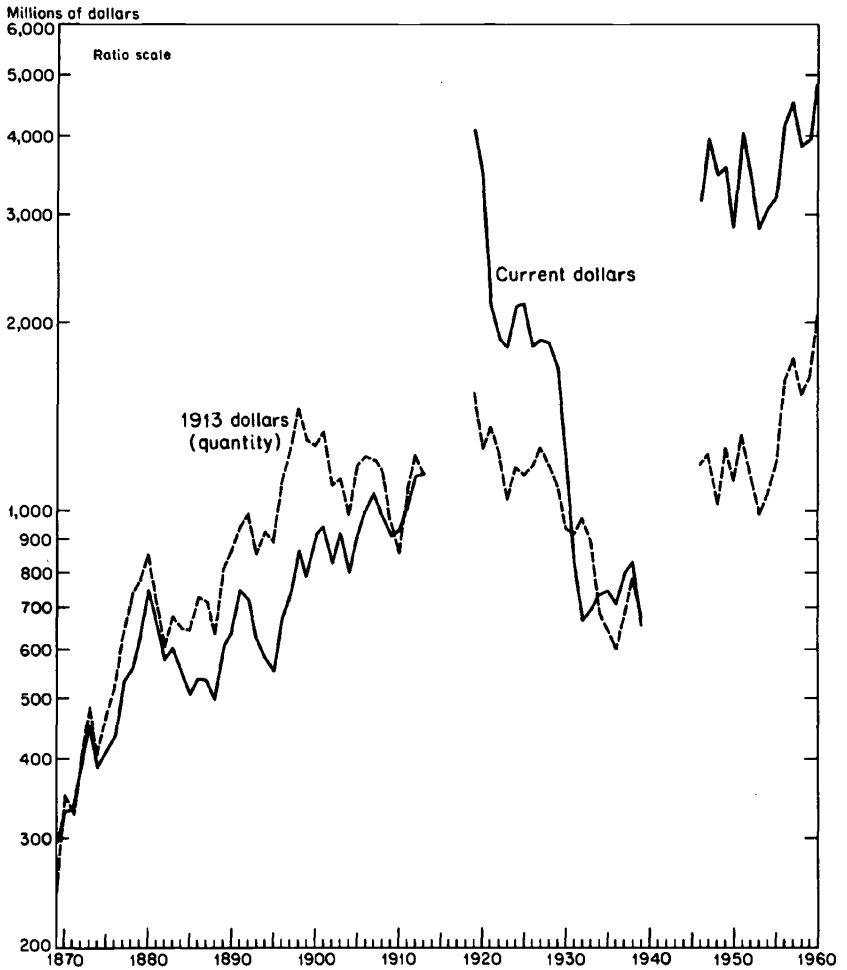
<sup>26</sup> U.S. Bureau of Statistics, Treasury Department, "The Provision Trade of the United States and the World's Provision Supply and Trade," *Monthly Summary of Commerce and Finance of the U.S.*, February 1900, pp. 2328-2336.

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trend for any length of time, slashing export values to 40 per cent of those in the 1920's and reducing them below the average value of the decade before World War I. The advance in general was an uneven one, slowing during the 1880's and 1890's and accelerating during the two wars.

The quantity of agricultural exports showed no such growth. Its rapid increase until the late 1890's—much faster than the values—was followed

**CHART 11**  
**Value of U.S. Agricultural Exports, Current and 1913 Dollars**



Source: Appendix Table A-7.

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by a long period of stagnation. The levels just after World War II were no greater than those of the 1890's, more than fifty years earlier. Only recently have exports of agricultural products come to life again, growing, at least for a few years, at a rate reminiscent of the nineteenth century.

Because of this lack of growth over so many years, the quantity of agricultural exports declined relative to total national output. The extent of this fall is shown in Chart 12. Before 1900 agricultural exports were almost always above 5 per cent of deflated GNP—slightly higher in the 1870's than in the eighties and nineties. By the 1930's, a long, steady decline had carried them below  $1\frac{1}{2}$  per cent of GNP. They have remained roughly at this level since that time. Data for current-value ratios, not shown in the chart, tell much the same story.

There are two possible explanations for this reduction in the importance of agricultural exports. It might have reflected the shifting of resources out of agriculture within the domestic economy, or it might have implied a shift within U.S. agriculture away from dependence on foreign markets and toward reliance on domestic consumption.

Over the period as a whole, as can be seen in Chart 12, the first factor was the crucial one. The decline in agriculture's share of gross national product is much steadier than, but roughly parallel to, the decline in the ratio of agricultural exports to GNP. This rough, long-run agreement is reflected in the fact that the ratio of agricultural exports to agricultural gross product shows no long-term trend.<sup>27</sup>

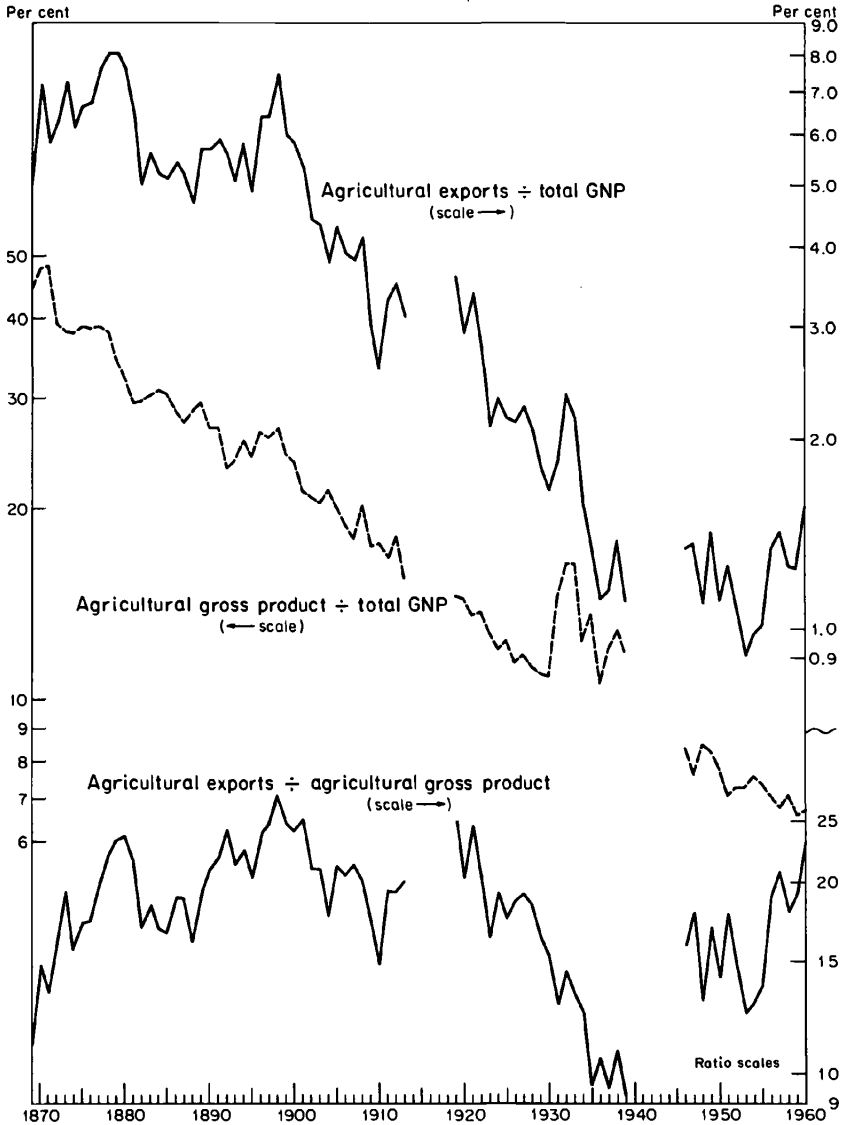
Despite the fact that the fall in agriculture's share of gross output explains the long-run fall in the ratio of agricultural exports to GNP, some very substantial shorter-term changes in the ratio remain to be accounted for. There is, in particular, the contrast between the steady decline in the domestic position of agriculture since 1869, and the failure of agriculture's share of exports, measured in constant or current dollars, to decline until the 1890's. This contrast reflects a considerable shift toward foreign markets for farm products; agricultural exports rose from about one-eighth of agricultural gross output just after the Civil War to a peak of roughly one-quarter at the end of the 1890's. After that, however, the

<sup>27</sup> This ratio is only a crude measure of the importance of export trade to farm income. On the one hand it tends to overstate the importance of exports because an agricultural product will have a higher value at the port of shipment than at the farm. Even if the product has not been processed, the export price includes value added by the transportation and, perhaps, the wholesale trade or service industries. Processed farm products contain value added in manufacturing as well.

On the other hand, the export ratio tends to understate the role of international trade because many products of agricultural origin, such as textiles and leather goods, drop out of the agricultural class between the farm and the port of export.

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CHART 12  
 Relations of Agricultural Exports, Agricultural  
 Gross Product, and GNP, 1913 Dollars



Source: Appendix Tables G-10, G-12, and G-14.



foreign share began to fall; following a brief rebound during World War I, it plummeted during the thirties to the lowest level since before 1869. World War II again lifted the ratio, which has continued to rise erratically toward the prewar levels.

The high ratio of exports to gross income within agriculture in the 1890's represented a peak not only for the post-Civil War years but apparently for the nineteenth century as a whole, judging from current-dollar data on agricultural production. A comparison of agricultural exports with the Towne-Rasmussen output series,<sup>28</sup> shows that the ratio rose from 11 and 12 per cent in 1800 and 1810 to 13 per cent or more in 1840 and 1850, almost 18 per cent in 1860, and between 20 and 23 per cent in 1880-1900.

The significance of the foreign market to American agriculture is only partially indicated by the level of these ratios, even apart from the ambiguities in them mentioned earlier. Exports were much more important for some crops than for others and were particularly important to individual products when their output was expanding most rapidly. It might be said that the existence of a broad foreign market made possible some of the great spurts in production by providing an incentive to produce goods which could have been sold on the domestic market only at much lower prices.

Cotton, which dominated U.S. agricultural exports before 1860, is the prime example of an export-dependent commodity. During the period of the most rapid growth in cotton production, between about 1815 and 1840, the export ratio rose to almost 80 per cent and remained near that mark. From 1870 to World War I output grew somewhat less rapidly than before the Civil War, and the export ratio fell to 65-70 per cent. Production leveled off after that, and the export ratio continued to fall, until in recent years it has rarely been above 40 per cent.

After supplying 80 per cent of the increase in agricultural exports between 1800 and 1860, cotton lost its leading role and provided only 14 per cent of the growth over the last forty years of the century. The main role then shifted to grain and meat products, which accounted for over 70 per cent of the increase between 1856-60 and 1895-99. Production data show that the growth in cotton output slackened after the middle of the century; the growth of output of food grains, feed grains, and livestock accelerated.<sup>29</sup> Per capita output of food and feed grains and livestock hardly changed from 1800 to the 1850's. After that all three rose until the 1890's and then declined until the beginning of World War I. Except for cotton,

<sup>28</sup> "Farm Gross Product."

<sup>29</sup> *Ibid.*, pp. 282, 292.

### TRENDS IN VALUES AND QUANTITIES

the peak in exports and export ratios coincided with that brief period when production ran ahead of the increase of population. The peak in cotton export ratios coincided with the most rapid increase in per capita output.

The story can be put in another way. The pattern of exports for the major food items can be at least roughly inferred from the output data by assuming constant per capita consumption. This stability in consumption, in the face of changing farm prices and growing real incomes, suggests that domestic price and income elasticities were low, as might be expected. These low elasticities imply that the absorptive ability of the foreign market was a prerequisite for the great expansion in American agriculture after the Civil War.<sup>80</sup>

Some further data on individual commodities emphasize the role of export trade in the expansion of agricultural output after the Civil War. Exports of pork products were never very high relative to farm income from hogs: less than 7 per cent in 1869-73, 21 per cent in 1899-1903, and 17 per cent in 1904-8. But of the increment in gross income between the first and last of these periods, exports supplied 57 per cent; and the increase in exports between the first and second periods was greater than the growth in gross income. Corn exports rose from a little over 10 per cent of production entering gross income in 1869-73 to over 20 per cent in 1899-1903, and the addition to exports was about 26 per cent of the addition to production. Exports were always important relative to wheat output—some 24 per cent in 1869-73 and 36 per cent in 1894-98. But they were still more important in the increment to production—almost 50 per cent in the same period.

For some commodities, foreign trade, then, quickly provided an extensive market which could only have been created much more slowly by the growth of the American economy itself. In this respect American development depended on the willingness of the older industrial nations, particularly the U.K., to permit their domestic resources to be shifted out of agriculture by the influx of cheaper products from the developing areas.

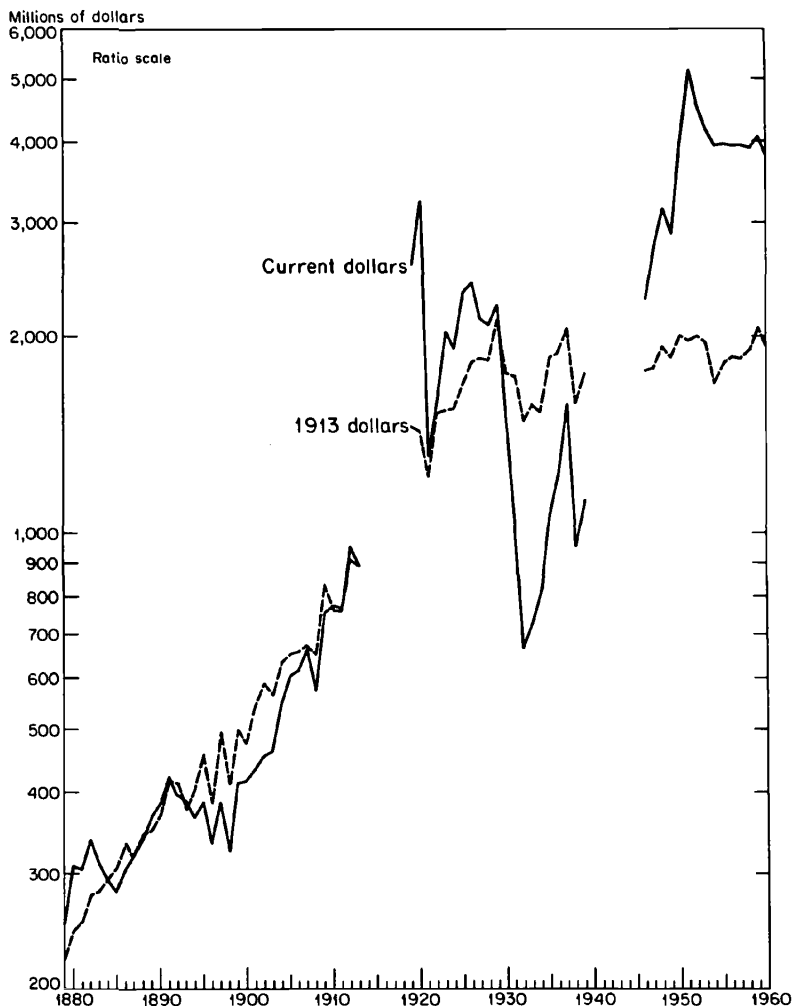
### TRENDS IN U.S. AGRICULTURAL IMPORTS

Agricultural imports, like exports, have shown a large long-term increase in values (Chart 13). The short-run similarity between the two value series, however, is mainly imposed by large price movements such as those

<sup>80</sup> It should be noted that the crude assumption of constant per capita consumption will not serve at all for cotton. The export ratio fell after 1840 while output per capita was still increasing.

CHART 13

Value of U.S. Agricultural Imports, Current and 1913 Dollars



Source: Appendix Table A-7.

during the two world wars. Over the long run, agricultural exports rose much more than imports in price, but rose much less in quantity.

Agricultural imports in 1913 dollars increased rapidly, and at a remarkably steady rate, before World War I. They showed none of the sharp fluctuations that were present in exports and no retardation after the 1890's. The interwar period found them between 50 and 100 per cent

## TRENDS IN VALUES AND QUANTITIES

above the prewar level, even during the 1930's,<sup>31</sup> and they remained in this range after World War II.

The great swings in the agricultural import value series were almost entirely in prices—even the tripling or more in value that took place during and after World War II. Despite the turbulence of the years that followed World War I the volume of agricultural imports hardly ever moved more than 15 per cent above or below the level of the 1920's. Relative to GNP, the value of agricultural imports declined before World War I, particularly during the 1890's, and continued to fall in the interwar and postwar years (Chart 14). But the quantities behaved very differently. Their ratio to deflated GNP was very steady before 1913 and then jumped to a considerably higher level, which was sustained through the 1930's. Only after 1937 did they really decline—far below earlier levels—and the decline has persisted until recent years.

Since agriculture was so steadily declining in importance in the domestic economy, all these trends are rotated counterclockwise when comparisons are made with gross farm output rather than GNP. Thus the volume of agricultural imports rose sharply relative to gross farm output in the prewar period. Even import values increased somewhat in comparison with current-dollar agricultural gross income. Imports in the interwar and postwar periods were higher relative to domestic farm output than before World War I in both quantities and values, particularly in the former. Despite the downward drift in the ratios, they still remain considerably above those of prewar days.

The growth of agricultural imports in comparison with agricultural output and exports cannot automatically be assumed to represent the result of direct competition between imports and domestic products. The two groups contain very different commodities and some of the largest appear on only one side of the account. Much of the competition between domestic and foreign agriculture is of a sort not revealed by foreign trade data; it is competition within the U.S. between imports and domestically-produced crops and in other countries, between exports and foreign-produced products.

### *Trade in Manufactured Articles*

It is difficult to date the end of agricultural predominance in exports and the beginning of the rise of manufactures. Our series indicate that the

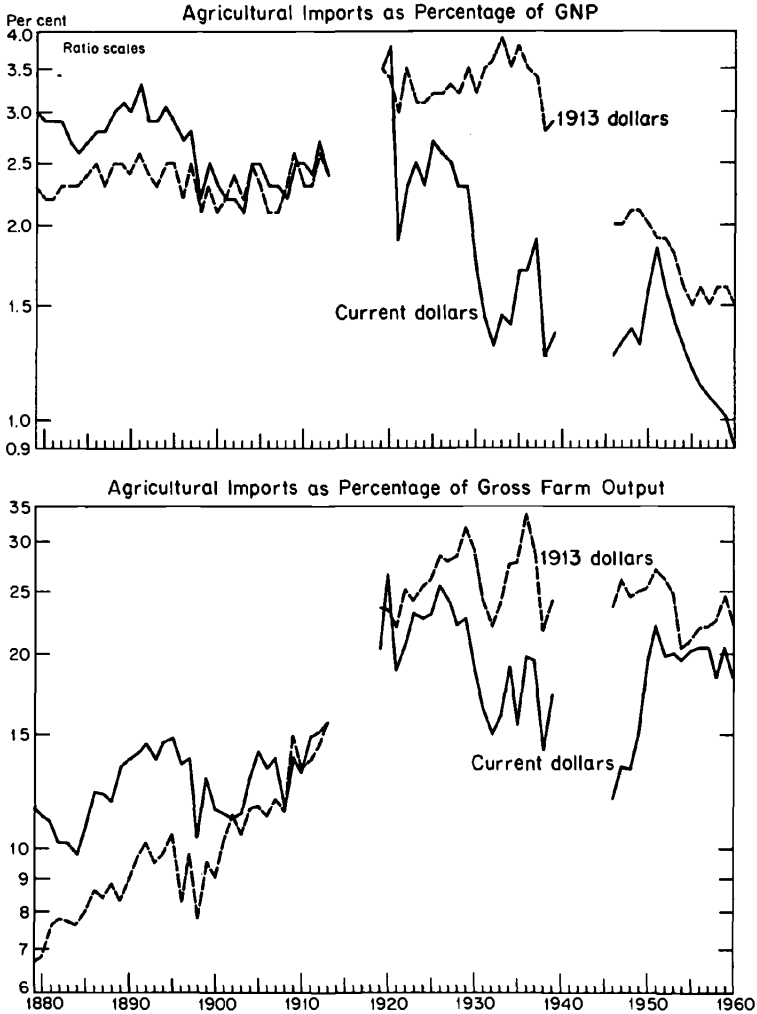
<sup>31</sup> There is some evidence that agricultural imports in the 1930's were sustained by the severe drought which afflicted the grain-growing areas of the United States. See John H. Adler, Eugene R. Schlesinger, and Evelyn Van Westerborg, *The Pattern of United States Import Trade Since 1923*, Federal Reserve Bank of New York, 1952.

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share of agricultural products in total exports remained almost unchanged from 1800 through the early 1890's (despite the relative decline of agriculture in the labor force and in national income).

Only after the 1890's did it begin to fall steadily. This constancy in the share of agricultural products in exports is partly conceptual : we consider

**CHART 14**  
**Agricultural Imports as a Percentage of Farm and Total GNP,**  
**Current and 1913 Dollars**



Source: Appendix Tables G-12 and G-14.

### TRENDS IN VALUES AND QUANTITIES

as agricultural a number of manufactured foods, such as flour and meat, which are treated in income and labor force statistics as products of manufacturing. Ideally, the export values should be divided among the sectors (including transportation) in proportion to their contribution to value added up to the point of export.<sup>32</sup>

It is possible to roughly estimate the effect of applying the domestic industry classification to the trade figures. Excluding manufactured foods, the share of agricultural products in total exports ranged from 60 to 70 per cent until the late 1870's,<sup>33</sup> and then began to fall. In other words, the share of manufactured foods in agricultural exports (as defined here) began to increase in the 1870's. Between 1820 and 1870 it had varied generally between 14 and 25 per cent, and had been close to 15 per cent in the years just before and after the Civil War. Subsequently the share began to rise, reaching 37 to 39 per cent in the middle 1890's, thus offsetting the falling importance of crude agricultural products. The ratio of manufactured food to total agricultural exports fell below 30 per cent after 1908. It was again below that level during the interwar period but has frequently been higher since the beginning of World War II.

The inclusion of certain products of manufacturing industries in agricultural exports requires some explanation. Aside from reasons of convenience, such as the fact that crude and processed foods are customarily combined in international trade statistics, there is an economic argument as well. As illustrated in Table 7, the food industries which supplied the main items of exports, meat packing and flour milling, had a comparatively small part of their total value added in manufacturing. Costs other than purchased materials accounted for only 12 to 16 per cent of the total output in these industries, and most of the materials purchased came from agriculture. In all other industries combined, despite the fact that some food industries are included, costs other than purchased materials accounted for 41 to 49 per cent of the value of output. Furthermore, many of the materials were obtained from other manufacturing industries rather than from agriculture.

Because of the very large role of purchases from agriculture in the total value of manufactured food products, agricultural developments appear

<sup>32</sup> This can be done using the type of data assembled for an input-output table. See, for example, Conference on Research in Income and Wealth, *Input-Output Analysis, Technical Supplement*, New York, NBER, 1954, Chap. 3. But such tables would be needed, not for one year, but for a historical series.

<sup>33</sup> This is a rough estimate made by subtracting manufactured foods from total agricultural products. It is too low by amounts between 1 and 5 per cent, judging from the evidence of the period after 1879, because some of the manufactured foods subtracted had never been included in the agricultural total.

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more relevant for understanding the trade in manufactured foods than changes within manufacturing.

Despite the industrial development of the United States, exports of manufactures (nonfood manufactured products) had not, by the late 1890's, encroached substantially on the overwhelming share of agricultural products. In the next fifty years, however, manufactures became the leading export, accounting for more than all the other classes combined (Chart 15). Since World War II, the share of manufactures in total exports seems to have leveled off at about 60 per cent.

TABLE 7  
MATERIALS AND OTHER COSTS IN RELATION TO VALUE OF PRODUCT:  
COMPARISON OF MAIN FOOD INDUSTRIES WITH OTHERS,  
1880-1900  
(dollar figures in thousands)

	Value of Product	Cost of Materials	Other Costs	Other Costs as Per Cent of Value of Product
<i>Slaughtering and meat packing excl. retail butchering</i>				
1900	790,253	686,861	103,392	13.1
1890	564,667	482,897	81,770	14.5
1880	303,562	267,739	35,823	11.8
<i>Flour and grist mill products</i>				
1900	560,719	475,826	84,893	15.1
1890	513,971	434,152	79,819	15.5
1880	505,186	441,545	63,641	12.6
<i>All other industries</i>				
1900	11,653,428	6,182,727	5,470,701	46.9
1890	8,293,799	4,244,995	4,048,804	48.8
1880	4,560,831	2,687,540	1,873,291	41.1

SOURCE: U.S. Census Office, *Twelfth Census of the United States: 1900, Manufactures, Part 1* (1902), pp. 3, 8, and 14.

The ratio of manufactured exports to deflated GNP behaved similarly; it grew rapidly over the period as a whole, reaching its highest levels in the postwar period. But again, there is no evidence of a rising trend within the postwar years.

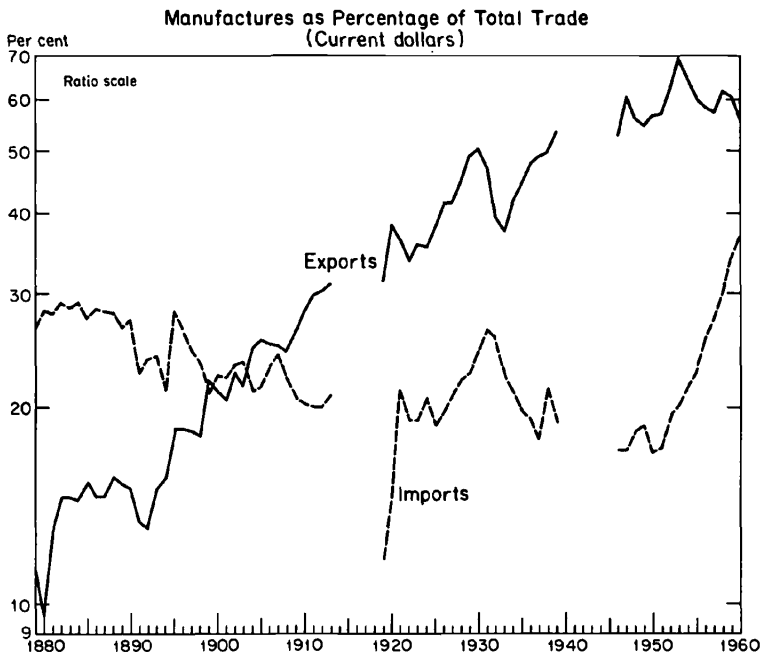
The rise of manufactures to a leading role in exports was partly a reflection of the increasing importance of manufacturing in the economy,

## TRENDS IN VALUES AND QUANTITIES

as exemplified by its growing share of the labor force and of national income. But the share of manufactures increased much more rapidly in exports than in the domestic economy as the growth of manufactured exports outstripped that of manufacturing output.

This difference in rate of growth is reflected in the ratio of exports to gross manufacturing output,<sup>84</sup> which more than doubled between the early years

CHART 15  
Trade in Manufactures Compared with Total Exports  
and Imports and GNP



<sup>84</sup> This calculation is more hazardous for manufactured than for agricultural products because the valuation questions are more important (see footnote 10). We have evaded the problem posed by valuation by comparing only indexes of export and import quantities and manufacturing output.

The ratio of value added to value of product is much higher in agriculture than in manufacturing. Therefore, the comparison of exports, which are a value-of-product measure, with gross output, which is a value-added measure, is more appropriate for the farm sector. Comparisons of exports and imports with value of production, by industry, were made in an unpublished study by Phyllis A. Wallace, reported on briefly by Solomon Fabricant in the National Bureau's 33rd Annual Report, May 1953, pp. 77-78. Some of the results of this study were published in an article by Irving B. Kravis on "Wages and Foreign Trade" in *The Review of Economics and Statistics*, February 1956.

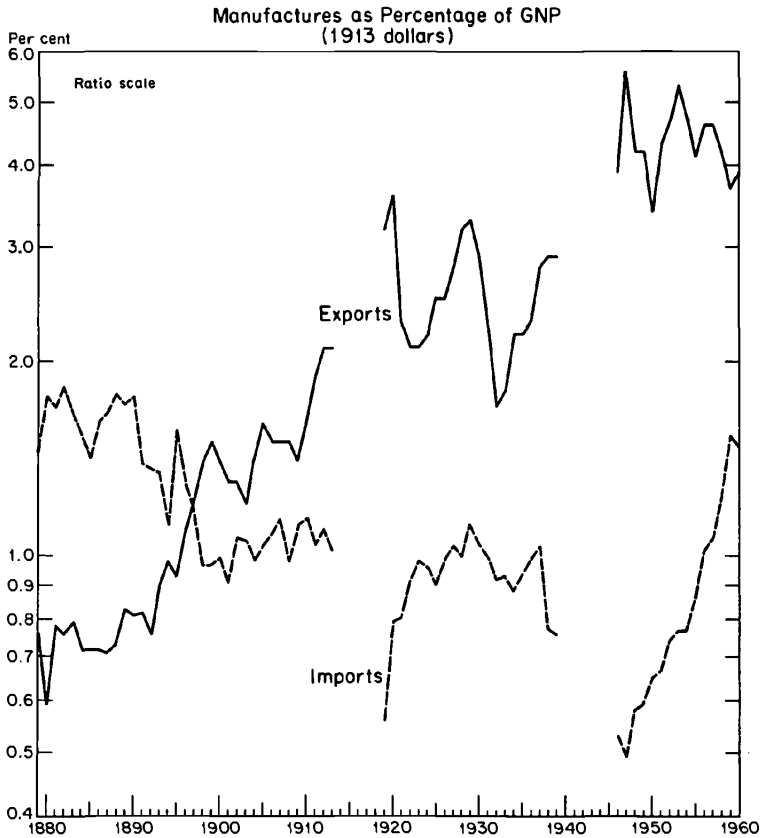


## TRENDS IN VALUES AND QUANTITIES

of our period and 1911-13 and rose another 50 per cent by the postwar period (Chart 16).

Manufactured products are an enormously varied collection of commodities, ranging from the simplest transformation of agricultural or mineral products to complex machinery or scientific equipment in which the cost of the original raw material is insignificant. The composition

### CHART 15 (Concluded)



Source: Appendix Tables A-6, A-8, A-10, and G-13.

of manufactured exports has been changing ceaselessly since 1879 in a fairly consistent direction—away from products of animal or vegetable origin and toward those of mineral origin. Among those of mineral origin, the trend has been away from commodities closely tied to the production of raw materials, such as petroleum products, to metal products, including

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machinery and vehicles; and within the metal products group the shift has been to the more complex machinery and vehicles.

In 1879-81, manufactured petroleum products and articles of animal or vegetable origin (mainly textiles, wood, and tobacco products) represented more than 65 per cent of American exports of manufactures, while all metal products accounted for only 21 per cent. But the leading commodities of 1879 contributed very little to the great surge in manufactured exports that followed: of the increase between 1879-81 and 1910-13, petroleum products, which were over 40 per cent of the total at the beginning, contributed only 13 per cent; textiles, which had been 16 per cent, added only 8. Metal products were responsible for 73 per cent of the gain, and doubled their share.

By the end of World War II, commodities of agricultural origin had dwindled still further in importance. Petroleum products had fallen to 5 per cent of the total, while metal products had soared to over 60 per cent. By 1957, petroleum and textiles combined were less than 8 per cent of manufactured exports, and textiles had declined even in absolute terms. The metal products group reached two-thirds of manufactured exports and, in 1949-1957, accounted for almost 75 per cent of the growth in this class.<sup>35</sup>

The very steep rise in exports of manufactures was not matched on the import side, although imports have increased almost continuously since 1870. Rapid advances occurred immediately after both world wars, the recent increase considerably surpassing the earlier one in quantity and, even more, in value and length.

For about seventy years (from 1879 to 1950), the share of manufactures in total imports showed a declining trend (Chart 15), except during the late 1920's, when skidding prices reduced the share of agricultural imports. Since 1950, however, manufactures have jumped from 17 per cent of imports to more than 35 per cent—considerably above the levels of the 1880's. One must go back to the early 1870's to find percentages as high.

<sup>35</sup> Many complex phenomena are buried in this summary. For example, the United States has steadily lost ground as a supplier of petroleum products according to the usual international trade statistics. But American-owned companies continue to supply capital, entrepreneurship, and technical skills for petroleum production abroad.

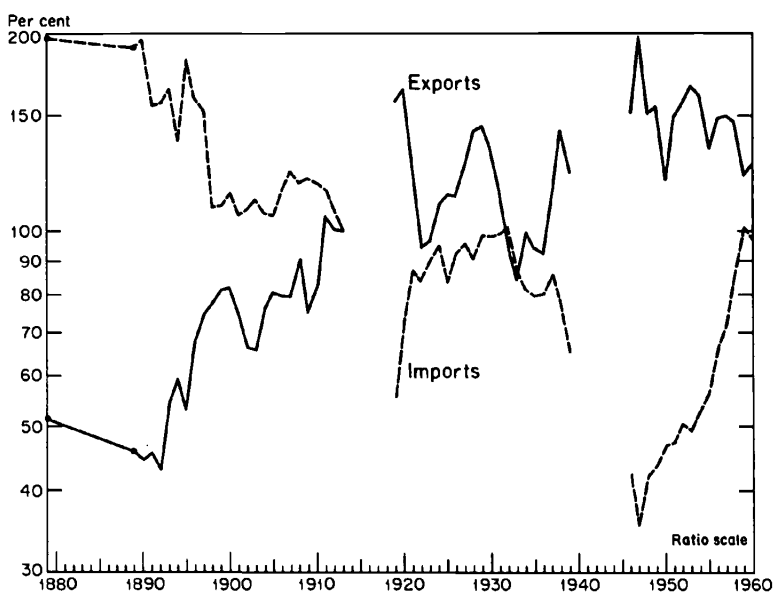
Another interesting case is that of rubber products exports, the main component of which was automobile and truck tires. Despite the growth in use of automobiles outside the United States between 1949 and 1957, this class did not even keep up with total manufactured exports. But exports of synthetic rubber, which appears among semi-manufactures, grew more than tenfold in the same period. Both groups consist of rubber products which are the output of domestic manufacturing industry and which contain a large technological component, but the shift from a finished to a semifinished product reduces the manufactured goods category.

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The ratio of manufactured imports to GNP in 1913 dollars also suffered a great decline from the 1880's to the late 1940's. It has recovered strongly since then, reaching the level of the 1880's in 1959 and 1960.

By comparison with domestic gross output in manufacturing, imports of manufactures had dwindled by the early postwar years, to less than one-quarter of the 1880-89 level (Chart 16). Since then they have recovered to the level of the 1920's but not to that of the prewar period.

CHART 16  
Ratio of Manufactured Export and Import Quantity Indexes  
to Manufacturing Output Index  
(1913 ratio = 100)



Source: Appendix Tables A-2 and A-4, and John W. Kendrick, *Productivity Trends*, output index on a 1913 base. (1955-60 from unpublished Kendrick tables.)

Imports of manufactures, like exports, have changed radically in composition. In both 1879-81 and 1890-94, textile products alone accounted for more than two-thirds of the total; by 1910-13 they had fallen to a half, and by 1949 to 20 per cent. Paper and paper products rose from 6 to more than 36 per cent, and metal manufactures from 8 to 13 per cent between 1910-13 and 1949.

The postwar resurgence of manufactured imports is of interest for a number of reasons. One is that reversal of the long-standing trend away

## TRENDS IN VALUES AND QUANTITIES

from manufactures would have implications for the stability of import demand and prices and for the U.S. balance of trade with other industrial nations. Another is that the changing composition of imports since 1949 has involved shifts almost identical with those in exports—away from products of agricultural or organic origin and towards products of mineral origin, particularly metal products (including machinery and vehicles). Textile and paper products, which constituted 60 per cent of all manufactured imports in 1949, shrank to 35 per cent by 1958, and accounted for only 22 per cent of the increase in imports of manufactures. But machinery, vehicles, and other metal products, the mainstays of American manufactured exports, increased their share of manufactured imports from 13 per cent to over a third during the same period, and were responsible for over 44 per cent of the increase in manufactured imports.

### *Price-Quantity Relations*

#### PRICES AND QUANTITIES WITHIN U.S. TRADE

We have collected in this study an array of matched price and quantity data covering a wide variety of commodity groups within U.S. exports and imports. No attempt has been made, except in a few cases, to go beyond U.S. trade data for the information on incomes and prices in other countries which could be built into a more complete analysis of price-quantity relations. And no attempt has been made to estimate the underlying supply and demand elasticities.

It has become a commonplace that a set of price-quantity observations cannot be assumed to trace out either the supply curve or the demand curve. However, these observations can be and are used to suggest inferences about the underlying functions.<sup>36</sup> Here we will only call attention to some of the empirical regularities in the data, and offer a few tentative explanations or interpretations of them. In particular we shall note the pervasiveness and strength of negative relations between prices and quantities, particularly over the long run.

This section deals only with evidence for commodity aggregates. Some inferences concerning price-quantity relations for individual commodities are drawn in Chapter 3. By examining the relation between Paasche and

<sup>36</sup> A recent example is an attempt to infer supply elasticities from price and acreage data for British wheat in the prewar period. See Mancur Olson, Jr., and Curtis C. Harris, Jr., "Free Trade in 'Corn': A Statistical Study of the Prices and Production of Wheat in Great Britain from 1873 to 1914," *Quarterly Journal of Economics*, February 1959.

### TRENDS IN VALUES AND QUANTITIES

Laspeyres price indexes, we find that substitution in favor of commodities with relatively declining prices was an almost universal feature in total exports and imports and within virtually all of the commodity classes.

The expectation of inverse price-quantity relations usually involves the response to relative price changes of relative quantities sold. But before 1913 there are quite clear examples of inverse relations between absolute volumes and prices for total exports and individual commodity classes. Total exports, for example, showed a rising trend from 1879 to 1913 (Chart 17). But there was a noticeable slackening in the rate of growth after 1898—the year in which export prices ended their long post-Civil War decline and turned upward. Before 1898 the only marked reversal in the growth in quantity was in the early 1880's. This was accompanied by a corresponding temporary reversal in the price decline.

Over shorter time periods, some parallel, instead of inverse, price and quantity movements emerge. Two sharp increases in export quantities (which occurred in 1888-92 and 1895-98, during the long-term downswing in prices) were accompanied by pauses in the price decline rather than by severe price cuts.

Exports of agricultural products and manufactured foods exhibit negative price-quantity relations more clearly, without the obscuring presence of strong trends. The period of rising agricultural exports coincides with the period of falling prices between 1882 and 1897-98, after which time, quantities declined slightly until World War I. It was as if the rising prices after 1898 (which, as noted in Chapter 1, were associated with a slowing in the growth of output and a decline in per capita output) choked off the growth of exports. Once again, however, short, sharp rises in export quantities temporarily stabilized prices in the course of the long-term decline.

For manufactured food exports, the period of rising prices before World War I was clearly associated with a decline in quantities rather than a retardation or cessation of growth. Again, short spurts in export quantities seemed to bring a slight increase in prices.

The difference between the long- and short-term patterns of price-quantity behavior suggests that the long-term changes represented shifts mainly in the supply function and the short-term changes, shifts mainly in the demand function. One would expect a negative price-quantity relation from the former and a positive one from the latter.

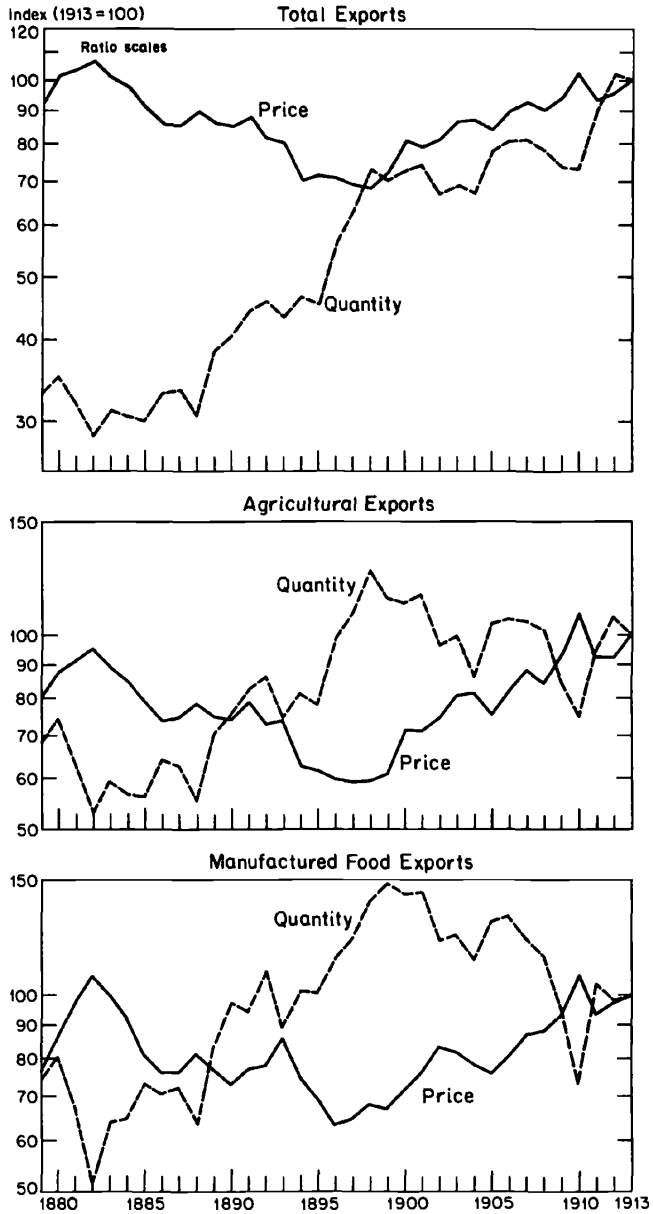
In the sphere of relative, instead of absolute, price-quantity relations a striking illustration was given by Folke Hilgerdt<sup>37</sup> of the inverse relation between the relative prices of primary and manufactured products and

<sup>37</sup> *Industrialization and Foreign Trade*, p. 18.

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CHART 17

Price and Quantity Indexes for U.S. Total, Agricultural, and Manufactured Food Exports



Source: Appendix Tables A-1, A-2, and A-5.

### TRENDS IN VALUES AND QUANTITIES

their relative quantities in international trade. Using three- to five-year averages, he showed that prices of primary products relative to those of manufactured goods fell between 1876-80 and 1896-1900, between 1911-13 and 1921-25, and between 1926-29 and 1931-35; they rose between 1896-1900 and 1911-13, between 1921-25 and 1926-29, and between 1931-35 and 1936-38. In each case the relative quantities moved in the opposite direction.

Hilgerdt's method of estimating quantities was probably biased in favor of an inverse price-quantity relationship. He constructed his estimates by deflating the value of world trade in manufactured goods by a price index. This price series, which related to Great Britain alone during much of his period, was probably a poor approximation of the true world price index, as we have suggested in Chapter 1. To the extent that it was, Hilgerdt introduced in his quantity estimates spurious changes inverse to those in the price index.<sup>88</sup>

However, we have encountered similar inverse relations in many instances where the likelihood of such bias was much smaller. A purely technical explanation, therefore, seems inadequate; an economic one is required.

Over short periods, changes in demand might be expected to outweigh those in supply. Yet, inverse price-quantity relations between primary (or agricultural) products and manufactured goods are frequent. One explanation is that 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. Some of these inverse movements go beyond short periods and encompass swings of ten or twenty years' duration.<sup>89</sup> Presumably these represent changes in supply conditions.

Along the same lines as Hilgerdt we have compared manufactured and agricultural products within exports and within imports. The export and import price trends differed markedly, as has been mentioned earlier. Within exports, manufactured goods became cheaper by comparison with

<sup>88</sup> The danger of spurious correlation is discussed further in Chapter 4.

<sup>89</sup> The influence of differences in supply elasticities may persist over longer periods because of differences in ease of entry and exit between agriculture and manufacturing. See Kindleberger, *The Terms of Trade*, pp. 227-231.

### TRENDS IN VALUES AND QUANTITIES

agricultural products; within imports they became more expensive. Since the 1930's, the direction of the import trend has been reversed.

Changes in export quantities have been broadly the opposite of those in prices (Chart 18). Over the long run the quantity of manufactured exports has increased rapidly relative to that of agricultural products, while the price of manufactured goods has fallen. Even the rate of growth of manufactured exports seems to have been related to price changes. After 1882, both quantity and price ratios were comparatively stable for ten or twelve years. Between the 1890's and 1913, manufactures prices fell and quantities rose rapidly relative to agricultural products. The interwar period was dominated by large fluctuations in the price and quantity ratios, mostly in opposite directions. Relative quantities of manufactures fluctuated about a higher level, and prices about a lower level, in the interwar period than in prewar years. In the postwar period manufactured exports were again much higher, relative to agricultural exports, while the price ratios hovered around the lowest level of the interwar period. Postwar short-term fluctuations, in relative quantities and prices, however, seem to have been completely independent.

The shares of manufactured and agricultural products in total exports have fluctuated inversely to the price ratios. Like the quantity and price ratios, they were stable for a time after 1882. Between the 1890's and 1913, the share of manufactures rose from 20 to over 30 per cent, while the relative price of manufactured exports declined.

Within imports, inverse behavior of prices and quantities was much less visible; even quite large movements in one variable were without reflection in the other (Chart 19). But taking whole periods at a time, one can observe the phenomenon here too.

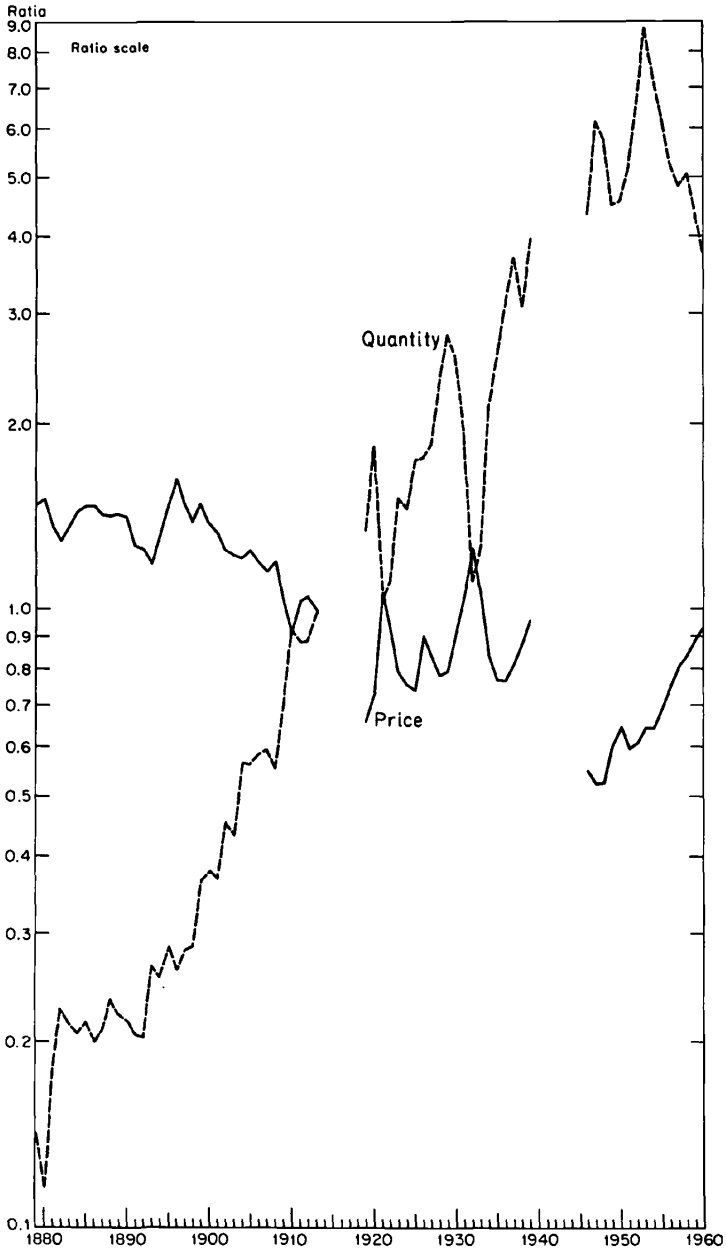
The strength of the inverse relationship in Chart 18 is not easy to explain, since agricultural and manufactured exports do not, to an important extent, compete with one another for markets. There are some elements of competition, however: all industries compete for some resources and, to some extent, all commodities compete for the consumer's dollar. In addition, there may be a choice as to whether a particular product should be exported before or after processing. The decision would be affected by changes in the productivities of processing industries. For example, in the last half of the nineteenth century a larger and larger proportion of wheat was exported as flour. The change presumably was linked to the increasing efficiency in the U.S. flour milling industry.

Within agricultural products, where substitution between exports and



TRENDS IN VALUES AND QUANTITIES

CHART 18  
Ratio of Manufactured to Agricultural Export  
Price and Quantity Indexes  
(1913 ratio = 100)

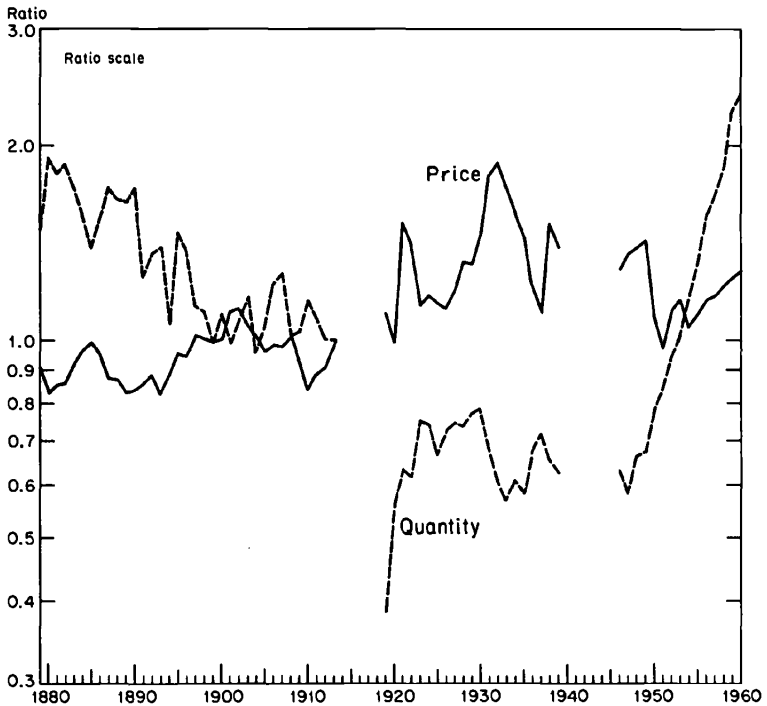


Source: Appendix Tables H-9 and G-15.

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imports is plausible,<sup>40</sup> no trend appears in the quantity or price ratios before 1900 (Chart 20). But from then until the late 1930's, agricultural export prices rose steeply in comparison with imports, and export quantities fell even faster. After World War II the price ratio reversed direction and fell most of the way back to the 1913 level, while the quantity ratio regained most of its loss since that date.

CHART 19  
Ratio of Manufactured to Agricultural Import  
Price and Quantity Indexes  
(1913 ratio = 100)



Source: Appendix Tables H-9 and G-15.

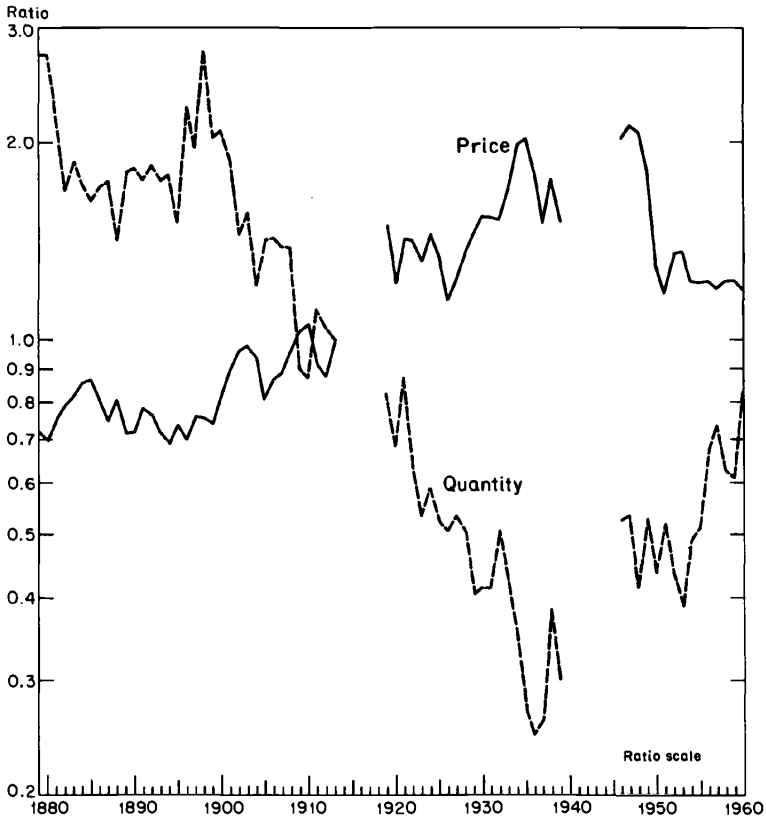
At first glance the relation between export and import price and quantity ratios for manufactures appears weak before World War II because the changes in price ratios were so small compared with those in quantity ratios (Chart 21). On closer examination, however, it is clear that the

<sup>40</sup> Although a large proportion of agricultural imports are considered by the Department of Agriculture to be "complementary."

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changes were definitely inverse. A period of comparative stability, until about 1886, was followed by a drop in the price ratio and a sharp increase in the quantity ratio. From 1898 to 1910 there was another period of stability for both, followed by another drop in price and jump in the quantity ratio. Only the very great rise in the quantity ratio between

**CHART 20**  
**Ratio of Agricultural Export to Import**  
**Price and Quantity Indexes**  
**(1913 ratio = 100)**



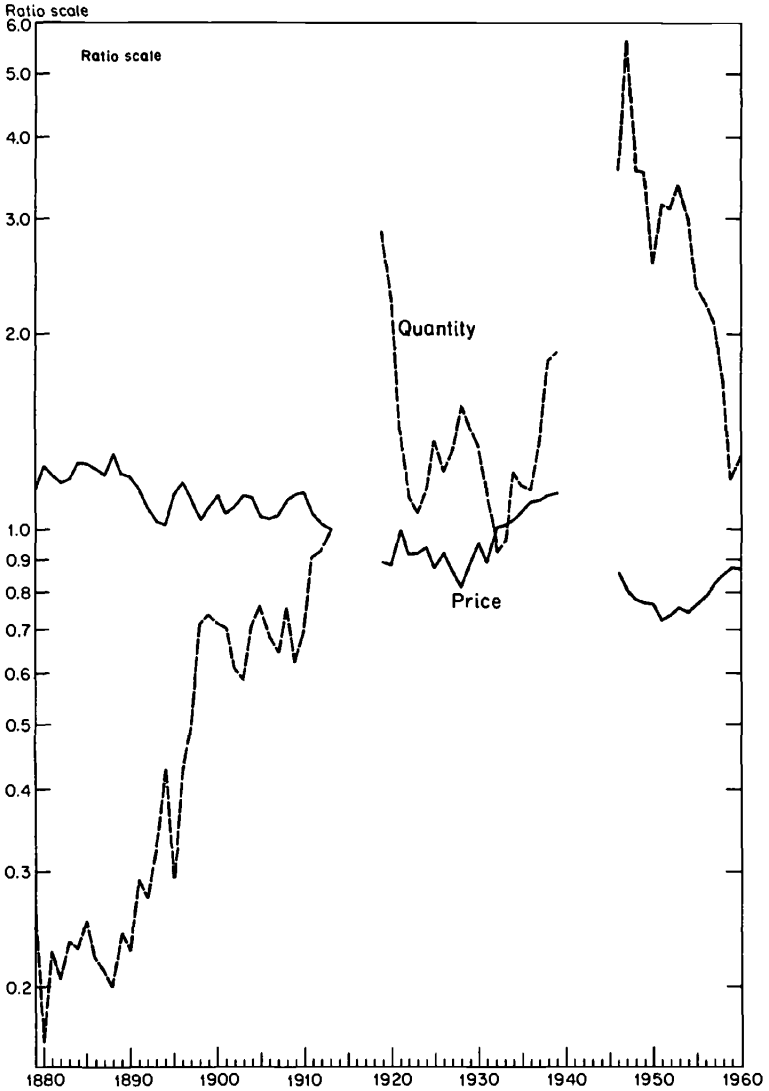
Source: Appendix Tables H-20 and G-16.

1894 and 1898 seems eccentric; it might have been a product of the sharp increase in tariffs that took place at that time.

A surprisingly high elasticity of substitution between exports and imports of manufactures is implied by the fact that quantity-ratio fluctuations

CHART 21

Ratio of Manufactured Export to Import  
Price and Quantity Indexes  
(1913 ratio = 100)



Source: Appendix Tables H-20 and G-16.

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were so much larger than price-ratio movements.<sup>41</sup> If our data had ended with the interwar period, the negative price-quantity relation might be attributed to a spurious correlation between two series with trends in opposite directions. But the reversal of the price-ratio trend after 1950—the rise in manufactured export prices relative to import prices—was accompanied by a great relative increase in imports of manufactures. This fact suggests that the large implied response of quantity to price ratios may have been quite genuine.

### COMPARISON OF U.S. AND FOREIGN PRICES AND QUANTITIES

The rise in world trade of a new country, a new commodity, or a new supplier of a commodity is often accompanied by declining prices and terms of trade. We might think of the lowering of price as the way in which the newcomer forces its way into world markets. Or, perhaps more appropriately for a competitive economy, we might say that technological advances or the opening of new lands to cultivation have, by reducing prices, pushed the new country or commodity into world trade.

This phenomenon has often been noted in such cases as the growth of American raw cotton and British cotton goods exports in the first half of the nineteenth century, and in the rise of the American provision trade in the second half. The inverse movement of the volume of British exports with the terms of trade was commented on by Schlote,<sup>42</sup> for example, and we noted (in Chapter 1) the relative fall in American export prices and terms of trade as the United States overtook and passed Great Britain as an exporter.

For the years covered by our new indexes it is possible to examine the behavior of some components of the major import and export classes. A few of many possible comparisons for the period before World War I are discussed below.

American exports of manufactures have been the main force behind the rise in this country's foreign trade since the 1890's. If we compare U.S. export prices and quantities with those of Great Britain (Chart 22), we note that both ratios were steady until the late 1880's. Between the 1890's and 1913, the ratio of American to British prices fell by almost a third, while the quantity ratio increased almost four times. Two brief reversals of the

<sup>41</sup> See, however, the substantial elasticities of substitution (of the order of 2½-3) between U.S. and U.K. exports of manufactures found in G. D. A. MacDougall, "British and American Exports: A Study Suggested by the Theory of Comparative Costs," *Economic Journal*, December 1951. Our "elasticity of substitution" here is a somewhat strange construction, since exports and imports of manufactures are sold in different markets.

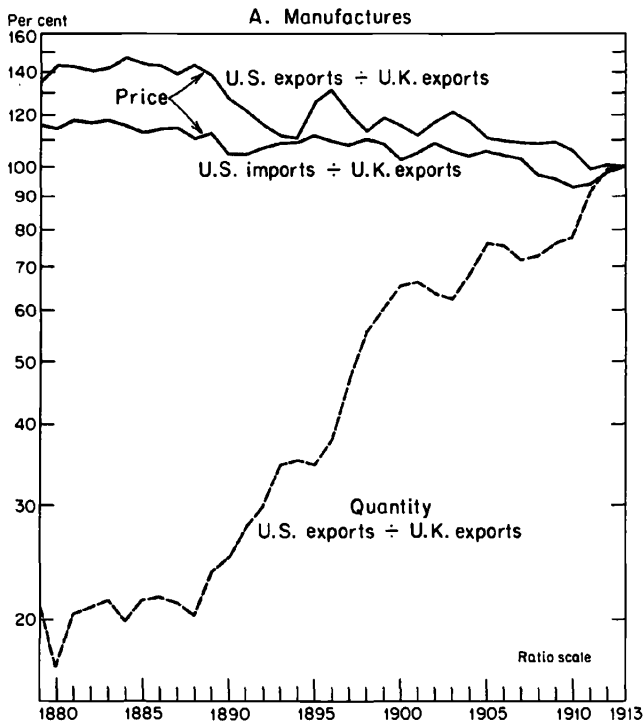
<sup>42</sup> Werner Schlote, *British Overseas Trade*, pp. 46-47.

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price ratio decline were reflected in interruptions of the rise in quantity ratios.

Similarly, U.S. import prices for manufactures declined relative to British export prices, even though Great Britain supplied an important part of U.S. manufactured imports. Unless British export prices of manufactures to the U.S. fell relative to those of exports to other countries,<sup>43</sup> this means that U.S. import prices from countries other than Great Britain fell by

CHART 22  
Ratio of U.S. to U.K. Export and Import Price and Quantity  
Indexes, Total Manufactures and Textiles  
(1913 ratio = 100)



<sup>43</sup> Kindleberger's figures (*The Terms of Trade*, p. 33) do not suggest that they do. He gives export unit values indexes for total United Kingdom exports and exports to the U.S. for 1900/1876 and 1913/1900 which can be combined into the following indexes (1872 = 100) for the two main manufactured goods categories.

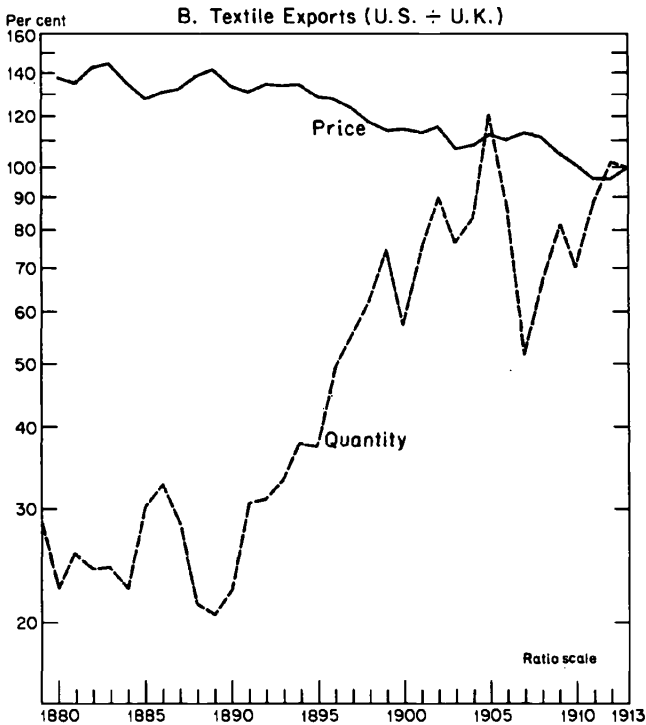
Exports To:	Metals and Manufactures	Textiles
U.S.	133	72
World	130	74

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more, and probably substantially more, than the 15 per cent decline in total import prices.

A narrower comparison<sup>44</sup> can be made of British and American exports of textile products. Again the fall in relative prices for U.S. exports over the period as a whole was accompanied by a great relative expansion in exports (Chart 22). Short reversals of the fall in prices were clearly reflected in the quantities. Relative prices of American textile exports rose in 1881-83, 1885-89 and 1903-07; relative quantities fell in 1881-84, 1886-89 and 1902-07.<sup>45</sup>

CHART 22 (Concluded)



Source: Appendix Tables H-21 and G-17.

<sup>44</sup> One of many possible such comparisons using the data in Appendixes A to C.

<sup>45</sup> A number of other comparisons could be made between groups of British and American exports, using the indexes of Schlote (*British Overseas Trade*) and A. G. Silverman ("Monthly Index Numbers of British Export and Import Prices, 1880-1913," *Review of Economic Statistics*, August 1930). Textiles could be subdivided further, and comparisons might also be made of groups of metal products. The range of comparison could be widened a great deal by using domestic price data for narrow classes of commodities and both price and unit-value data for individual commodities.

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These observations on American import and export prices of manufactures cast further doubt on the representativeness of British export prices of manufactured goods. By showing the decline in Great Britain's share in world trade, the quantity trends illustrated here, as well as those shown by Hilgerdt,<sup>46</sup> reinforce the impression that British export prices of manufactures must have been rising relative to those of other countries. Thus, the improvement in Great Britain's terms of trade before World War I may have been more a reflection of the decline in the competitive position of her exports than a source of increasing real income.

The use of U.K. data to represent the whole world results in errors, which can be seen when the League of Nations indexes for U.S. manufactured exports and imports are compared with the NBER indexes (Table 8). The League's export-quantity index for 1881-85, derived by dividing U.S. export values by a price index constructed from U.K. data, was more than 40 per cent higher than the NBER index. On the import side the League's index falls by 11 per cent between 1881-85 and 1896-1900, while the NBER import-quantity index rises by over 30 per cent.

TABLE 8  
LEAGUE OF NATIONS AND NBER ESTIMATES OF VOLUME OF U.S. TRADE IN  
MANUFACTURES, 1881-1913  
(1913 = 100)

	<i>Exports</i>		<i>Imports</i>	
	NBER	League of Nations	NBER	League of Nations
1881-1885	11.8	16.8	52.8	59.2
1886-1890	14.1	18.9	64.2	63.2
1891-1895	19.4	21.9	57.8	61.1
1896-1900	35.2	34.4	70.3	52.6
1901-1905	47.5	52.1	70.3	69.1
1906-1910	62.1	65.6	91.5	87.6
1911-1913	93.1	90.2	98.7	94.7
1913	100.0	100.0	100.0	100.0

SOURCE: League of Nations indexes from *Industrialization and Foreign Trade*. NBER indexes from Appendix A.

### SIGNIFICANCE OF PRICE-QUANTITY RELATIONS

We have discussed a number of cases in which price and quantity changes showed a strong negative correlation. The direction of the relation is in

<sup>46</sup> *Industrialization and Foreign Trade*, pp. 157-158. Because of Hilgerdt's method of estimating quantity, these are essentially value trends.



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accord with the hypothesis that the changes represent shifts in supply functions. However, two questions arise. Should it be possible to observe the effects of supply changes through price changes? And why are these price-quantity relations often characteristic of commodity aggregates even when not of the individual commodities?

If product *A* exported by country *X* is a perfect substitute for product *A* exported by country *Y*, their prices in country *Z* must, by definition, be equal. If there are no transportation costs, the export unit values for commodity *A* from the two countries will be equal also. An increase in productivity in country *X*, which results in a fall in the export price of commodity *A*, will cause a fall in the export price of *A* from country *Y*, if *Y* is to remain in the market. No interrelations between price and quantity changes will be observable.<sup>47</sup>

What then accounts for the many negative price-quantity relationships that were found? It is the incomplete adjustment of prices in the two countries, because of such factors as transportation costs and imperfect substitutability. If transportation costs are introduced in the example above, the fall in *X*'s export price of *A* will widen *X*'s market area and contract *Y*'s market area. After the adjustment they will still be selling at the same c.i.f. price in any market they share, but *Y*'s export price need not have fallen to the same degree as *X*'s price.

Imperfect substitutability operates in the same manner. The fall in *X*'s price of commodity *A*<sub>1</sub> will drive *Y*'s exports of *A*<sub>2</sub> out of some uses or reduce its share in some areas, but will not eliminate it completely. One can therefore observe a fall in *X*'s export price relative to *Y*'s associated with a rise in *X*'s relative quantity of exports.

Even where there are no frictions (and every decline in *X*'s export price for *A* is matched by *Y*, but accompanied by a decline in *Y*'s volume of exports) a negative price-quantity relation may be observed for commodity aggregates or total trade. *A* will gain in importance among *X*'s exports and lose in importance among *Y*'s exports. In a price index which reflects this shift, the price of *X*'s exports will decline relative to that of *Y*'s exports. The quantity index of country *X* will rise correspondingly.

We conclude, then, that these negative price-quantity relations are not freaks or accidents. While they may not directly measure elasticities of substitution, they reflect them and may serve as approximations to them.

<sup>47</sup> Several attempts were made in the early stages of this study to explain the growth of particular U.S. food exports in terms of changes in export price relations between the U.S. and foreign competitors. Most of them failed because of the similarity between U.S. and foreign price movements.

*Summary of Main Findings*

Before going into some of the more technical aspects of the NBER indexes, it may be worthwhile to recapitulate the main findings of the first two chapters.

Two widely held beliefs regarding net barter terms of trade found no confirmation in the data for the United States. One is that there has been a substantial long-term improvement in the terms of trade of developed countries, including the United States; the other, that there has been a significant long-term deterioration in the terms of trade of primary as compared to manufactured products.

Although there have been very large swings in U.S. terms of trade since 1879, no long-run trend has emerged. The average level of U.S. terms of trade since World War II has been almost the same as before World War I. However, the terms of trade have been improving quite steadily since 1951.

The preponderance of our data appeared to be contrary to the accepted view regarding the terms of trade between primary and manufactured products. Manufactured products in U.S. trade became cheaper relative to primary products, particularly before World War I. The purchasing power of U.S. manufactured exports fell with respect to both exports and imports of primary products; export prices of primary products rose compared with those of imported manufactures.

Neither of these findings prove that less developed or primary producing countries have experienced favorable shifts in their terms of trade. Like most of the original evidence on this question, ours is indirect. A regional or country breakdown of trade would be required to ascertain the course of U.S. terms of trade vis-à-vis particular areas or countries.

For only one of the comparisons of agricultural and manufactured prices—that within exports—was it possible to test roughly whether the trend represented mainly productivity or real income changes. It appeared that most of the long-run relative decline in export prices of manufactures could be accounted for by the fact that manufacturing productivity advanced at a more rapid rate than agricultural productivity, particularly before World War I. The reversal of the productivity relation since World War II has been accompanied by a reversal of the price relation as well. However, it was evident that the price ratio understated the plight of the agricultural sectors in the 1930's. By comparison with manufactured exports, agricultural exports suffered a drop in purchasing power per unit of input not only back to the prewar level, as indicated by the price ratio, but far below any level we have observed here.

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The productivity data suggest that declining long-run net barter terms of trade are far from a certain sign of declining real income—they may well represent growing productivity and competitiveness. This impression is confirmed by the frequency with which declines in relative prices are associated with growth in relative quantities. This negative price-quantity relation appeared not only between agricultural and manufactured exports but between agricultural and manufactured imports, between exports and imports of agricultural products, and between exports and imports of manufactures. Similarly, the growth of U.S. exports of manufactured products (for example, textiles) relative to those of the U.K. was accompanied by a relative decline in U.S. export prices. These events, in conjunction with other evidence that negative relations between price and quantity changes are quite pervasive, suggest that productivity changes were the most frequent cause of long-term relative price movements.

A comparison of the value of exports and imports with the value of domestic output confirmed the view that there has been a decline in the ratio of trade to output. Import ratios have been falling for more than a century, while export ratios reached something of a peak in the last half of the nineteenth century before receding.

The volume of trade, however, shows no such long-run decline in importance. Recent export ratios have been among the highest since 1879; import ratios, very low just after World War II, have recently recovered strongly, reaching the pre-World War I levels in 1958-60. However, they have not repeated the higher levels of the interwar years.

The contrasting behavior of current- and constant-dollar trade ratios, caused by the substantial decline in the ratio of export and import prices to domestic prices, demonstrates how misleading the common practice of using them interchangeably can be. Most of the decline in this ratio occurred during the interwar period. The subsequent recovery in foreign trade prices fell far short of restoring the prewar relations.

Although no long-term trend was observed in aggregate trade-output ratios, there was evidence of a connection between export ratios and rates of growth in output for the agricultural sector, as well as for agricultural products individually. It took the form of a peak in the importance of the foreign market when the growth rate of domestic output was at its highest. Foreign markets took large shares of additions to output, even for commodities in which their initial share was not so great. In such commodities as cotton, grains, and meats it appeared that the wide extent and penetrability of the foreign market was a prerequisite for the rapid growth of

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American agriculture, particularly in view of the presumably low elasticity of demand for agricultural products. American economic growth was thus aided not only by the frequently cited size of the domestic market but by the opportunity the foreign market provided for rapid expansions in specialized fields of production.