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## CHAPTER 9

# Raw Materials: A General View

Raw materials, comprising goods purchased by manufacturers either from other fabricators or from nonmanufacturers but not yet manipulated by their owners, account for about 40 percent of the total stocks of manufacturers. We begin with some theoretical considerations bearing on the behavior of the category as a whole. In Section 2 we present evidence bearing on the conformity and timing of a small sample of raw materials inventories, and in Chapter 10 examine their behavior in more detail.

### 1 *Conformity and Timing of Stocks*

As a preliminary hypothesis there seems substantial ground for believing that stocks of raw materials generally grow and decline together with manufacturing activity. Such behavior is consistent with what seem to be the chief principles on which businessmen decide about the quantity of raw materials to hold. These principles are perhaps best described as efficiency in production and protection against loss from price fluctuations.

Efficiency in production requires a stock of raw materials that increases with the rate of consumption for two reasons. First, stocks of goods that manufacturers would classify as raw materials are, in a special sense, goods in early stages of the production process. Goods in transit to the plant at which they will be consumed, title to which has already passed to the purchaser, count as part of the raw materials stock of manufacturers. When the rate of consumption of materials increases, more raw materials are likely to be in transit to fabricators. When goods arrive at the plant they must be checked, weighed, or counted, and taken to storage rooms. If the rate of their arrival is relatively high, a relatively large quantity of goods will be going through this routine. And if the rate of con-

sumption is high, a relatively large quantity will be going through the processes incident to feeding the raw materials into production—unpacking, perhaps cleaning, being checked out of storage and routed to the fabricating departments.

A stock of raw materials, secondly, serves to safeguard the continuity of production against delays in the arrival of essential materials. Such delays can arise for various reasons: difficulties in discovering satisfactory suppliers of precisely the kind of goods desired, delays incident to the negotiation of contracts with suppliers, interruptions in the output of suppliers due to strikes or mechanical breakdowns, delays or losses in transit, the failure of suppliers to ship goods that meet specifications. These difficulties, no doubt, increase as business expands and as suppliers and transport agencies work more nearly to capacity. Against any or all these difficulties manufacturers can guard by maintaining a stock that covers their expected requirements for a period deemed adequate. The larger their requirements, the larger the stock they will need. This relation between stocks and production is doubtless not as rigid as the first, but it constitutes a powerful incentive for adding to stocks as the level of activity rises.

Manufacturers manage their stocks of raw materials also with an eye to changes in prices. It would be fatuous, of course, to expect a high degree of foresight. Subject to interest and storage charges and the risk of depreciation, perfect foresight would involve an attempt on the part of fabricators to cover their requirements for an expansion to come at the trough of business when prices are lowest. But if such an attempt were general, it would be self-defeating. Troughs of the kind we know would not materialize. The cycle of business would be something quite different from the cycle of experience.

After the trough of business has passed and the decline of prices quite definitely ended, when recovery has been under way for some time and the near-term trend of demand seems clearly marked, however, manufacturers may begin to take some cautious steps toward protecting themselves against price rises likely to accompany active business. They may embark on a somewhat more liberal buying policy—seeking to cover their expected requirements a little further ahead than they thought wise as long as the price

outlook was bearish or uncertain. Since prices in general rise and fall with business activity this policy, of course, reinforces the rise in stocks of raw materials that an increasing rate of consumption demands. Similarly, after business has begun to slump and prices turn soft, businessmen will try to reduce their commitments by covering their expected requirements for a somewhat shorter period. And this will accelerate the decline in stocks desirable in view of the decline in the rate of consumption of materials.

This picture of manufacturers' speculative activities is intended to portray the course of events that characterizes business cycles as a general rule. In periods of excited speculation, of course, the purchasing plans of businessmen are bolder and more far reaching. Then they may abandon all thought of adjusting their stocks to some expected rate of consumption in the near future. They will buy materials not merely for consumption in their own operations, but frankly against the chance of resale at a higher price. Such episodes, however, are sporadic, not typical, features of business cycles. They seem to occur when some dramatic conjuncture convinces businessmen that prices are almost sure to rise very rapidly in the near future. During our period such conjunctures seem to have occurred in 1919-20 in consequence of the universal shortages following World War I and again in 1933 when the devaluation of the dollar and the imposition of NRA Codes persuaded manufacturers that prices would leap upward. A more doubtful and certainly milder period of speculation may have occurred in late 1936 and early 1937 when several large and successful strikes threatened higher prices in the near future. Otherwise, the interwar period does not seem to have been characterized by alternating periods of bullish and bearish speculation on a wide scale. The more hesitant and limited response of stock policy to price expectations suggested by the preceding paragraph therefore seems more typical. However, taken together with inventory movements that seem desirable in view of changes in the volume of production, even this mild speculative incentive appears to imply that stocks of raw materials will rise and fall synchronously with production and that their cyclical amplitude will be about the same as that of cycles in production. If the increases in inventories motivated by changes in production alone were fully proportional to the lat-

ter, the amplitude of stock cycles, including variations due to price speculation, will be somewhat larger.

This neat outcome is hardly likely to be realized in practice. Some period, more or less long, intervenes between a decision to purchase raw materials and the actual delivery of the goods. For stocks of raw materials to begin to contract simultaneously with production, the decline in production must be foreseen far enough in advance to allow deliveries to be altered appropriately. Such accurate forecasting, however, is probably not characteristic. It seems more plausible to suppose that manufacturers do not foresee the cyclical turning point in their sales at all. Indeed, when sales and production turn down after a cyclical peak, it must typically be an open question whether the drop signals the beginning of a cyclical contraction or a temporary setback similar to several others experienced during the preceding expansion. It seems likely, therefore, that after the peak of production has passed manufacturers are likely to hesitate before deciding to cut purchases of materials below the current level of consumption.[1]

After these decisions are taken, more time still must elapse before receipts of materials at manufacturing plants begin to conform to the new rate of purchase. If the materials are bought from stock, time is required for transportation from suppliers; if they are made to order, time is required for production as well as transportation. Materials made to order are likely to be products of manufacturing industries, and here, as we have seen, production periods are likely to be short—less than a month on the average. Transportation periods, of course, vary in length. They are likely to be short, a few days or weeks, if goods are supplied from within the United States where rail transportation is the rule. If goods are procured from abroad, time is consumed in longer and slower sea voyages, customs clearance, and often transfer from ship to train for an additional rail journey.

[1] This hypothesis does not imply that manufacturers do not curtail orders for raw materials until production has passed its cyclical peak. They may or they may not. The hypothesis does imply that in most manufacturing industries stocks of materials are still increasing at the cyclical peaks of production. It implies also that at cyclical peaks of production in most industries, deliveries to fabricating plants and orders for materials are still running higher than the rates at which materials are being fed into the fabricating process.

If we suppose that the rate of purchases of materials does not fall below the rate of consumption prior to the peak of production, the intervals described above define a minimum lag that must intervene in a given industry between the peak of production activity and the peak of raw materials stocks. For goods procured within the United States, the interval may vary from a few weeks to 2 or 3 months depending on the promptness with which purchases are cut, whether goods are made to order or supplied from stock, and on the time required for transport from suppliers to fabricators. For goods supplied from abroad, the interval will be longer, ranging up to 5 or 6 months or more.

Whether stocks of raw materials actually begin to decline at the expiration of this minimum interval depends upon the adequacy of the initial cut in the rate of purchases. They will do so if the initial cut is large enough to bring the rate of deliveries below the rate of consumption ruling at the end of the period. The forecast that is involved is, of course, more likely to be correct if the interval is short. But whether short or long, decisions that purchases must be cut further need not wait until the period has expired. Indications that sales and production are falling more rapidly than expected will presumably be forthcoming before the initial reduction of orders is realized in the form of reduced receipts of materials. These indications may then be acted upon more or less promptly. Even so, if the initial cut is insufficient, stocks will not begin to decline until some time after the expiration of the minimum interval.

If manufacturers underestimate the pace at which their rate of production will fall during the interval between purchase and delivery, so that the initial cut in purchases turns out to be insufficient to initiate liquidation of stocks, there is no solid basis for defining the interval by which the cyclical peak of stocks will lag behind that of production. There is, however, some reason to suppose that the lag will not, in general, greatly exceed the minimum interval. For during the period of the lag stocks will pile up while production falls and the inventory-output ratio will rise rapidly. These facts can hardly be overlooked by manufacturers and they should soon precipitate drastic reductions in the rate at which raw materials are purchased. If this surmise is valid, we might expect

stocks of raw materials to lag two to four months behind production. The lag in the case of goods procured from abroad is likely to be considerably longer.

This hypothesis is subject to two further qualifications. If manufacturers are bound by long-term contracts governing the rate at which they receive all or nearly all their supplies of a material, they will not be in a position to alter their rate of purchases as soon as they may desire. Such situations are presumably exceptional, but as far as they exist they will cause the cyclical turns of stocks to lag still further behind those of production.[2]

A second qualification is required to cover cases, of which agricultural crops are the chief example, in which the current output of the materials cannot be adjusted to demand in the short run. As far as manufacturers' stocks of raw materials are concerned, this does not make any difference provided the manufacturers draw their supplies from stocks held principally by dealers. But if fabricators are themselves the main holders of the stock, as in the case of cottonseed and crude rubber, the size of their stocks will be strongly influenced by the size of the crop.[3] Since most crops are not responsive to short-run demand but fluctuate markedly with weather conditions, the primary effect is to cause manufacturers' stocks to behave erractically during business cycles.[4]

These general considerations suggest that the conformity and timing of the cyclical fluctuations in raw materials inventories depend upon the character and location of the sources from which manufacturers draw their supplies. Manufacturers who procure their materials from other domestic manufacturers, or from domestic mining industries, are likely to be able to get additional

[2] Cf. Chapter 10, Section 8 on stocks of newsprint at publishers.

[3] In the case of crude rubber, by the number of rubber trees planted some years before.

[4] If we take several cycles together, supplies of such goods will tend to be about as large in expansions as in contractions. Thus if the rate of consumption moves up and down with the level of business, we may expect some tendency for stocks to vary inversely, with a lag. The lag is caused by the fact that when consumption rises, it does not immediately surpass supply. Hence stocks do not begin to fall as soon as consumption turns up. And the same thing will be true when consumption falls. In any small number of cycles, however, this tendency may be effectively smothered by the erratic fluctuations of supply in individual cycles.

supplies quickly. First, the supplying manufacturers keep on hand stocks of their finished goods which, as we shall see in Chapter 11, they allow to be drawn down when business improves. Second, the output of most manufacturers can usually be expanded fairly rapidly. Thus consumers of materials from such sources can quickly, though not immediately, get supplies in the quantities ordered. On the other hand, manufacturers who draw their supplies directly from abroad, rather than from wholesale importers in the United States, will not be able to adjust the rate at which they receive goods as promptly. Manufacturers who use agricultural raw materials are in a still different situation. If they are the principal holders of the stock, they may find their inventories fluctuating erratically with the fortunes of the growing season. If they purchase materials from dealers who themselves hold stocks large enough to absorb the variations in the size of crops, they will be in a position to adjust supplies to their requirements.

Fortunately, we can gauge the relative importance of these various sources of supply of raw materials. They were elaborately catalogued in a census monograph based upon the Census of Manufactures, 1929 (Table 42).[5] The raw materials and fuels used by manufacturers were classified in ways that make it possible for us to tell what portion was crude and what portion already processed to some degree; what portion was domestic and what foreign. The crude materials were further classified by industrial source: agriculture, mining, logging, and so on.

Most raw materials used in manufacturing in the United States are derived from sources that make possible rapid adjustment of receipts to changes in their rate of consumption. Goods from other domestic manufacturers alone account for 58 percent of the total. When the products of domestic mines, quarries, and logging, and fuels from domestic sources are added, the total percentage of products whose supply responds easily to the demand of domestic fabricators is 67.[6] Stocks of these goods, when held by manufac-

[5] Tracy E. Thompson, *Materials Used in Manufactures: 1929* (1933).

[6] There may be some question about the treatment of petroleum fuels such as crude oil. Since the total supply of petroleum is not easily controlled, crude petroleum used by refiners for processing or sold in unrefined form was placed with the items whose supply is not quickly expansible. But petroleum products used by general manufacturers for fuel can quickly be supplied in larger quan-

TABLE 42

Materials Used in Manufactures, 1929

| | | COST $ MIL. | % OF GROSS COST |
|---|---|---|---|
| 1 | Raw materials & fuels, gross cost[a] | 38073 | 100.0 |
| 2 | Domestic semimanufactures | 22152 | 58.1 |
| 3 | Imported semimanufactures | 1855 | 4.9 |
| 4 | Domestic crude materials | 10472 | 27.5 |
| | a) Agriculture & animal husbandry products | 6763 | 17.8 |
| | b) Mining & quarrying products | 1562 | 4.1 |
| | c) Crude petroleum, natural gas & gasoline | 1717 | 4.5 |
| | d) Logging products | 390 | 1.0 |
| | e) Fishing, hunting & trapping products | 40 | 0.1 |
| 5 | Imported crude materials | 2204 | 5.8 |
| | a) Agriculture & animal husbandry products | 1778 | 4.7 |
| | b) Mining & quarrying products | 215 | 0.6 |
| | c) Logging products | 87 | 0.2 |
| | d) Fishing, hunting & trapping products | 124 | 0.3 |
| 6 | Fuels | 1390 | 3.7 |
| 7 | Supply easily & rapidly adj.: lines 2, 4b, 4d, & 6 | 25494 | 67.0 |
| 8 | Supply adj. after lag: lines 3 & 5 | 4059 | 10.7 |
| 9 | Supply not responsive to demand in short run: lines 4a, c, & e | 6520 | 22.4 |

Source: Tracy E. Thompson, op. cit.

[a] Excludes cost of purchased electric energy, which cannot be stored.

turers for whom they are raw materials, probably move in cycles that conform positively to their rate of consumption. Failures in forecasting, prior contractual arrangements, and the interval between purchase and delivery, however, probably combine to cause stocks to lag behind fabricating activity by a few weeks to a few months. And for similar reasons, the amplitude of inventory fluctuations measured between the troughs and peaks of manufacturing activity (as distinct from the amplitude of inventory cycles proper) seems likely to be smaller than that of fluctuations in output.

A second block of materials, small but still substantial, is derived from sources that cannot adjust their output rapidly in response to changes in demand: mainly the domestic products of

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tity by drawing upon stocks of petroleum producers and refiners. We, therefore, count this part of the total among the items whose supply to their users can be readily expanded or contracted.

agriculture, with which we have combined crude petroleum and some minor items. In 1929 they comprised some 22 percent of the total value of materials consumed in manufacturing. The output of products from such sources tends to behave erratically during business cycles. A large part, perhaps most, of the stocks are held by dealers. To that extent the erratic fluctuations of crops will be reflected largely in dealers' stocks, and manufacturers will be free to adjust their holdings to the requirements of their operations. But when manufacturers are the main holders we expect their inventories to fluctuate irregularly and to tend to move inversely to business cycles with a lag (see above).

The group of imported products, amounting to about 11 percent of the materials consumed in manufacturing in 1929, may provide some regular offset to the behavior of the first large category. We have classified imported goods as commodities whose supply to United States manufacturers is responsive to demand, but only slowly. If this characterization is valid, it is not clear whether stocks in the hands of domestic fabricators conform positively to production with only a moderate lag or with a long lag, or even conform inversely. The evidence, as we shall see, is mixed and inadequate. Again, however, long lags or inverse behavior is probable only if domestic fabricators hold the bulk of the stock of such commodities in the United States. If they draw their supplies from wholesale importers, manufacturers will be in a position rapidly to adjust the rate at which they receive materials to changes in their requirements. Here again, we would expect stocks at manufacturers to lag behind fabrication by only a short interval.

If this analysis is substantially accurate, the bulk of the materials used by manufacturers is clearly drawn from sources that permit deliveries to be adjusted fairly rapidly to the rate of manufacturing activity. These materials include not only the products of domestic manufacturers, mines, and forests, but also such agricultural commodities and imported goods as are stocked mainly by dealers and wholesale importers. Together they probably account for over 80 percent of all materials used. The hypothesis set forth above supposes that stocks of such goods held by manufacturers conform positively to cycles of production with a short lag—perhaps two to four months—unless the manufacturers are bound by long-term

contracts. Manufacturers' stocks of other imported commodities probably lag further behind production. Finally, when manufacturers are the principal holders of domestic agricultural products, stocks will tend to move erratically during cycles of manufacturing activity, with some tendency, on the average, toward inverted conformity with a lag.

## 2 *General Indications of the Behavior of Manufacturers' Stocks*

### CHARACTER OF SAMPLE

Our collection of series representing raw materials held by manufacturers is, as we shall see, inadequate to be the basis for any really well-founded theory about their behavior. Certainly the above hypothesis must rest as much upon its own inherent reasonableness as upon any evidence we can present. But the materials at our disposal are not, as far as they go, inconsistent with this theory and they can serve to illuminate several factors that influence raw materials inventories. The collection comprises ten series: raw sugar at refineries, monthly, 1890-1944; raw cotton at mills, monthly, 1912-41; raw silk at manufacturers, monthly, 1921-35; raw cattle hides at tanners, monthly, 1922-41; newsprint at and in transit to publishers, monthly, 1919-44; refinable petroleum in pipelines and at tank farms and refineries, monthly, 1918-41; lead in warehouses, monthly, 1894-1918; crude rubber in and afloat for the United States, quarterly, 1923-24, and monthly, 1924-41; cottonseed at mills, monthly, 1916-41; iron ore at furnaces, monthly, 1918-39.

In comparison with the kinds of commodity that dominate the raw material holdings of manufacturers, this sample is not representative. The peculiar circumstances that control the behavior of each series are noted below and studied in some detail in Chapter 10. At this point it is useful to get a summary impression of two salient features of their cyclical fluctuations.

The relation between stocks and business activity can be judged in two ways. We can study the movements of stocks during cycles in business at large as indicated by the National Bureau chronology or we can compare stocks with manufacturing activity in a given industry. After allowing for typical timing of individual production series the two methods may be expected to yield similar

results since output in most manufacturing industries rises and falls with business activity. For any small group of industries during a few cycles, however, this will not be so even for industries whose output is normally related closely to business cycles. Peculiar conditions affecting individual industries in certain periods can distort the typical cyclical conformity and timing of production. In such cases, measures of the conformity of inventories to business cycles and of the timing of inventories at business cycle turns can conceal or distort the usual relation between stocks and manufacturing activity. Since the sample of industries for which there are records of raw materials stocks is small it seems best to rely on comparisons between stocks and the rate of fabrication in the industries holding them.

The behavior of eight series can be measured by the National Bureau's methods. Difficulties encountered in correcting the data for seasonal fluctuations made special analyses necessary for cottonseed and iron ore stocks; these are presented separately in Chapter 10. The measure of conformity for each stock series was computed according to a reference chronology determined by the specific cycle peaks and troughs of the related indicator of manufacturing activity (Table 43). Timing was measured by comparing the specific cycle turns in stocks with the specific cycle turns in manufacturing activity (Table 44).

The general impression is that my hypothesis about the behavior of raw materials stocks is supported. Six of the eight measures of full cycle conformity have positive signs, five of the indexes are high. Evidence of inverted behavior is significant in only one case. The series that vary positively with manufacturing activity also tend to lag and the length of the lags are, in general, consistent with expectations.

Closer study of the tables, however, indicates that the support for my view is both weaker and stronger than first appears. I expect stocks of raw materials to vary positively with the rate of production because there is evidence that most raw materials are supplied by domestic manufacturing and mining industries or by other domestic sources that can quickly adjust their output and deliveries to changes in the requirements of the manufacturers that fabricate their products. None of the commodities in the tables is

## TABLE 43

### Raw Materials Stocks, Conformity to Manufacturing Activity Cycles

| STOCKS | INDICATOR OF ACTIVITY | NO. OF PHASES[a] | INDEX OF CONFORMITY TO ACTIVITY[b] | | |
|---|---|---|---|---|---|
| | | | Exp. | Contr. | Cycle |
| Raw cotton at mills | Cotton consumption, 1913-38 | 17 | +50 | +56 | +62 |
| Raw silk at mfr. | Raw silk deliveries to mills, 1920-33 | 10 | +100 | +20 | +100 |
| Raw cattle hides at tanners | Cattle hide wettings, 1923-42 | 8 | +50 | +50 | +71 |
| Newsprint at & in transit to pub. | Newsprint paper consumption, 1919-39 | 8 | +50 | +100 | +100 |
| Lead at warehouses | Lead imports, 1895-1918 | 8 | +100 | +100 | +100 |
| Refinable petroleum in pipelines & at tank farms & refineries | Crude petroleum consumption, 1917-38 | 8 | 0 | 0 | +14 |
| Raw sugar at refineries | Sugar meltings, 1891-1940 | 21 | −20 | −9 | −20 |
| Crude rubber in & afloat for U.S. | Auto. tire prod., 1923-41 | 8 | 0 | −50 | −71 |

[a] Determined by the number of cycles in manufacturing activity during which inventory data were available.

[b] Measured synchronously, except in the case of newsprint stocks, which were assumed to lag 10 months behind newsprint consumption at both peaks and troughs.

TABLE 44

Raw Materials Stocks, Timing at Turns in Manufacturing Activity

| STOCKS | NUMBER OF Leads | Lags | Coin. | AV. LEAD (−) OR LAG (+) MONTHS |
|---|---|---|---|---|
| | AT PEAKS IN ACTIVITY | | | |
| 1) Raw cotton at mills | 3 | 5 | 0 | +1.5 |
| 2) Raw silk at mfr. | 1 | 3 | 0 | +0.5 |
| 3) Raw cattle hides at tanners | 2 | 2 | 1 | +1.2 |
| 4) Newsprint at & in transit to pub. | 0 | 4 | 0 | +9.8 |
| 5) Lead at warehouses | 2 | 2 | 1 | +3.0 |
| 6) Refinable petroleum in pipelines & at tank farms & refineries | 0 | 2 | 1 | +3.7 |
| 7) Raw sugar at refineries | 4 | 3 | 0 | −4.4 |
| 8) Crude rubber in & afloat for U.S.[a] | 1 | 1 | 0 | +1.0 |
| 9) Sum of 5 series with significant positive conformity (lines 1-5) | 8 | 16 | 2 | |
| | AT TROUGHS IN ACTIVITY | | | |
| 10) Raw cotton at mills | 0 | 6 | 1 | +5.1 |
| 11) Raw silk at mfr. | 1 | 2 | 0 | +1.0 |
| 12) Raw cattle hides at tanners | 1 | 3 | 0 | +6.2 |
| 13) Newsprint at & in transit to pub. | 0 | 4 | 0 | +9.2 |
| 14) Lead at warehouses | 1 | 3 | 0 | +3.0 |
| 15) Refinable petroleum in pipelines & at tank farms & refineries | 0 | 3 | 0 | +10.7 |
| 16) Raw sugar at refineries | 1 | 6 | 0 | +5.4 |
| 17) Crude rubber in & afloat for U.S.[a] | 0 | 2 | 0 | +1.5 |
| 18) Sum of 5 series with significant positive conformity (lines 10-14) | 3 | 18 | 1 | |

For indicators of manufacturing activity and periods covered, see Table 43.
[a] Timing measured invertedly; see Ch. 3, note 5.

supplied from such sources. Newsprint may appear to fit because it comes by rail and motor transport from United States and Canadian mills. Unlike most commodities, however, it is bought on contracts that control purchases and deliveries for a year or longer. Lead stocks consist mainly of metal of foreign origin held in bond for fabrication and reexport. The output of petroleum has not, in the past, kept pace with current consumption because of the haphazard rate of discovery of new oil fields and the competition of individual producers to capture subsoil reserves. The other commodities are agricultural products whose output is not sensitive to short-run demand, and several are partly or wholly of foreign origin.

Nevertheless, the general consistency of the measures with the

theory is not merely fortuitous. Materials supplied by domestic manufacturers or miners are not the only cases in which one may expect stocks to conform positively with a few months' lag. The same expectation applies to other commodities, provided large buffer stocks are held by dealers on whose inventories manufacturers can draw at need. This is the situation that characterizes raw cotton, silk, and hides. Their behavior, therefore, conforms to the rule.

The output of newsprint and lead can be readily adjusted to demand, but the former is purchased on long-term contract and the latter comes by sea from Mexico and South America. In such cases we expect adjustments to be longer delayed and the lag of stocks to be longer. The average lag of newsprint stocks at publishers behind consumption of newsprint paper was indeed long—between 9 and 10 months. The average lag of lead stocks was shorter than might have been expected, but this is a lag behind imports. If imports lag behind fabrication, as seems plausible, the lag of stocks behind their rate of utilization would have been longer than our figures show.

The output of petroleum, sugar, and natural rubber does not respond to short-run demand. But in contrast to the situation in cotton, silk, and hides, there are no dealers with large stocks to absorb cyclical discrepancies between output and consumption. American manufacturers are themselves the chief holders of the stock. Since the output of petroleum and sugar has fluctuated erratically during business cycles, the stocks held by United States manufacturers have not varied regularly during business cycles. The annual variations in rubber output, however, have been fairly small compared with the cyclical fluctuations in consumption. Hence stocks of rubber move inversely during cycles in the rate at which it has been fabricated.

These remarks suffice for a brief review of the data. Chapter 10 subjects these materials to closer study and introduces additional data bearing on stocks of cottonseed and iron ore.