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3. *The Problem of Aggregative Analysis of Ownership*

Of the several questions that require empirical study, to which the previous chapters point, this monograph deals with only one: What can be learned about "inventory cycles" by studying ownership of materials—materials on hand and on order? [1]

The investigation is undertaken at an aggregate level. Stocks of materials on hand for the economy as a whole are the sum of those in all business enterprises. But for materials on order, the relation between microcosm and macrocosm is a bit more complicated. The difficulty concerns the relation between unfilled orders received and outstanding orders placed. Within the individual firm it is simple enough to distinguish between backlogs of sales orders and materials on order but not yet received. But for the economy as a whole, outstanding sales orders of one business are the outstanding purchase orders of some other business. These somewhat confusing relationships can be examined by means of a vertical sequence of operations.

A VERTICAL SEQUENCE EXAMINED

Stocks are a reservoir of goods having an inlet and outlet stream. Stocks of materials, for example, have an inlet stream, goods received from suppliers; and an outlet stream, goods on which production is commencing. When receipts are larger than utilization rates, stocks of materials increase; when smaller, they decrease. The change in stock over an interval of time is equal to the inlet minus the outlet stream over the period (with minor adjustments for wastage).

Outstanding purchase orders are likewise a reservoir having an inlet and outlet stream; the inlet is new purchase orders placed with suppliers; the outlet, the physical receipt of goods. The difference between these two flows is the change in outstanding orders (with adjustments for cancellations).

Change in the ownership of materials during, say, a month comprehends changes in outstanding purchase orders plus changes in stocks of purchased materials. It is the difference between the volume of new orders placed during the month with a firm's suppliers and the volume of goods on which production is commenced that month; the receipts of materials cancel out since they reduce outstanding orders and increase stocks on hand by an equal amount. The relationships are shown in Exhibit 2.

The exhibit is concerned with steps prior to the movement of goods to final users. Thus, for consumer goods, orders placed by individuals (commonly called retail sales) constitute the top line of the table. For durable pro-

[1] "Ownership" has a legal implication that is not fulfilled in the case of stock on order. For this, though there often is a legally enforceable commitment to purchase, title has not yet passed to the purchaser and therefore he does not actually own the merchandise. There appears to be no word that is exactly correct for both stock on hand and on order, and accordingly I use the approximation, ownership.

EXHIBIT 2

A Vertical Sequence of Flows and Stocks
(equivalent units of finished goods)

Flows of Goods or Orders	Case I	Case II	Stocks of Goods or Orders	Changes in Stocks or Orders: Case I	Changes in Stocks or Orders: Case II
Consumer					
1. Orders placed	100	100			
Retailer					
2. Orders received (sales)	100	100			
3.			Unfilled sales orders	0	0
4. Shipments	100	100			
5.			Stock	0	+2
6. Receipts	100	102			
7.			Outstanding purchase orders	+4	-4
8. Orders placed	104	98			
Manufacturer					
9. Orders received	104	98			
10.			Unfilled sales orders	-(+4)	-(-4)
11. Shipments	100	102			
12.			Finished stock	0	+1
13. Production	100	103			
14.			In-process stock	+2	-1
15. Starts	102	102			
16.			Purchased materials stock	+1	-1
17. Receipts	103	101			
18.			Outstanding purchase orders	+2	-5
19. Orders placed	105	96			
Importer or Raw-Materials Dealer					
20. Orders received	105	96			
21.			Unfilled sales orders	-(+2)	-(-5)
22. Shipments	103	101			
23.			Stocks	-1	+1
24. Receipts	102	102			
25.			Outstanding purchase orders	0	0
26. Orders placed	102	102			
Miner, Rancher, or Farmer					
27. Orders received	102	102			
28.			Unfilled sales orders	0	0
29. Shipments	102	102			
30			Finished stock	0	0
31. Production	102	102			

ducers' goods, whose final use is by a business firm, the top line of the table would represent the orders placed by the purchaser expecting to install the machinery. Stopping the table at this point reflects the thought that stocks of consumer goods in the hands of individuals or families, or stocks of durable capital goods in the hands of producers, respond to very different influences from goods moving through the operations of production and marketing. Final product is excluded throughout this analysis.

The first two columns show, at some particular time, the vertical steps in the production, shipment of, or orders for goods which could apply to the economy as a whole or to steps whereby cotton is converted to bath towels, steel into screws, or cattle hide into shoes. Each step constitutes the inlet for one stock of goods or orders, and an outlet flow for another. The changes in stocks or orders that result from differences in the volume of inlet and outlet streams are shown in the second set of columns. All figures represent physical units of finished goods or of its constituent materials.

In order to keep the agents identified, steps that constitute virtually two sides of the same coin are listed separately. In the case of receipts and shipments there is similarity but not identity: receipts of purchases follow the same time pattern as shipments by the supplying manufacturer except for changes in time in transit (cf. lines 6 and 11). In the case of orders, there is actual identity: purchase orders placed, say, by a retailer are actually the same instruments as the sales orders of the supplying manufacturer (cf. lines 8 and 9). Consequently, changes in the outstanding orders of a customer placed with one supplier are, precisely, changes in the unfilled orders of the supplier. Convention records an increase of these pools of orders with a positive sign. But an increase in outstanding orders is thought of by the purchaser as precursor of an increase in ownership responsibility. An increase in unfilled orders may be thought of by the supplier as a remission of ownership responsibility—it passes to his customer. Increases in stocks all represent an increase, other things the same, in ownership responsibility. To maintain consistency of thought and record, then, a change in unfilled sales orders is subtracted algebraically from an increase in stocks or in outstanding purchase orders.[2]

This means that, for a vertical sequence as a whole, the net change in orders that are unfilled or outstanding is close to zero. At the finished end, we exclude changes in unfilled sales orders for goods which will be shipped to the final user, whether consumer or business purchaser of durable capital; at the crude end, the miner or farmer does not typically place purchase orders for basic stock. For intermediate orders, all the rest in the vertical sequence, outstanding and unfilled orders are exactly equal and opposite to one another.

Yet it seems clear that the presence of unfilled (or outstanding) orders and how they are changing is highly material to the power of purchasing to generate or respond to instability. Consider an example.

Assume in both cases I and II that retail sales have been rising during the course of a general cyclical expansion. The retailers in case I think that sales will continue to rise. They underestimated the rise when advance orders for the current season were placed and therefore they must try to get merchandise delivered swiftly. They think competitors are in a similar situation and that stocks in the pipelines are also low, and this may cause a rush for goods and some difficulty in obtaining highly desirable merchandise surely and promptly. If this occurred, prices might also rise; indeed manufacturers have been threatening that present prices would not hold except for preseason purchases. Consequently,

[2] Inventory position is defined this way by Hadley and Whitin: "The inventory position is the amount of stock-on-hand plus on order minus backorders. . . ." *Inventory Systems*, p. 46.

they think it wise to increase the proportion of expected season's requirements which are ordered now for delivery in two or three months, instead of waiting for a month or so and then ordering these goods for immediate delivery. They also scout around and find some extra goods for "at once" delivery. Their total current orders (line 8), therefore, those for immediate delivery and for advance delivery, are four units larger than current sales (line 2). Outstanding orders have risen by four units (line 7). Stocks have not changed (line 5) because, though they were drawn down by unexpectedly large sales, they were built up by the additional market-prospect-linked orders for at-once delivery.

The manufacturers, whose production was adjusted to current retail sales, have felt the increase in demand. New orders and unfilled orders have risen. They have responded by increasing production starts (line 15); moreover, they are buying (line 19) more than they are selling (line 9) and more than current receipts (line 17); these in turn are larger than production starts. The fact that manufacturers are buying more than they are selling, in spite of the fact that they are receiving more advance notice (more orders carrying advance delivery dates), may express a willingness to increase stocks because the relative cost of carrying them has declined. For one thing, because of the increase in backlogs, there is less danger of buying or producing an article that will not sell. Also the pressure to raise output may put a premium on steady employment and larger production lots, both of which imply some increase in stocks. In addition, manufacturers, like retailers, are expecting either delay in deliveries or rising prices or both. Perhaps, if it is the bath towel-cotton sequence, the published estimates of the cotton crop may now look as if the crop had previously been overestimated. Supply, then, may be smaller than was formerly expected as well as demand stronger, thus further increasing the likelihood of scramble for goods. As a result, sellers all along the line become tougher traders as buyers become more eager. In effect, short-term demand schedules shift upward and to the right. There is movement along supply schedules; but these schedules also shift upward and to the left as suppliers become less anxious to sell goods which may rise in value. If the example, instead of applying to the bath towel-cotton sequence, applies to the screw-steel or shoe-hide sequence, the chances of shifts in supplying schedules may perhaps be somewhat less. In any event, supply schedules for crude materials have the classic upward slope. Accordingly, larger requirements are attracted to central markets from further distances, as purchased scrap steel, country hides, and imported hides are induced by higher prices to augment the pseudo-byproduct supply of home-produced scrap and packer hides. But, in any case, the sensitive prices of crude materials rise.

The exhibit shows receipts of raw material dealers (line 24) responding only slowly to increased demand since supply is inelastic and inflexible. Their receipts are a little higher than sales of retailers and lower than the receipts of manufacturers. Stocks of dealers decline. Perhaps if the sequence involved hides or steel, at least the orders placed by dealers would be higher because of the efforts to import hides from abroad and to collect larger quantities of scrap metal.

The example has pictured typical occurrences during an upward phase of a business cycle. Efforts to fill the pipeline augment the upward surge. Though consumer buying is increasing, the buying of retailers and manufacturers increases more, since stocks buy more efficiency than formerly, requirements are found to have been underestimated and delivery periods are expected to lengthen and prices to rise. At the later stages of production, swelling demand takes the form of an increase in outstanding materials orders and of stocks of purchased material—an increase, that is, in ownership of materials. At the earlier stages, increased buying endeavor, meeting resistance of inflexible supply, presses on

the price structure. The increasing orders, order backlogs, delays, and price increases support the expectation of increasing tensions and cause further buying at later stages and further price increases at earlier stages.

Contrast this picture with one which might apply in case II. Though sales have been rising, retailers had expected them to rise more and had made provisions based on these too-optimistic expectations. These errors have caused stocks to be quite high and they have increased two units more (line 5). Buying, it is thought, should now be cautious. For, if, as seems likely, other retailers have had similar experiences, markets will soften and goods become easier to obtain on short notice. With this possibility in mind, buying is cut back substantially. Retailers' orders are cut to two units less than sales and total ownership declines by two units—a four-unit decline in outstanding orders minus the increase in stock on hand of two units associated with the error in estimating sales (line 7 + line 5).

Manufacturers learn of the changed opinion of retailers from the reduction in their orders as well as from trade sources. Their production starts are now equal to their shipments, but they expect shipments to decline not only because orders have, but because retail sales are probably lower than shipments to retailers because retailers' stocks are rumored high. The decline in their backlogs of sales orders (line 10) increases the economic risk in holding stock. Furthermore, the continued rise in materials prices has started to pinch margins so that the idea is gaining currency that prices are too high. If so, many manufacturers are thinking that "you cannot make money" with prices where they are because margins are too narrow; yet they fear the effect on sales of any effort to raise selling prices in line with increased costs. Accordingly, they reduce their purchasing in the hope that materials prices will come down and goods can be picked up later at a better price. In the example, manufacturers' purchase orders (line 19) are reduced more than is their selling (line 9). Their ownership of purchased materials (line 16 + line 18) is cut drastically—new orders are six units less than production starts. The rising finished stocks of manufacturer and dealer, and the presently undesired increase in retailers' stocks, all evidences of errors in guessing demand, cause buyers all along the line to be less patient than previously; by the same token, sellers are more willing to listen. Demand and supply schedules shift. If prices do not fall, at least they cease to rise. This reinforces expectations of further weakening. Here, as in case I, output and shipments at the earlier stages are little affected as yet by the changed buying interest. Since production and shipments all along the line are still increasing, income payments to consumers are ample to support the current level of sales. But if the situation holds its present shape, production will be curtailed; then income payments will be reduced even though stocks may still rise for a while.

The examples that we have been considering have concentrated, to their injury, on very limited aspects of even the central data under consideration. But in spite of their deficiencies, they serve, perhaps, to suggest the meaning of the several sorts of information about stocks and orders.

Notable is the fact that in the tabular example none of the difference between case I and case II is reflected in net change in stocks. Change in stocks in all hands is +2 in both cases.

The force of buying endeavor, given the level of final demand, seems to be evidenced most immediately and accurately close to the purchasing operation. It is evidenced by changes in outstanding purchase orders and in stocks of purchased materials. Most accurately, it appears in the sum of the two—changes in ownership of materials.

In the exhibit, the difference between case I and case II is well represented by the fact that changes in materials ownership for retailers and manufacturers are +4 and +3, respectively, in case I, whereas the corresponding figures for case II are −2 and −6.

THE CONCEPT

Definition

Ownership of materials combines stocks of purchased materials of manufacturers, or merchandise stock of distributors, with orders for these materials that have not yet been received by the purchaser—purchase orders outstanding. My basic notion is that stocks and outstandings should not necessarily be combined, but simply studied together.

The concept is intended to aid in the exploration of the complex of events comprehended under the rubric, inventory cycle.

It is not unusual, as we saw in Chapter 1, to study outstanding or unfilled orders in connection with inventory cycles. However, the concept that I use differs from the usual one in three ways:

1. It views unfilled orders from the point of view of the buyer rather than the seller; thus it concentrates on purchase orders outstanding rather than on unfilled sales orders.
2. It combines purchase orders outstanding with stocks of purchased materials (including merchandise stock of distributors, which henceforth will not be named separately) and thus deals with purchased materials on hand and on order. For many purposes, however, it is useful to separate the two components; there need be no rules on this score.
3. It excludes outstanding purchase orders of the final buyer of durable producers' goods.

It is customary, of course, to exclude from the concept of inventories the buyers' stock of durable producers' goods—the installed machinery of manufacturers or others. But the unfilled orders for these goods in the form of unfilled sales orders received by producers of durable goods are ordinarily included in the analysis of unfilled orders. Indeed, statistics on unfilled orders are dominated by this segment of the total. I exclude them because many of the influences to which they respond may be different from those that affect orders for goods intended to be resold or processed. Their impact on sales and stock decisions is, as we saw in Chapter 2, also different.

Aggregation

A comprehensive aggregate of materials ownership for the entire economy would aim at summing, for all enterprises, materials stocks on hand and on order. "Materials stocks" is meant to cover "stock in trade" for distributors; for manufacturers, it is often referred to as stocks of "purchased materials" or "raw" materials (with "raw" signifying a state prior to processing by the enterprise rather than truly raw). "Enterprise" could be defined in a number of ways—an establishment, a financial or management unit such as corporation or firm, a major division of a corporation in one industry field. The choice is likely to depend on available data.

A vertical sequence of types of establishment for which materials on hand and on order need to be included follows.

Manufactured Goods Destined for Consumer Use

1. Retailers
2. Wholesalers and dealers in finished products
3. Manufacturers of finished products
4. Dealers in intermediate products
5. Manufacturers of intermediate products
6. Manufacturers of raw materials
7. Dealers in raw materials

Manufactured Goods Destined for Business' Final Use

Line 1 would typically not apply. (Perhaps trucks and farm machinery are major exceptions.) Line 2 would also not apply in the common case of direct sale by manufacturer; otherwise the list is the same.

Construction

Lines 1 and 2 would apply in connection with do-it-yourself trade and work by private contractors. Line 3 is replaced by the construction company, which is the last business agent who sells to the final user, whether consumer, business, or government.

Ideally, one would like to provide statistical representation of each major vertical stage for all industry. Moreover, it would be desirable to provide information for several vertical sequences. At the very least, since the backward transmission of demand must be different for goods having different patterns of final use, it would be valuable to have separate chains for consumer nondurables, semidurables, and durables, and business capital equipment, particularly for sorts having very long production periods and consequently long intervals by which orders can precede delivery. Separate chains, appropriately designed, could provide information about the dynamics of the process, such as the impact of multiplicity of stages, of size of firms, of overcapacity.

The data should be in terms of equivalent physical units required per unit of finished product. Thus, if dollar figures had been used, they would need to be adjusted for the value added as processing and distribution are completed.

Unfortunately the statistical realities put an end to these daydreams. The basic building blocks that are required are data on sales, stocks, and outstanding purchase orders *for the same companies.* As far as I know, this information is available for a single group of companies, a sample of large department stores, but as of the end of 1963 the "is" must be changed to "was." The series was discontinued, temporarily, it is hoped. All the rest of such data as there are on orders or unfilled orders applies to sales orders, so that for a particular company stocks can be matched with backlogs of sales orders but not with outstanding purchase orders. All available data are in book value and none in the physical units in terms of which the analysis has been phrased. As beggars then, not choosers, with what statistical rags can the analytic skeleton be clad?

THE DATA

Beginning in 1939, the "Merchandising Sample" of large department stores had submitted monthly information to the Federal Reserve System concerning (among other things) sales, change in stocks, and change in outstanding orders; and from these figures the System also calculated stocks, outstanding orders, receipts, and new orders. About two hundred stores participated. It is usual for retail stores to carry inventories at retail prices rather than at purchase price, and this is the meaning of book value for the department store data. It has the advantage of coming closer to the notion of "equivalent finished units" than does the usual book value concept. These figures, then, provide one small sample for line 1 of the previous enumeration—retailers' stocks and outstanding orders. Unfortunately there is no satisfactory way of matching them in other lines of the vertical sequence.[3]

The second pool of information concerns

[3] The outstanding purchase orders of department stores are the unfilled sales orders of their suppliers. These would be chiefly manufacturers of finished goods (line 3), and very occasionally wholesalers (line 2). To carry the sequence backward another step, then, the outstanding purchase orders for line 3 are primarily required. Since all data for manufacturers are for sales orders, the outstanding purchase orders of finished goods manufacturers would have to be estimated on the basis of the unfilled sales orders of their suppliers, manufacturers of semifinished or crude products which enter into the finished goods that department stores use. However, the data for manufacturing, to be discussed presently, do not provide the appropriate industry breakdown except for the textile group.

manufacturers. It consists of monthly statistics on shipments, inventories in three stages of manufacture, and change in the unfilled orders of the product the company sells; from the latter, new sales orders are computed. The data were collected by the Office of Business Economics of the United States Department of Commerce until the work was transferred to the Bureau of the Census in 1957. Although some totals are available, industry breakdowns cannot be carried back earlier than 1947, or 1946 in some cases. The sample consisted of 3,100 companies in 1948–49, but declined to 2,400 in 1953 and to 1,650 in 1957.[4] Reporting is on a corporation, not an establishment, basis.

This body of information has recently undergone a serious overhauling, and the old series was revised back to 1953. However, the new data were not available in time for use in this study. Indeed, it is a moot point whether in any event they should have been used for a study covering the period from 1946 to 1962. I would have been inclined not to.[5] Needless to say, the new series is greatly superior to the old, when, beginning January 1962, the basic information was supplied by the new enlarged sample in which many corporations submitted reports for each of several major divisions.

Because the individual companies report sales orders and not purchase orders, the data can picture materials on hand and on order only if it is possible to match the materials stocks of one set of companies with the unfilled orders of the companies from whom the first group buy their materials. For example, the materials stocks of shoe manufacturers (chiefly leather) could be matched with the unfilled sales orders (for leather) reported by tanners, which would typically also be the outstanding purchase orders of shoe manufacturers, tanners' customers.

However, for nondurable goods, virtually no vertical sequences could be isolated, and therefore the data could not be used. For durable goods, the prospect was a little more hopeful. Nevertheless, the discussion of what can and cannot be done is exceedingly tedious.

[4] The sample is discussed in *Manufacturers' Shipments, Inventories, and Orders: 1947–1963 Revised*, U.S. Department of Commerce, Series M3-1, p. 12. The figure for 1953 is from *Statistics of Business Inventories*, Report of Consultant Committee on Inventory Statistics, Organized by the Board of Governors of the Federal Reserve System at the Request of the Subcommittee in Economic Statistics of the Joint Committee on the Economic Report, November 1955, p. 170. Not all of the 2,400 companies reporting in 1953 supplied monthly figures. For the durable goods industries, the annual sample supplying annual or quarterly data was estimated to cover 72 per cent of the estimated total manufacturers' shipments, and the monthly sample 48 per cent; the coverage of the monthly series for eleven industry groups varied from 80 per cent for motor vehicles and equipment to 7 per cent for lumber and furniture. The median was 50 per cent (*Statistics of Inventories*, p. 171). For unfilled orders it is lower, though how much is hard to say. For the new sample, for example, 65 per cent of the shipments reported by the sample in the durable goods industries was reported by firms that also gave information on unfilled orders (*Manufacturers' Shipments*, p. 11, Table E).

[5] Thanks to the courtesy of the Office of Business Economics in making unpublished material available, we had thirty-four industry breakdowns, about the same number now available in the new sample, though it is hoped eventually to expand the tabulations to fifty-five industries (*Manufacturers' Shipments*, p. 15). The new series is based on a sample of 4,000 companies, and efforts have been made to get divisional reports for the large diversified companies—about 375 of them (*ibid.*, p. 8). The divisional reports make it possible to approximate the establishment basis of reporting, and accordingly the Annual Survey of Manufacturers now provides the benchmark figures. (The old series was linked to Bureau of Internal Revenue figures, which are, of course, on a corporate basis.) The old series, for each industry group that was tabulated, was revised back to 1953 on a monthly basis (*ibid.*, p. 14). A chief aspect of the revision was the shift to the Annual Survey of Manufacturers base. However, the actual reporting sample is for entire corporations only, and this frequently does not provide an adequate means of interpolating annual benchmarks on an establishment basis. As a result, it was necessary to resort to a variety of estimating devices. (See discussion, *ibid.*, p. 14.) Whatever the limitations of these devices for the purpose of estimating stocks and shipments (for which some parallel information exists), they are greatly magnified in the case of orders. All in all, since my study focuses on the 1946–62 period, it seems preferable to stay with sow's ear rather than turn to the silk purse at best for about half of the period.

Moreover, the final outcome, which is far from a desirable one, adds a feeling of frustration to the tedium. One thing stands out in garish clarity—our statistics are not constructed on a principle which is prepared to yield exactly the information we need.

Two large industry groups chiefly make durable finished products. They are the machinery industries and the transportation equipment groups. Their unfilled sales orders are for the most part either those placed by distributors who sell autos,[6] household appliances, and the like, mostly to consumers, or farm equipment and standard machines for business use, or those placed by business firms buying capital equipment often for their own use. In either case, these unfilled orders should not be included in the aggregate materials ownership for manufacturers. (The first group would, of course, properly be included as outstanding purchase orders of distributors, but the stock data are missing for them.) Other major industry groups make parts or semifinished or crude materials that enter into the production of the two finished groups. They are primary metals (ferrous and nonferrous), fabricated metals, and some of the miscellaneous group. It would seem, then, that our basic tactic should be to use the unfilled sales orders of these intermediate groups as estimates of the outstanding purchase orders of the finished-product groups. Their materials ownership would then be this plus purchased materials stocks for the finished-product groups. Of course, this tactic bows without even a demurrer to the fact that stocks cover all materials and outstandings only those of durable goods. Since this difficulty is present in any approach using existing data, it will be ignored.

But the difficulty of matching figures to the requirements of this general scheme counsels some modification of it. The difficulties are:

1. Many companies in the intermediate group sell to one another, and therefore their sales orders are not all purchase orders of the finished-goods industries.
2. A not inconsiderable portion of the finished-product group actually make intermediate products such as parts used by other divisions of the same company or other companies, and the sales orders of these companies are really purchase orders of a finished-goods manufacturer in just the same sense as are the sales orders of firms in the intermediate-industries group.
3. Manufacturers that must be classed primarily in the intermediate group make some products that are not sold to finished-goods manufacturers in the machinery and transportation equipment industries. Examples are construction materials sold to construction companies, or products of any sort sold to industrial or institutional users, wholesalers, or even retailers.

Accordingly, one cannot isolate a substantial part of the outstanding purchase orders of the two broad finished-product groups by looking at the unfilled sales orders of the intermediate group. The latter include too much because of 1 and 3, and too little because of 2. Moreover, the misplacement of an industry subgroup (with respect to the finished product vs. materials criterion) that distorts the measurement of outstanding orders also distorts the materials stock part of ownership. The defects are large. This can be seen simply in the fact that the book value of shipments of the intermediate groups in 1956, as defined in the previous paragraph, summed to 97 per cent of that of the finished product group, thereby suggesting, absurdly, that, according to the logic of the classification scheme, value added by finished-goods manufacturers was 3 per cent. On the basis of the sample breakdowns that are available (I refer to the unpublished material), there is no way to eliminate what does not belong and add what does. The difficulty may be analyzed by using the far finer breakdowns and establishment data assembled in the course of the work on the Federal Reserve Board Index of

[6] No unfilled orders for automobiles are presumably recorded by auto manufacturers.

Industrial Production, and this confirms the negative conclusion.[7]

An alternative scheme seems preferable for most purposes. It abandons the effort to isolate two parts of the durable goods industries—those making finished products and those supplying these industries with materials. Instead, it estimates ownership for all durable goods manufacturing. We have data on outstanding sales orders of all corporations manufacturing durable goods—the sum of both groups previously mentioned. We also have their materials stocks. Concerning their outstanding purchase orders, we know the following:

1. They should not include the vast majority of the unfilled sales orders of machinery and transportation equipment industries; and these can actually be removed, though in so doing we also remove unfilled sales orders for machine parts or materials manufactured by this group which ought to remain.
2. They should not include the unfilled sales orders of manufacturers of construction materials or other goods sold to jobbers or construction companies which do not undergo further manufacture; about this nothing can be done.
3. They should include the unfilled sales orders of all the rest of the reporting sample of durable goods manufacturers, and these figures we have.
4. They should include the unfilled sales orders of dealers, miners, or importers who sell materials to durable goods manufacturers (this would be particularly important for the manufacturers of crude materials); these figures are unavailable.

Following this procedure, then, outstanding purchase orders of all durable goods manufacturers are somewhat too large by the inclusion of 2 and too small by the exclusion of 1, 3, and 4.[8] The materials stocks on hand are appropriately represented. Unfilled sales

[7] Calculations were made in terms of the production weights assigned to each category that needed to be singled out. The weights were developed in the course of the 1959 revisions of the Index of Industrial Production. They represent value added in 1957 (*Industrial Production, 1959 Revision,* Board of Governors of the Federal Reserve System, 1960, pp. 29–30). The FRB tables, "Series in Industrial Production Index," which give "market classifications" for each industry subdivision (*ibid.,* pp. S-3–S-11) were summarized to conform with the industry classifications available in the OBE unpublished data. In this way one could see, for example, that for 4.61 weight assigned to "aircraft and parts," 2.57 were for finished goods ("equipment") and 2.04 for parts. In addition to these data, use was made of the information in the 1958 Census of Manufacturers, *Distribution of Manufacturers Sales.* The calculations are at best little more than informed guesses concerning general orders of magnitudes concerning what one would like to measure on *an establishment basis.* The actual OBE data are, of course, on a company basis, and this can make very substantial differences. For example, auto parts manufactured by separate companies as reported to OBE were *far* smaller than by separate establishments as calculated by FRB. In addition, the small samples reporting to the OBE sample in some industries sometimes mean that the companies actually reporting are poor representatives of the industry group.

However, for whatever they are worth, my calculations for the adjustments required under points 1, 2, and 3 in the text involved adding 8.8 weight points (intermediate products in final-products industries) to the groups' unadjusted weight for the intermediate-goods manufacturers of 22.5, and subtracting 18.3 points (the sum of a number of different adjustments). The net decrease of 9.5 points brought the intermediate-group weight down to 13.0. The final-products group, which started with a weight of 26.1, was decreased by 8.8 points (for intermediate products in final-products industries) and increased by 5.2 (for final products in the intermediate group), causing a net decrease of 3.6 to a final figure of 22.5.

Shifts of this order, or indeed half this order, cannot be ignored unless it were safe to assume that materials and unfilled orders for all industries behaved alike. Very little could be done to meet the difficulty. Auto parts could have been shifted to the intermediate group, but the company reports failed to isolate most of this group (as indicated by comparison of FRB and OBE weight) and none of the other intermediate products in the finished-goods group were covered by separate OBE industries. The furniture industry could not be shifted to the final-products group because it had not been tabulated separately from lumber for most of the interval covered. Instrument manufacturers were left in the intermediate group, though the industry title suggests that they produce final products. There were two reasons for the decision: first, separate tabulation for the group did not start until 1954; second, a substantial part of the output of the actual companies in the sample consisted of parts rather than finished products.

[8] Evaluation of the sins of this calculation was similar in many respects to the procedure described

orders, shipments, and new sales orders are appropriately given by the totals for the durable goods industries. The figures are, I believe, the best that can be devised for the period prior to 1962 and adequate for preliminary exploration of the fluctuation of materials on hand and on order in durable goods manufacture.

For January 1962, I shift to the revised series compiled by the Bureau of the Census. The industry groupings are roughly comparable to those previously used, but the actual company reports not only are greatly expanded but differ since divisional information makes it possible to make a better assignment of the output of large integrated companies to the major fields that their work covers. For these and other reasons, I have made no effort to reconcile the differences in the two sets of data. Instead the new series have been set at the same level as the old for January to June 1962, and used without further ado beginning January 1962. (The data are discontinuous December 1961 to January 1962.) The procedure implies that subtle judgments concerning the location of turning points and the like cannot be made after 1962, and our measurements and summaries therefore end in 1961. However, the charts and discussions take the later evidence into account.

The calculation turns its back on some potentially useful information. Perhaps the most regrettable neglect is that of separate tabulation for the consumer durables industries, for which unfilled sales orders would be outstanding purchase orders of distributors. Combined with appropriate retail sales and stocks, this would be valuable evidence on how fluctuations in consumer buying are altered as they become incorporated in the buying of retailers and wholesalers. Also, by using the unfilled sales orders for the two groups of manufacturers, one could, in effect, compare the outstanding purchase orders for consumer durables bought by distributors and for capital equipment bought by dealers and final users. Both these comparisons would, of course, be greatly enriched if it were possible to contrast also the outstanding purchase orders for producers of finished consumers' and producers' goods. Needless to say, the latter calculation is impossible. But the division at the finished-goods stage is also foiled by the character of the actual reports.[9]

in the previous note. Two of the difficulties were shared by both calculations—those caused by intermediate products made by finished-goods manufacturers, and those caused by products made by the intermediate-products industries that are sold to construction companies and industrial or institutional users or distributors (since for these, unfilled sales orders are not outstanding purchase orders of any covered company). One difficulty of the previous calculation is not present here: the outstanding sales orders of the intermediate group that sell to one another are properly included. One difficulty is present here and not in the previous calculation: outstanding purchase orders for materials bought from miners, dealers, etc., should be included and cannot be. My estimates on the basis of the production data show the need for an adjustment downward by 11.3 index points and upward by 12.7. The net increase of 1.4 points, which is negligible, is, however, produced by a gross shift of 25.0 points, which is only slightly smaller than the gross shift of 27.1 points in the rejected calculation. But the redeeming features of this one is that the shifts should be measured against the base of all durables, 48.6, where in the other the appropriate base was 22.5, the unadjusted base of intermediate products alone. Further, for this concept, the defect is confined to outstanding orders. Stocks of materials or other stocks are correctly represented, as are shipments and new orders.

[9] The possibility of dividing materials producers into two groups is ruled out by the fact that even without the subdivision they cannot be adequately isolated. (See footnote 3 above.) But the difficulty goes deeper than this, and even the improved data now available may well not solve it adequately. Even the detailed level of the FRB sample and establishment data gives small representation to materials used in the durable consumer goods industries, which have a total weight of 3.67, and always as a part of contributions by the same industry subgroup to some other market classification. No subdivision for primary metals is undertaken for the FRB index; indeed, the distinction may well be meaningless at that level of production. This means that, at best, the consumer-producer break would have to be justified for what the analysis of the sales orders of the finished goods producers could show.

However, here, too, the separation could not be achieved on the basis of the company data. The new divisional reporting system should change this sad story. The obvious groups to include among the consumer group are (1) radio and communications, (2) household machinery, (3) motor vehicles, (4)

Questions, then, concerning the behavior of materials on hand and on order are to be addressed to two relatively small pools of information—those supplied by department stores, which are conceptually appropriate; those supplied by durable goods manufacturers for which appropriate concepts are only partially attained. It is clear that these are about the best data available. But this does not mean that they are good enough. However, I do indeed believe that they are good enough to support useful exploratory work.

Why? It is not easy to display the complex and dissimilar elements of which the judgment (perhaps one should say the partly intuitive judgment) is compounded.

There is, for one thing, information about the figures—information of the types discussed in the previous footnote; there is information about the reporting samples conveyed to me by the people who have striven to evaluate and improve them (and even the very character of these strivings is not immaterial); there are observations about how the data behave—the reasonableness of the way that parts of the total relate to one another, and to parts of parts, and to outside evidence.

Into the judgment seeps, no doubt, some wishful thinking. (An investigator is constantly horrified by the crafty ways in which he contrives to find relevance and order.) The judgment also scans the relation between the tools and the work to be done. The figures are for many reasons, including their level of aggregation, suited at best to box the compass of the problem rather than to explore in depth any single direction. Perhaps most reassuring is the realization that the shortcomings of the data are capable of obscuring meaningful information, but it is hard to see how they conceivably could produce the many sorts of sensible relations which, in fact, they show. Their greatest difficulty is that they must remain at a level of aggregation which is truly inappropriate to the problem under study.

Finally, there is a time dimension to be considered. The strategy of scientific advance often means that a good question answered badly may be a necessary prelude to a good answer some years later. Without further apologies, then, we turn to the effort to observe and understand how the time series behave.

furniture. However, the actual data available in no case were adequate to serve a useful purpose. The output of the reporting companies in (1) was far more heavily weighted with industrial than with consumer products. For (2), the chief producers of household machinery were classified in a different section of the machinery industries. As for (4), reports for furniture companies were not tabulated separately from those for lumber until 1954. But the worst difficulty was for (3), the group which on the surface seemed clear, the motor vehicle group. The industry had huge backlogs of orders in the early fifties, which must have been associated with defense contracts written by the auto manufacturers, whereas their outstanding orders for automobiles are presumably small or not recorded as such. Thus the outstanding orders of the largest group of consumer goods manufacturers were large, variable, and actually associated with nonconsumer goods business.