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Finished-Goods Inventories and Inventory Investment

In analyzing the behavior of finished goods, Abramovitz distinguished two major types: finished goods made to order and finished goods made to stock. The second category was subclassified according to whether the production cycle of the commodity was governed by demand or by conditions of raw materials supply, and according to whether the finished products were perishable items or staples. This classification may be outlined as follows:

I. Goods made to order.
II. Goods made to stock:
    A. Goods whose production cycles are governed by demand:
        1. Perishables.
        2. Nonperishable staples.
    B. Goods whose production cycles are governed by the supply of raw materials:
        1. Perishables.
        2. Nonperishable staples.

Abramovitz drew no conclusions regarding the timing of finished-goods inventories as a whole, but instead dealt with the behavior of the component classifications. Goods made to order he saw as tied to the level of output.[1] Of those goods whose production cycle is governed by demand, nonperishable staples would tend to move inversely to the rate of manufacturing and to business cycles; perishable goods, even if produced to stock, would be expected to vary with the volume of business, moving with, perhaps, a moderate lag. Goods whose output is governed by supply would not be expected to be cyclically sensitive. Their behavior would be influenced by the conditions of supply and the degree of perishability of the product.

Knowledge of the relative importance of these several components may be gained by examining the composition of finished stocks, comparing Abramovitz' estimates for the prewar period with postwar estimates. Such an investigation is made in this chapter; it is followed by an analysis of inventory behavior which deals first with the largest component, staple (nonperishable) made-to-stock finished goods whose production is governed by demand, and then with total finished goods. In subsequent sections inventory investment behavior is treated in a similar manner.

Composition of Stocks

Abramovitz' estimates of the size of the various components was based largely on an analysis of finished goods within each industrial

[1] The statements contained in this paragraph are based on Abramovitz, "Inventories and Business Cycles, With Special Reference to Manufacturers Inventories," New York, November 1950, pp. 240-241.

breakdown of the 1939 Census of Manufactures. He used the following classification:

1. Finished goods whose raw materials were procured from the agricultural sector:
   (*a*) perishable.
   (*b*) nonperishable staple.
2. Finished goods whose raw materials were procured from the nonagricultural sector:
   (*a*) perishable.
   (*b*) nonperishable staple.

His investigation was made on the assumption that commodities whose raw materials were procured from the agricultural sector would have production cycles that were supply determined and from the nonagricultural sector, production cycles that were demand determined. The assumption results in an underestimate of the demand determined category, in that there are important industries using agricultural raw materials that are not supply dominated (e.g., cotton textiles). The approach does, however, indicate the importance of nonfarm goods which, by and large, can be reliably classified as demand dominated. Moreover, it makes possible the identification of those industries for which agricultural raw materials are most important, and permits, through an inquiry into the nature of their production processes, the determination of whether their fluctuations are supply or demand influenced.

A duplication of Abramovitz' techniques, making use of 1947 Census of Manufactures data, revealed the following:

1. The staple demand dominated category was by far the largest; it is estimated at roughly 66 percent. Staple finished goods whose raw materials are procured from the nonagricultural sector accounted for 55.3 percent of total finished stocks; some produced from agricultural raw materials, but clearly demand dominated, accounted for 10.3 percent more.[2]

2. Those industrial categories using agricultural raw materials which may be supply influenced, and whose finished stocks are staple, accounted for about 23 percent of total finished goods. They included principally the food, beverage, and tobacco industries which are probably the least sensitive to business cycles.

3. The perishables are a relatively small category. Perishable finished goods whose raw materials are agricultural were estimated to be 9.1 percent; those with nonagricultural raw materials, 2.4 percent.

This classification of census material provides no insight into the size of the made-to-order category, but there is reason to believe that it is relatively small. Abramovitz estimates that it is no more than 15 to 25 percent of total finished goods stocks in spite of the fact that a much larger volume of business is done on a production-to-order basis.[3]

[2] I estimate that in 1947 the staple finished stocks held in the textile industry accounted for 5.8 percent of total finished goods; in the apparel industry, 3.1 percent, and in the leather goods industry, 1.4 percent. All are demand-oriented industrial activities, although, according to Abramovitz' classification, they make important use of agricultural raw materials.

[3] I found finished stocks-to-sales ratios for goods made to order to be much lower than similar ratios for goods made to stock, indicating that the magnitude of the former is much smaller than might be implied by the importance of the practice of producing to order (see footnote 7 below). For an analysis of the importance of production to order as a postwar practice in American manufacturing see Victor Zarnowitz, "The Timing of Manufacturers' Orders During Business Cycles," in Business Cycle Indicators, vol. I, Princeton for NBER, p. 426.

If we accept Abramovitz' rough estimate that 15 to 25 percent of finished stocks are made to order and deduct this from the 66 percent of total finished stocks previously designated as the staple demand dominated category, then staple made-to-stock finished goods in industries whose production cycles are demand dominated comprise from 41 to 51 percent of total finished goods. This estimate, combined with the percentages of perishables and the supply-dominated staples given above, provide an estimated composition of finished goods in 1947 which is compared with Abramovitz' estimates for 1939 in table 20.

Two observations may be helpful in interpreting the subsequent analysis of finished goods behavior. The first is that demand-dominated, nonperishable, made-to-stock finished goods, though important, are less so than before the war. This change in composition should make for somewhat less inverted behavior in the entire category. The second is that the estimate of made-to-order finished goods may well be too low. I have accepted Abramovitz' very tentative figure in the absence of other evidence, but a larger made-to-order category is quite possible in view of the increased importance of durables (produced principally to order) in the postwar period. Of course, a larger made-to-order component would also tend to reduce inverted behavior in the entire finished-goods category.

TABLE 20.—*Estimated composition of finished goods stocks, 1939 and 1947*

Components of finished goods stocks	1939 (percent)	1947 (percent)
Goods made to order	15–25	15–25
Goods made to stock	75–85	75–85
Goods whose production cycles are governed by demand:		
Perishables	(1)	2
Nonperishable staples	50–60	41–51
Goods whose production cycles are governed by supply:		
Perishables	(1)	9
Nonperishable staples	16	23

[1] Total perishables were estimated to be 9 percent. There was no breakdown.

Source: For 1939 estimates see Abramovitz, "Inventories and Business Cycles," p. 246; 1947 estimates were prepared from 1947 Census of Manufactures data.

In evaluating the significance of composition we must keep in mind that there does not exist in practice the sharp distinction between firms producing to stock and firms producing to order that is implied by the preceding classification. One finds new cases in which the producer sells entirely on an immediate delivery basis out of stock already on hand, and relatively few in which there is no production except to order. There will usually be at least some orders taken for subsequent delivery; and the practice of producing to stock may vary from that of a firm which produces a line of standardized items, selling freely from stock. but studying closely such orders for future delivery as it receives as a guide in planning production—to the firm which produces almost entirely against orders, but allows a relatively small quantity of buffer stocks to fall and rise against the cyclical tide.

Nevertheless, manufacturers do tend to operate predominantly on either a produce-to-stock or produce-to-order basis. Evidence that variability of practice may exist within these well-established classifications is found in the results of tests performed by Victor Zarnowitz,

which revealed that made-to-stock and made-to-order activities could be distinguished by the size of average ratios of stocks to unfilled orders over a period of years. Working with a variety of manufacturing activities and industry groups which had previously been reliably classified as producing principally to stock or to order, Zarnowitz found that the stock-to-unfilled-orders ratios fell into a well defined dichotomy: ratios for the made-to-order series had average values substantially below the level of 1; ratios for the made-to-stock series, values above 1.[4] Zarnowitz also notes that, "according to the ratios * * * industries which sell mainly from future output are decidedly dominant in the composite of all durable manufactures. In contrast, production to stock apparently prevails within the aggregate of nondurable goods industries." [5]

The Staple, Made-to-Stock Inventory Series

Abramovitz studied the behavior of demand-dominated staples made to stock with a sample of 18 nonfarm commodities.[6] In the present study, 25 series, representing a variety of activities, are analyzed. Among them are postwar extensions of some of Abramovitz' original 18 series. The only available commodities which have been omitted are those which would have given roughly duplicate coverage (e.g., additional lumber series, some other categories of gas heaters, men's hosiery).

Abramovitz' 18 series, as well as the 25 here, may be regarded as representing activities in which production is principally to stock rather than to order, although several of the postwar series would seem to be on the borderline.[7]

TIMING AND CONFORMITY OF STOCKS DURING ACTIVITY CYCLES

The 25 commodity series display well-developed timing and conformity characteristics. They tend to move with good conformity in a strongly inverted fashion relative to activity (see table 21).[8] Ninety-one inventory turns may be matched with the 109 activity turns on an inverted basis.[9] In a large majority of the comparisons (64 out of 91) the inverted turns in stocks were roughly coincident with activity turns. The remaining comparisons were about equally divided between leads and lags of 4 or more months. Average timing for all comparisons on an inverted basis was approximately coincident.

[4] Zarnowitz, in Business Cycle Indicators, vol. I, p. 426.

[5] Ibid.

[6] We shall have occasion to refer frequently to this category of finished goods. For the sake of convenience it shall be designated henceforth simply as "staples made to stock."

[7] In attempting to apply the Zarnowitz test to the 25 series it was found that only 8 have unfilled orders data available. Of these, seven (gas domestic heating stoves, bathtubs, lavatories, southern pine lumber, oak flooring, paper, and ladies full-fashioned hosiery) are clearly made-to-stock activities with stocks-to-unfilled-orders ratios ranging from 1.39 to 5.15. The other series—paper products—is a borderline case with a ratio of 0.62.

In an effort to classify the remaining series, stock-to-sales ratios were tested as an alternative basis of classification. The series for which both types of ratios were available were ranked first according to Zarnowitz' average stocks-to-unfilled-orders ratios, and then according to average stocks-to-sales ratios during the period 1948–55. The ranks were identical.

Using the stocks-to-sales in lieu of stocks-to-unfilled-orders ratios it was then possible to classify the entire sample. With 2 exceptions (newsprint, 0.29, and wood pulp, 0.10) all of the series had stock-to-sales ratios considerably larger than the border-line paper products (stocks-to-sales ratio, 0.42); 16 had ratios above 1, 20 above 0.70.

[8] I attempted to use shipments (sales) data where possible to represent activity, and was able to secure such data for 20 of the 25 commodities. For the remaining commodities, output data were used. As Abramovitz has shown, the two give very similar results. See Abramovitz, "Inventories and Business Cycles," p. 248.

[9] Immediately following the war there occurred a long period of finished-goods inventory buildup. No inverted behavior of stocks took place until the recession of 1948–49. For this reason the comparisons were not begun on an inverted basis until the beginning of the 1948–49 recession period.

TABLE 21.—*Timing and conformity of 25 commodities at activity turns, 1947–55*

A. TIMING AND CONFORMITY MEASURES

Stocks	Indicator of activity	Activity turns [1]	Turns matched [1]	Extra turns	Percent months out of phase [2]
1. Gas domestic stoves	Shipments	5	5		80
2. Gas ranges	do	5	5		74
3. Warm air furnaces	do	5	5		87
4. Domestic refrigerators	do	5	5		77
5. Electric ranges	do	5	3		84
6. Lavatories	do	5	5		96
7. Kitchen sinks	do	3	3		90
8. Bathtubs	do	5	5		87
9. Southern pine lumber	do	5	5		79
10. Oak flooring	do	3	3	2	56
11. Glass containers	do	5	5		72
12. Refined copper	do	3	3	2	55
13. Slab zinc	do	3	3		61
14. Lead	do	5	3		49
15. Portland cement	do	0	0	5	[3]
16. Women's hosiery	do	4	4	1	62
17. Auto tires	do	5	3		54
18. Newsprint at mills	do	2	1	3	[4]
19. Paper, all grades	do	3	2		58
20. Total rayon	do	5	5		90
21. Synthetic rubber	Production	5	5		62
22. Lubricants	do	3	3		72
23. Wood pulp at mills	do	3	2		51
24. Cotton cloth, unsold mill stock	Cotton consumption at mills.	5	5		89
25. Flat rayon fabrics	Production	5	3		35

B. SUMMARY OF TIMING AND CONFORMITY [1]

	Number
Number of activity turns	109
Matching turns	91
Leads, 4 or more months	14
Rough coincidences	64
Leads, 1–3 months	(22)
Coincidences	(11)
Lags, 1–3 months	(31)
Lags, 4 or more months	13
Average timing all turns	+.08

[1] Only turns beginning with the trough in activity corresponding to the trough of the 1948–49 recession have been used in this analysis. Conformity and timing measures are based on inverted timing.
[2] First major peak to final major trough.
[3] No activity turns.
[4] No 1948–49 cycle.

Source: Line 1: Facts for Industry, series M51E, Department of Commerce; lines 2, 3: Facts for Industry series M51N; lines 4, 5: data from National Electrical Manufacturers Association, with restrictions on publishing; lines 6, 7, 8: Facts for Industry series M51H; lines 9–15, 17–19, 21, 22: Survey of Current Business, various issues and supplements; line 16: National Association of Hosiery Manufacturers, annual reports; line 20: Textile Organon, various issues; line 23: Facts for Industry, series FF1, 14A, line 24: various issues of Textile Hi-Lights, American Cotton Manufacturers Association (data for cotton consumption at mills from Survey of Current Business); line 25: data from National Federation of Textile Manufacturers, with restrictions on publication.

Abramovitz' investigations established for the prewar period the hypothesis that staples made to stock would tend to conform to activity cycles in an inverted fashion, but that the tendency for stocks to move in the opposite direction from sales and output would weaken as the phase increased in duration. This length-of-phase hypothesis was demonstrated by an analysis of timing in inventory turns compared, on an inverted basis, to the timing of turns in corresponding indicators of manufacturing activity. When leads and lags in the inverted stock series were classified according to the length of their comparable activity phases, it was found that the percentage of leads

in the stock turns increased as the duration of the phase increased; the average timing changed from a lag for phases of 12 months and under, to a lead which became progressively larger as the activity phase lengthened beyond 12 months.[10]

When the same test was performed for the postwar data, the hypothesis was sustained both for expansions and contractions, with some indications that the postwar turns occurred slightly earlier. Sufficient observations for analysis could be made for only two categories of phase duration, 12 months and under, and 13 to 24 months. For these two categories leads of 1 or more months occurred in 30 and 50 percent of total timing comparisons, in contrast to 19 and 43 percent for similar prewar timing computations. The average postwar timing (inverted) was a lag of 1.2 months for activity phases of 12 months and under, and a lead of 1.05 months for those of 13 to 24 months, compared with average prewar lags of 6.1 months and 0.7 month, respectively.[11]

Total Finished Goods Inventories

For the period from 1945 to 1958, it is clear (see chart 10) that total finished stocks conform positively to sales cycles, lagging by a number of months at most turns. During the relatively short sales contraction phases lags in the inventory series make for essentially inverted timing, but during the longer expansion phases the two series move in the same direction in most months. It is for this reason that the timing comparisons in table 22 are made on a positive, rather than an inverted basis.

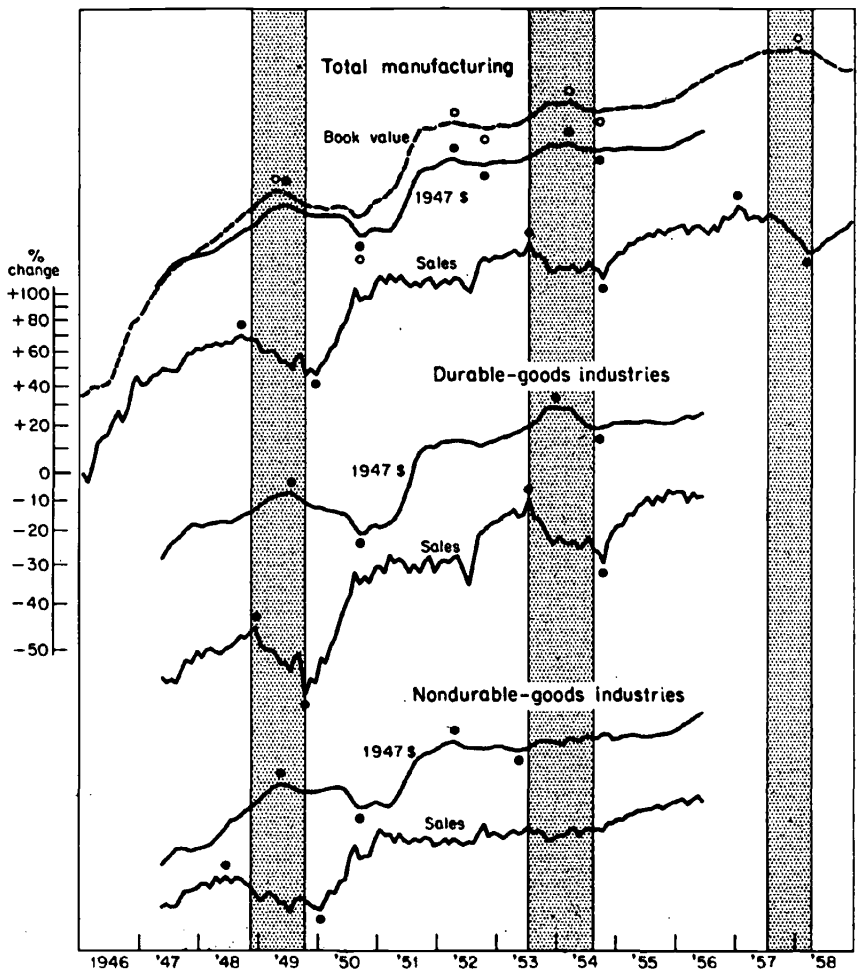
Timing and Conformity of Stocks: Comparisons with Sales and Reference Turns

Timing comparisons for finished goods inventory turns are shown in table 22 for the comprehensive and the nine-industry series, along with measures indicating the degree to which cyclical movements in finished goods conform to cycles in the sales series. The total manufacturing and durables series conformed positively to major turns in sales activity in 1948–49, 1953–54, and 1957–58, but displayed long lags at five of the six turns (table 22 and chart 10). It is interesting that the nondurables inventory series shows a longer lag than the durables series at only one of the four comparisons; the lag is actually shorter on two occasions. Zarnowitz' finding that the practice of producing to stock is much more prevalent among nondurables would lead us to expect significantly longer lags in this series at all turns. There is no direct evidence to explain the observed behavior. It is possible that it may reflect the fact that nondurables sales do not fluctuate as vigorously as those of durables. If inverted movements in staples made to stock are regarded as largely due to unanticipated changes in sales, it is to be expected that the duration of inverted behavior (i.e., the duration of the lag of inventories behind sales) would be influenced by the extent to which sales fluctuate.

[10] Ibid., pp. 249–256.
[11] Ibid., p. 253.

CHART 10

FINISHED-GOODS INVENTORIES AND SALES: TOTAL MANUFACTURING, DURABLE- AND NONDURABLE-GOODS INDUSTRIES, 1946–58



Shaded areas represent business contractions; unshaded areas, expansions.
Dots identify peaks and troughs of deflated inventory cycles; circles, of undeflated cycles. All sales data are undeflated.

Source: Department of Commerce. Data deflated by the author.

TABLE 22.—*Timing and conformity of manufacturers' finished goods inventories at sales turns*

A. TIMING MEASURES [1]

Industry	Lead (−) or lag (+) of inventories to sales, in months, in zones associated with business cycle reference turns					
	1948 peak	1949 trough	1953 peak	1954 trough	1957 peak	1958 trough
Total, manufacturing	+9	+9	+8	−1	+12	+9
Durable goods industries, total	+7	+11	+5	−1	+12	+9
Nondurable goods industries, total	+11	+8	(2)	(2)	+12	+6
Primary metals	+7	[3] +20	+9	+13	-------	-------
Machinery (including electrical)	+8	+9	+5	+15	-------	-------
Transportation equipment (including motor vehicles)	−21	+9	+3	+5	-------	-------
Stone, clay, and glass	+10	+9	(2)	(2)	-------	-------
Food and beverages	[3] +20	+9	−3	+2	-------	-------
Paper	[3] +20	[3] +21	(4)	(4)	-------	-------
Chemical	+14	[3] +20	(2)	(2)	-------	-------
Petroleum and coal	+7	+8	+12	+6	-------	-------
Rubber	+13	+15	+2	+7	-------	-------

B. SUMMARY OF TIMING AND CONFORMITY

Timing and conformity comparisons	9-industry series	4 durable goods industries	5 nondurable goods industries
Number of comparisons at business cycle turns	34	16	18
Matching inventory turns	30	14	16
Percentage of matching inventory turns	88	88	89
Leads more than 3 months	1	1	0
Rough coincidences	4	1	3
Leads 3 months or less	(1)	(0)	(1)
Coincidences	(0)	(0)	(0)
Lags 3 months or less	(3)	(1)	(0)
Lags more than 3 months	25	12	13

[1] Inventory series have been deflated to 1956, 1957–58 turns based on undeflated data. Timing comparisons are based on a positive relationship between cyclical movements. Timing of inventory turns for "Korean" cycle is not shown since there were no inventory that could be matched with sales turns related to this episode. See table 23 for timing comparisons of inventory turns with Korean reference turns.
[2] Sales turn occurs, but no matching inventory turn.
[3] Timing relationship is completely inverted: turn is coincident with subsequent sales turn.
[4] No turn occurs in either sales or inventories.

Source: Based on material from Department of Commerce.

For the Korean period it is difficult to measure the timing of manufacturing and total durables inventory movements because the related sales series show only a period of retardation rather than actual decline.[12] If, however, sales turns were marked from diffusion index series showing accumulated net increases (total manufactures sales series: peak February 1951, trough February 1952; total durables sales series: peak February 1951, trough November 1951), we would note inverted inventory movements throughout the contraction periods.

When we turn to the industry measures, the major impression is the consistent tendency for finished-stocks series to lag behind sales turns; lags are noted at 28 of the 30 possible comparisons. The duration of these inverted movements varies considerably, however, particularly among the nondurables. The five nondurables series

[12] Sales failed to contract because expanding defense shipments in key durable-goods industries offset declines elsewhere in the economy. If diffusion indexes based on durable-goods industry group-sales volume (quarterly) are constructed, the behavior of the aggregate sales series appears in a different light. The number of industries with expanding sales falls sharply from 90 percent in the first quarter of 1951 to 46 percent in the second, and remains well below the 50-percent level through the first quarter of 1952. As would be expected, the contraction is more pronounced in the nondurables group, but the diffusion indexes of the durables sales series show a contraction to below 50 percent during the second and third quarters of 1951 and no marked expansion until the first quarter of 1952.

available for study give a picture of erratic behavior, with long lags at the first major turns, and short lags, roughly coincident turns, or nonconforming movements at the last major turns.

Timing comparisons with reference turns are not significantly different from those with sales turns (table 23). Relatively earlier timing at business cycle peaks than troughs is noted for 22 of the 30 comparisons of industry series with business cycle reference turns, but the tendency is not well established in the comprehensive series.

It may be concluded from this analysis that total finished-goods stocks tend to lag behind sales and reference turns with considerable variation in timing. The completely inverted timing noted in the staple made-to-stock series is not observed in the total finished-stock series. Lacking additional evidence, we must conclude that the staple made-to-stock inventories contribute a strong tendency toward inverted behavior, but that the other categories of finished goods move more readily with sales, thereby offsetting inverted tendencies to a very significant extent. The net result is the strongly lagged timing which has been observed.

TABLE 23.—*Timing and conformity of manufacturers' finished-goods inventories at reference turns*

A. TIMING MEASURES [1]

Industry	Lead (−) or lag (+) in months							
	Business cycle		Korean cycle		Business cycles			
	Peak, November 1948	Trough, October 1949	Peak, February 1951	Trough, June 1952	Peak, July 1953	Trough, August 1954	Peak, July 1957	Trough, April 1958
Total manufacturing	+7	+11	+14	+4	+8	+1	+6	+8
Durable-goods industries, total	+8	+11	(2)	(2)	+5	+1	+6	+9
Nondurable-goods industries, total	+6	+11	+14	+10	(2)	(2)	+6	+5
Primary metals	+8	+20	(2)	(2)	+9	+13	----	----
Machinery (including electrical)	+10	+11	(2)	(2)	+4	+17	----	----
Transportation equipment (including motor vehicles)	−12	+11	+12	+15	+3	+7	----	----
Stone, clay, and glass	+9	+11	(2)	(2)	(2)	(2)	----	----
Food and beverages	+14	+12	+13	+3	+6	+4	----	----
Paper	+18	+18	(2)	(2)	(2)	(2)	----	----
Chemical	+9	+16	(2)	(2)	(2)	(2)	----	----
Petroleum and coal	+7	+11	(2)	(2)	+12	+7	----	----
Rubber	+8	+18	(2)	(2)	+2	+9	----	----

B. SUMMARY OF TIMING AND CONFORMITY

Timing and conformity comparisons	9 industry series		4 durable-goods industries		5 nondurable-goods industries	
	All turns	All turns except Korean	All turns	All turns except Korean	All turns	All turns except Korean
Number of comparisons	54	36	24	16	30	20
Matching inventory turns	34	30	16	14	18	16
Percentage of matching inventory turns	63	83	67	88	60	80
Leads more than 3 months	----	1	----	1	----	0
Rough coincidences	----	2	----	1	----	1
Leads 3 months or less	----	(0)	----	(0)	----	(0)
Coincidences	----	(0)	----	(0)	----	(0)
Lags 3 months or less	----	(2)	----	(1)	----	(1)
Lags more than 3 months	----	27	----	12	----	15

[1] Inventory series have been deflated to 1956; 1957–58 turns based on undeflated data.
[2] Sales turn occurs but no matching inventory turn.

Source: Based on material from Department of Commerce.

The Staple, Made-to-Stock Inventory Investment Series

In studying finished-goods investment, once again we turn first to the important staple made-to-stock category before proceeding to the analysis of total finished-goods investment behavior as revealed in the Department of Commerce data.

In his study, Abramovitz used the NBER technique of dividing each activity cycle into nine separate stages. Levels of stocks were measured at each stage and inventory investment was computed by measuring the change per month between stages with eight intervals occurring in each cycle (four during expansion, four during contraction).

For the postwar period changes in these stocks have been computed on a strictly chronological basis (for each calendar quarter). The timing of each peak or trough (i.e., the lag from the beginning of the activity phase to the turn in the investment series) has been computed as a percentage of the duration of the activity phase during which it occurs. To provide a framework as similar to Abramovitz' as possible, the resulting timing measures have been arranged so that each expansion and contraction in activity is divided into four parts called quartile intervals. To time inventory investment, frequency distributions have been prepared, showing the proportion of inventory investment peaks occurring during each quartile interval of activity-contraction phases, the proportion of troughs occurring during each quartile interval of activity-expansion phases, and the percentage of all turns occurring in the first, second, third, and fourth quartile intervals of their respective activity phases (table 24).

Table 24.—*Distribution of timing of inventory investment turns (inverted) by quartile intervals of activity cycles, 25 finished goods, 1947–55*

Investment turns	Percent of turns during quartile intervals of activity phase				Mean length of phase (months)
	1st quartile interval	2d quartile interval	3d quartile interval	4th quartile interval	
Investment peaks, all activity contractions	21	26	21	32	----------
Cumulated percentage	(21)	(47)	(68)	(100)	----------
Investment troughs, all activity expansions	33	19	33	14	----------
Cumulated percentage	(33)	(52)	(85)	(100)	----------
Investment peaks or troughs, all activity phases	25	21	25	24	----------
Cumulated percentage	(25)	(46)	(71)	(100)	----------
Investment peaks:					
1948–49 contraction phases	13	26	30	30	14
1951–52 contraction phases	19	19	14	48	12
1953–54 contraction phases	40	27	20	13	11
Investment troughs:					
1949–51 expansion phases	52	0	29	19	20
1952–53 expansion phases	7	47	40	7	15

Note.—The above analysis is based upon 93 observations of timing of finished-goods inventory investment turns. With only 5 exceptions all investment peaks occurred during activity contractions and all investment troughs during activity expansions. The exceptions may not be regarded as significant departures from this typical timing relationship: 4 inventory investment turns occurred from 1 to 3 months prior to the activity phase with which an inverted comparison could be made. These turns were classified as falling within the 1st quartile interval of the subsequent activity phase. The other exception was an investment peak which lagged the corresponding activity trough by 1 month. This turn was classified as falling within the 4th quartile interval of the preceding activity phase.

Source: See table 25.

The measures show that almost half (46 percent) of the investment series reached peaks or troughs by the middle of their respective activity phases (measured on an inverted basis), and well over two-thirds (71 percent) during the first three quartile intervals. The results are not greatly different for frequency distributions made separately for expansions and contractions: the expansions showed only a slightly higher percentage (52 percent) of turns occurring during the first two quartiles, and the contractions, a slightly lower percentage (46 percent) during the same period.

Such measures of the relative timing of peaks and troughs are, of course, not completely comparable with medians of average rates per month from stage to stage, but they would seem to bear out Abramovitz' general conclusion that inventory investment in this class of stocks which moves against the tide of activity expansion or contraction levels off or declines in the second half, and certainly by the fourth quarter, of the phase.

Despite tendencies generally consistent with Abramovitz' findings, these measures provide some evidence of earlier turns in activity cycle phases than existed in the prewar period. It will be noted that a fourth of the peaks or troughs in the inverted inventory investment movements occur during the first quartile interval of all activity phases. This is in sharp contrast to the typical patterns shown by Abramovitz, in which the inverted movement of inventory investment has either not yet begun or has scarcely begun during the early stages of the phase.[13]

INVENTORY INVESTMENT AND RATES OF CHANGE IN ACTIVITY

In the above discussion the timing of made-to-stock inventory investment was related to turns in activity proper. Turning now to the timing of investment and peaks or troughs in activity rates of change, it is reasonable to suppose on a priori grounds that the relationship will be an inverted one. Very abrupt changes in the flow of shipments would be expected to result in abrupt changes in made-to-stock goods and could easily lead to coincident inverted timing of turns in rates of activity and inventory investment change.

There are situations, however, in which the inverted turns in investment might lag or lead, as well as be coincident with turns in rates of change in shipments. Suppose, for example, that increases or decreases in the level of shipments take place very gradually and that manufacturers are strongly disposed to retain past rates of production. Under these conditions fluctuations in rates of change in shipments might play a role secondary to the increasing discrepancy between monthly shipments and output, with the result that the peak or trough in inventory investment would occur late in the phase (when the discrepancy reached a maximum), very probably lagging behind the peak or trough in rates of change in activity. On the other hand, it could be assumed that manufacturers are attempting to keep as tight a rein on finished-goods inventories as possible. They may allow only such inverted movements in stocks to occur as are absolutely necessary to meet the requirement that output be maintained at a high enough level during recession to avoid the loss of valuable workers through excessive layoffs, and at a low enough level during

[13] Ibid., pp. 413–414.

expansion to minimize costly overtime work. Under such conditions large changes in inventories would occur principally as a result of inability to anticipate changes in shipments. Peaks or troughs in inventory investment might occur coincidently (on an inverted basis) with those in rates of change in shipments if the latter were large and abrupt. But if the efforts to control stock levels were partially successful, it is quite possible that the inverted inventory investment movement would be checked before the movement in shipment rates of change had reached its peak or trough, with the result that peaks or troughs (inverted) in inventory investment would lead those in activity rates of change.

In chart 11 a quarter-by-quarter record of the incidence of peaks and troughs in inventory investment and rates of change in activity is presented for the 25-commodity sample. It will be noted that peaks or troughs in investment tend to occur in clusters and that there is a well-developed inverted relationship between these turns and those in rates of change in activity (which also tend to cluster). Concentrations of peaks or troughs in inventory investment occur either coincidently or lead (on an inverted basis) those in rates of change in activity.

This tendency was also apparent when the commodity series were examined individually. The results of all timing comparisons for the 25 series are summarized below. Investment peaks and troughs led or turned coincidently with those in rates of change in activity for all but 16 percent of these comparisons, leads (41 percent) and coincident turns (43 percent) being about equally divided. The tendency was well established for both expansions and contractions.

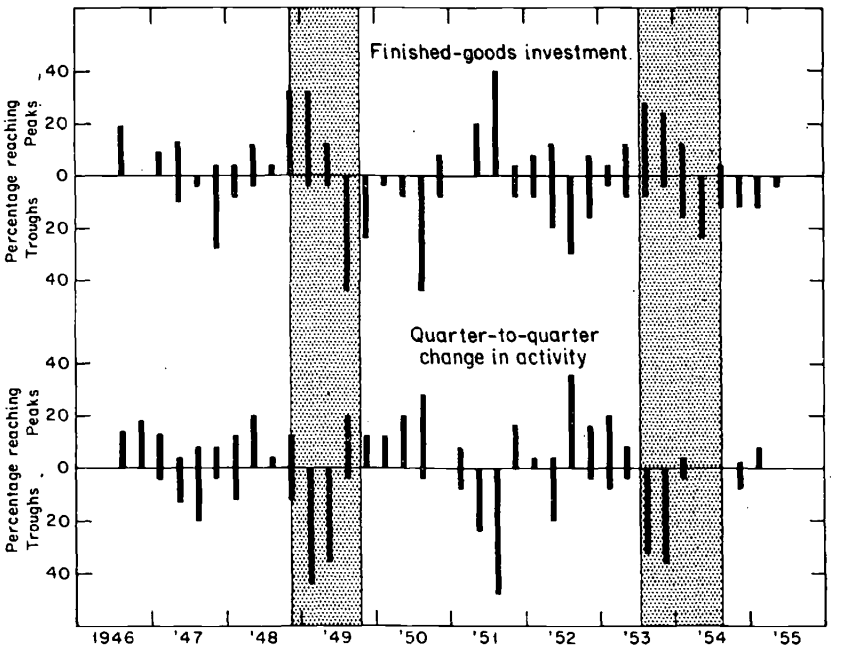
	Leads	Coincidences	Lags	Total
Timing at peaks in rate of change in activity:				
Number of investment troughs compared	15	17	10	42
Percent of investment troughs compared	36	40	24	100
Timing at troughs in rate of change in activity:				
Number of investment peaks compared	28	28	7	63
Percent of investment peaks compared	44.5	44.5	11	100
Timing at all turns in rate of change in activity:				
Number of investment turns (inverted) compared	43	45	17	105
Percent of investment turns (inverted) compared	41	43	16	100

No directly comparable study has been made for the interwar period but Abramovitz' stage-by-stage analysis of rates of change in stocks and in activity during activity cycles provides a basis for examining this timing relationship during the earlier period. Abramovitz has presented summary statements for median rates of change for all expansions and contractions observed regardless of duration, and also for expansions or contractions of 12 months and under, 13 to 24 months, 25 to 36 months, and over 36 months.

Most relevant to this discussion are his profiles for activity phases of 12 months and under, and 13 to 24 months (our postwar data show almost no activity phases longer than 2 years in duration). Patterns of rates of change for these two periods of activity phase duration show quite clearly that turns in inventory investment (i.e.,

CHART 11

FINISHED-GOODS INVENTORY INVESTMENT AND CHANGE IN MANUFACTURING ACTIVITY: 25 COMMODITIES



Shaded areas represent business contractions; unshaded areas, expansions.

Source: Compiled from seasonally adjusted industry data. For details on commodity series see table 21.

median rates of change in stocks) occurred coincidently with or lagged behind (on an inverted basis) turns in rates of change in activity. There were no leads: [14]

	Peak: Rate of change in activity	Trough: Inventory investment
Expansions:		
Phases 12 months or less	Stages IV-V	Stages IV-V.
Phases 13 to 24 months	Stages I-II	Stages III-IV.
	Trough: Rate of change in activity	**Peak: Inventory investment**
Contractions:		
Phases 12 months or less	Stages VII-VIII	Stages VIII-IX.
Phases 13 to 24 months	Stages VI-VII	Stages VI-VII.

Here, once again, is evidence that inventory investment has turned earlier in the postwar period. Abramovitz' prewar data show that timing of inverted investment turns was coincident or lagging. The postwar data for this class of stock show a marked tendency for peaks

[14] This summary of timing is based on charts 78 and 79, ibid., pp. 413, 414. According to the NBER techniques used by Abramovitz, stages I and IX are the terminal troughs of a cycle, stage V is the peak, and stages II to IV and VI to VIII are intermediate stages of the expansion and contraction phases.

and troughs in investment to lead or turn coincidently with troughs and peaks in rates of change in activity.

RELATION BETWEEN STAPLES MADE TO STOCK AND TOTAL MANUFACTURERS' FINISHED GOODS

The discussion of inventory investment thus far has dealt in some detail with staples made to stock. It has already been shown that this is the largest finished-goods category (comprising perhaps as much as one-half of finished stocks). Moreover, it is probable that cyclical fluctuations in these stocks display the greatest relative amplitude. Staple made-to-stock inventories act as buffers, allowing the firm to operate without a complete synchronization of output and shipments. Stocks are permitted to rise or fall as changes in demand bring disturbances in this balance and as, subsequently, such imbalances are corrected. In contrast, made-to-order stocks are merely awaiting shipment. In most instances changes in their level can be little more than a reflection of ease or difficulty in making shipment or of changes in customers' preferences as to actual date of delivery. Finally, perishable goods, by definition, can be neither large nor cyclically sensitive, and supply-dominated stocks can hardly be expected to fluctuate cyclically. In view of the evident size and significance of staple made-to-stock inventories, the question now arises as to whether there might be a generalized investment pattern among the made-to-stock commodity series which would closely resemble the pattern in the aggregative Department of Commerce series. In order to test this hypothesis a diffusion index of the commodity series was constructed by computing quarterly the percent of series in which inventory investment increased (i.e., increases in stocks were larger, or decreases smaller, than in the preceding period) and accumulating the net percentage increases (percentage of series expanding minus 50) from quarter to quarter. Such a diffusion index approximates the aggregate behavior of the series included.

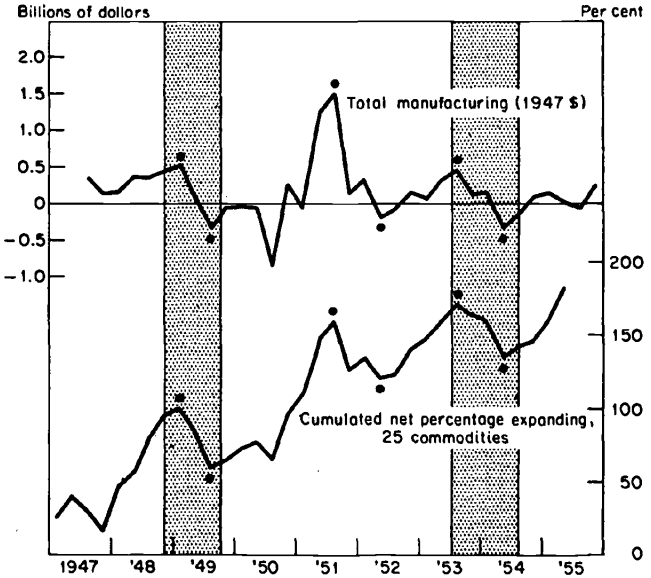
The resulting series, graphed in chart 12, shows a striking resemblance to the Department of Commerce series for total manufacturers' finished-goods investment series. The two display almost identical movements, coinciding in their turning points at five of the six turns and differing by only one quarter at the remaining turn.[15]

This presents a curious picture: there is ample evidence that the 25 commodity series for which the diffusion index was constructed represent activities in which goods are predominantly produced to stock; yet inventory investment for these series behaved like that for aggregate and durables manufacturing in which a large portion of output is produced to order.

[15] A strong upward trend may be noted in the diffusion index series, which is in sharp contrast to the trend-free behavior of the series for manufacturers' finished goods. The trend in the former series is not surprising in view of the type of data being observed. In preparing these series, quarterly computations were made of the net percentage of inventory investment series rising and the results accumulated. The average extent of participation in expansion and contraction periods is roughly the same (i.e., the typical quarterly amplitude of movement appears to be about the same for expansions and contractions), but the longer duration of the expansion periods gives the cumulative series an upward trend. Such a trend is impossible, of course, in the series showing quarter-to-quarter change in total manufacturers' finished goods, since disinvestment must be shown below the zero line.

CHART 12

FINISHED-GOODS INVESTMENT: TOTAL MANUFACTURING AND CUMULATED NET PERCENTAGE OF INVESTMENT SERIES EXPANDING (25 COMMODITIES)



Shaded areas represent business contractions; unshaded areas, expansions. Dots identify peaks and troughs of specific cycles.

Source: Total manufacturers' finished-goods investment series compiled from Department of Commerce data deflated by the author. For details on commodity series see table 21.

Two explanations of this agreement between the series are possible. The first is that total inventory investment was dominated by changes in the volume of finished goods made to stock; goods produced to order were quickly shipped and their variations played a negligible part in determining overall investment. The second is that inventory investment for made-to-order and made-to-stock finished goods share the same pattern.

The latter explanation is unacceptable; to adopt it is to say that inventories of goods produced to order show their sharpest rate of increase after shipments have begun to fall off and their sharpest rate of decrease after shipments have begun to rise. The statistical evidence is meager, but it does not point toward such behavior: Abramovitz found one made-to-order series, steel sheets, in which inventory investment moved with rates of change in sales, leading turns in sales proper. I have located one postwar series, steel barrels and drums, and here movements were irregular and of small amplitude.

The conclusion is that finished goods made to stock have much the greater amplitude of movement and that they dominate finished goods inventory investment. In short, the pattern and timing of inventory investment in our 25 made-to-stock series agree with that of total manufacturers' finished-goods investment because the movements that we see in the latter are predominantly reflections of movements in the former.

When the timing of inventories proper was compared by a similar means, however, the resemblance was less close. Turns in the cumulative diffusion index of the 25 commodity inventory series coincided with the Department of Commerce manufacturers' series in three of the five comparisons, but lagged by 3 and 6 months at the remaining comparisons.[16] It would seem that the influence of the other categories of finished goods is demonstrated here. As stated previously, it is to be expected that these other stocks will move more promptly with cyclical changes in activity than do the staple made-to-stock inventories, and that they will cause the aggregate finished-goods inventory movements to turn somewhat earlier. The stamp of the made-to-stock group remains, however, dominating the patterns in rates of change in the aggregate finished-goods series.

Total Finished-Goods Inventory Investment

Investment and Rates of Change in Sales

We may now ask whether total finished-goods inventory investment, which moves with similar timing to its staple made-to-stock component during business cycles, has a like tendency to move in an inverted fashion with turns in rates of change in sales.

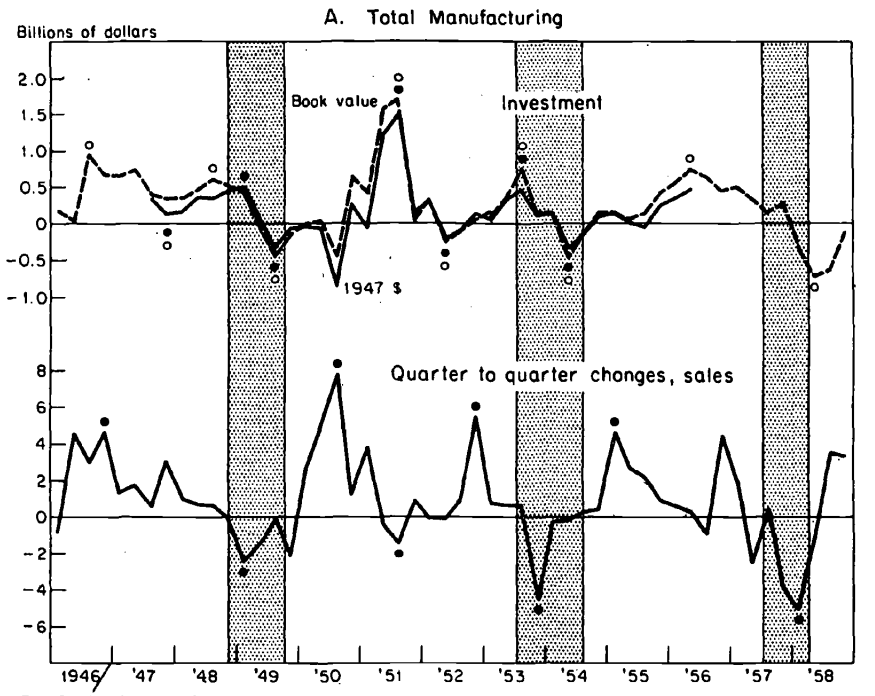
Chart 13 and table 25 show that, for the period beginning in mid-1947, there is a strong tendency for total finished-goods investment, as well as its durable and nondurable components, to move in an inverted manner in relation to rates of change in sales, but to turn and come into phase at least several months before the turn in the latter series. There are two instances in which the lead is a year or more in duration. The first occurs in third quarter 1949, when the trough in investment leads by 12 months the peak in rate of change in sales.[17] The second occurs during the 1954–58 cycle, when the peak in inventory investment leads the trough in rate of change in sales by 18 months in the total manufacturers' and nondurables series and by 27 months in the durables. It should be noted, however, that the movements in the investment and sales series are inverted during roughly the first year and a half of the expansion. It is only during the latter part of the expansion that we note departure from the earlier pattern.

[16] If the timing of the Department of Commerce and the commodity series are compared with their respective activity series, the relatively greater inverted tendency of the commodity series becomes even more apparent, for the commodity activity series tended to turn relatively early in the business cycle phase (see footnote 20).

[17] There was a second trough in investment, of even greater magnitude, in third quarter 1950, accompanying the outbreak of the Korean war. This movement was of only one quarter duration, however, and the trough has been marked at the earlier date. On the other hand, it is apparent that the peak in rate of change in sales, marked as third quarter 1950, could not have occurred earlier than second quarter 1950 had there been no such outbreak.

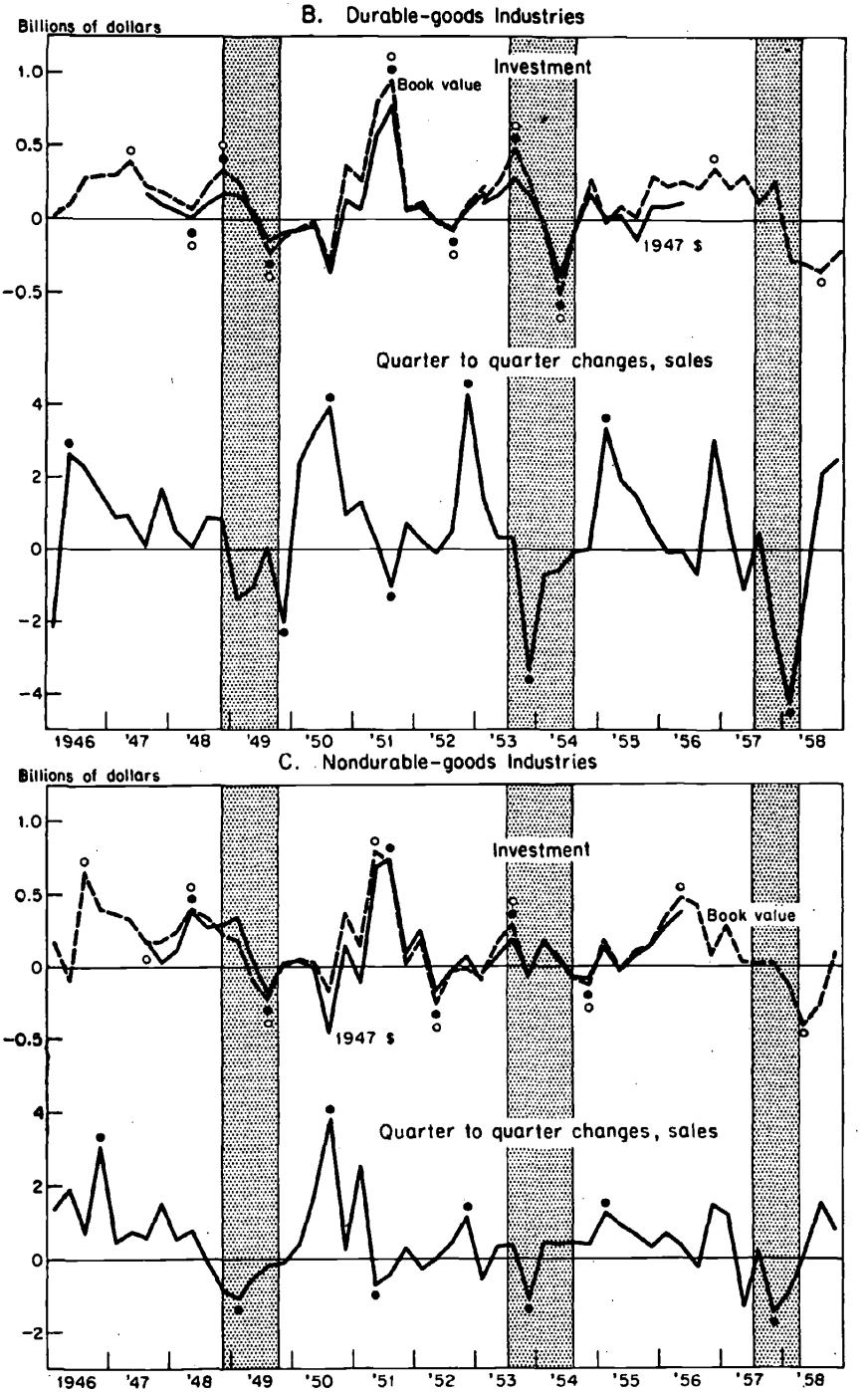
CHART 13

FINISHED-GOODS INVENTORY INVESTMENT AND QUARTER-TO-QUARTER CHANGE IN SALES, 1946–58



See chart notes on p. 78.

CHART 13—Continued



Shaded areas represent business contractions; unshaded areas, expansions.
Dots identify peaks and troughs of deflated inventory cycles; circles, of undeflated cycles. All sales data are undeflated.

Source: Department of Commerce. Data deflated by the author.

TABLE 25.—*Timing of finished-goods investment to rate of change in sales*

Date of turns in rate of change in sales			Timing of finished-goods investment (inverted)		
Quarter	Year		Total manufacturing	Durable goods	Nondurable goods
I	49	(Trough)[1]	0	−12	−9
III	50	(Peak)	−12	−12	−12
III	51	(Trough)[2]	0	0	+3
IV	52	(Peak)	−6	−3	−6
IV	53	(Trough)	−3	−3	−3
I	55	(Peak)	−9	−9	−3
I	58	(Trough)[3]	−21	−15	−18

[1] For durable goods, date was 4th quarter 1949.
[2] For nondurable goods, date was 2d quarter 1951.
[3] For nondurable goods, date was 4th quarter 1957.

Source: Based on material from Department of Commerce.

TIMING OF INVESTMENT DURING BUSINESS CYCLES

The postwar tendency of turns in inventory investment (inverted) to lead or coincide with turns in rates of change in activity provides a basis for generalization regarding the typical timing of investment during business cycles.

There is considerable evidence available relating to the timing characteristics of rates of change in activity. Abramovitz studied the behavior of rates of change in activity during reference cycles for 57 prewar series and noted well-established tendencies: "The rate of growth in output reaches a high point considerably before the end of expansion, a trough considerably before the end of contraction." [18] During the postwar period this same tendency has been quite apparent in rates of change in total manufacturing sales, as may be seen from the following chronology of turns: [19]

	Reference turns (quarterly basis)	Quarter-to-quarter change, total manufacturing sales
Expansion	IV 1945 to IV 1948	Peak IV 1947.
Contraction	IV 1948 to IV 1949	Trough I 1949.
Expansion	IV 1949 to I 1951 [1]	Peak III 1950.
Contraction	I 1951 [1] to II 1952 [1]	Trough III 1951.
Expansion	II 1952 [1] to II 1953	Peak IV 1952.
Contraction	II 1953 to III 1954	Trough IV 1953.
Expansion	II 1954 to III 1957	Peak I 1955.
Contraction	III 1957 to II 1958	Trough I 1958.

[1] Based on subcycle reference turns. See note 2, ch. 3.

It may be concluded, therefore, that since peaks and troughs in inventory investment tend to lead (on an inverted basis) these early-occurring turning points in rates of change in sales, their timing will cause inventory investment to move with the tide of business during

[18] Abramovitz, "Inventories and Business Cycles," p. 378.
[19] This tendency is also applicable to rates of change in output. During the postwar period quarter-to-quarter changes in total manufacturers' sales and output have had approximately the same patterns of movement with coincident or near coincident timing. Such data are not available for the prewar period, but Abramovitz studied shipments and output for 10 nonfarm (made-to-stock) commodities and demonstrated the "very close connection between the rates of production and shipment of manufactured staples." Ibid., pp. 248, 250–251.

most, if not all, business cycle phases.[20] Accordingly, timing comparisons are made with sales and reference turns on a positive basis in the sections which follow.

TIMING AND CONFORMITY OF INVESTMENT: COMPARISON WITH SALES TURNS

A somewhat higher conformity was noted for investment than for inventories proper with no significant difference in the conformity of the durables and nondurables series. Of the 42 sales turns in the industry sales series, including turns related to the Korean cycle, 41 (all 20 of the durables and all but 1 of the 22 nondurables) could be matched by investment turns.[21] Timing varied, showing no consistent tendency to lead or lag. Approximately half of the turns in the individual-industry series (21 of 41) occurred roughly coincidently with sales turns; among the others, lags of more than 3 months (14) were more prominent than leads of more than 3 months (6). The comprehensive series bear out this timing tendency. For total manufactures, timing ranges from a lead of 8 months to a lag of 6 months during the 1948–58 period (see also chart 11).

TABLE 26.—*Timing and conformity of manufacturers' finished-goods inventory investment at sales turns*

A. TIMING MEASURES [1]

Industry	Lead (−) or lag (+) in months, in zones associated with reference turns								
	1948 peak	1949 trough		Korean war		1953 peak	1954 trough	1957 peak	1958 trough
		Turns prior to mid-1950	Turns after mid-1950	1951 peak	1952 trough				
Total manufacturing	+5	−4	+8	(2)	(2)	+1	−5	−8	+2
Durable goods industries, total	−1	−2	+10	(2)	(2)	+1	−5	−2	+4
Nondurable-goods industries, total	−1	−5	+7	(2)	(2)	(2)	(2)	−8	+2
Primary metals	+5	(3)	+10	+2	+2	+1	−3	------	-------
Machinery (including electrical)	+2	−1	+8	(2)	(2)	−1	−5	------	-------
Transportation equipment (including motor vehicles)	−9	−7	(2)	(2)	(2)	+1	−2	------	-------
Stone, clay, and glass	+4	(3)	+8	+3	+8	−2	+4	------	-------
Food and beverages	−3	−5	+7	(2)	(2)	−8	+7	------	-------
Paper	+5	+1	+13	+3	+8	(2)	(2)	------	-------
Chemical	+8	+7	+13	+5	+2	+2	−2	------	-------
Petroleum and coal	+2	+4	(3)	(2)	(2)	+10	+2	------	-------
Rubber	+1	+1	+7	(2)	(4)	(2)	−11	------	-------

See footnotes at end of table, p. 81.

[20] It may be asked why, if there has been such a marked tendency for inverted turns in staple, made-to-stock investment series to occur early in business cycle contractions and expansions, there was not a greater concentration of turns in investment during the early stages of activity phases (see table 24). The answer appears to be that the sample is composed of series for which activity has shown a pronounced tendency to turn prior to business cycle turns, but which displayed roughly the same timing of movements in activity rates of change as the total manufacturing series. This was verified by analysis of diffusion indexes of activity and of rates of change in activity. The former series led total manufacturers' sales but the latter turned roughly coincidently with rates of change in these sales.

[21] Timing comparisons presented a special problem for the period following the recession of 1948–49. In five of the nine industry series, troughs in inventory investment occurred prior to the second quarter of 1950, but during the third quarter there were second and deeper troughs which were related to the sudden upsurge in sales at the outbreak of the Korean war. These later troughs would probably not have occurred had there been no outbreak of hostilities, but there is no certainty of this. For this reason, and in order to present as accurate a picture of timing as possible, measures for both troughs have been included. (See table 26.)

B. SUMMARY OF TIMING AND CONFORMITY

Timing and conformity comparisons	9 industry series		4 durable-goods industries		5 nondurable-goods industries	
	All turns	All turns except Korean	All turns	All turns except Korean	All turns	All turns except Korean
Number of comparisons	42	34	20	16	22	18
Matching inventory investment	41	33	20	16	21	17
Percentage of matching turns	98	97	100	100	95	94
Leads more than 3 months [5]	6	6	3	3	3	3
Rough coincidences	21	16	11	8	10	8
Leads 3 months or less	(7)	(7)	(5)	(5)	(2)	(2)
Coincidences	(0)	(0)	(0)	(0)	(0)	(0)
Lags 3 months or less	(14)	(9)	(6)	(3)	(8)	(6)
Lags more than 3 months [5]	14	11	6	5	8	6

[1] Inventory investment series have been deflated at 1956. 1957–58 turns based on undeflated data.
[2] Inventory investment turn occurs, but there is no sales turn.
[3] Sales turn occurs but no matching inventory investment turn.
[4] No turn occurs in either sales or inventory investment.
[5] In the 1949 revival zone, investment troughs prior to mid-1950 have been used in the timing measures when 2 troughs occurred.

Source: Based on material from Department of Commerce.

TIMING AND CONFORMITY OF INVESTMENT: COMPARISON WITH REFERENCE TURNS

It may be concluded from table 27 that finished-goods investment is very sensitive to cyclical forces. Conformity to reference cycles is very high: of 54 possible comparisons 52 turns could be matched with reference turns.

With overall conformity so high it is not surprising that there is little difference between that of durables and nondurables. It will be noted that investment turns could be matched with reference turns on occasions when no sales turns occurred, indicating that investment was responsive to cyclical forces even when these forces were not sufficiently strong to bring about full-fledged movements in the related sales series.[22]

There is one observation that deserves special mention: timing of investment turns shows less variation among the several industry series when compared to reference turns than when compared to sales turns. (See the timing measures in table 26 and table 27 for any given peak or trough.) This suggests further evidence of the relations between inventory investment and rates of change in sales. Analysis of the individual series indicates that turns in rates-of-change-in-sales movements tended to occur at about the same time in most of the series during the period studied. Some indirect evidence of this may be seen by observing the comprehensive series in chart 13: timing of turns in the durables and nondurables rates-of-change-in-sales series is coincident in five comparisons, and varies by only 3 months in the other two. Since turns in rates of change in sales occur at about the same time, comparisons of inventory investment with reference turns which were fixed points in time give roughly the same degree of agreement among the revised series as would timing

[22] These "extra" turns may be noted in table 26. In most instances they relate to the "Korean" cycle which has already been discussed, but there is one investment cycle, in the paper products industry, which is related to the 1953–54 business cycle peak and trough.

comparisons with rates of change in the respective sales series. Apparently, this relationship is closer than with movements in the series for sales proper.

TABLE 27.—*Timing and conformity of manufacturers' finished-goods inventory investment at reference turns*

A. TIMING MEASURES [1]

Industry	Lead (−) or lag (+), in months								
	Business-cycle peak, Nov. 1948	Business cycle trough, October 1949		Korean cycle		Business cycles			
		Turns prior to mid-1950	Turns after mid-1950	Peak, February 1951	Trough, June 1952	Peak, July 1953	Trough, August 1954	Peak, July 1957	Trough, April 1958
Total manufacturing	+3	−2	+10	+6	−1	+1	−3	−14	+1
Durable-goods industries, total	0	−2	+10	+6	+2	+1	−3	−8	+4
Nondurable-goods industries, total	−6	−2	+10	+6	−1	+1	+3	−14	+1
Primary metals	+6	(2)	+10	+6	+2	+1	−3	-------	-------
Machinery (including electrical)	+3	+1	+10	+6	+1	−2	−3	-------	-------
Transportation equipment (including motor vehicles)	0	−5	+10	+3	+2	−2	−3	-------	-------
Stone, clay, and glass	+3	(2)	+10	+6	+2	−2	−3	-------	-------
Food and beverages	−6	−2	+10	+6	+2	+1	+9	-------	-------
Paper	+3	−2	+10	+6	+8	+7	+6	-------	-------
Chemical	+3	+4	+10	+6	+2	+1	−9	-------	-------
Petroleum and coal	+3	+7	-------	+3	−1	+10	+3	-------	-------
Rubber	−3	(2)	+10	+12	(2)	(2)	−9	-------	-------

B. SUMMARY OF TIMING AND CONFORMITY

Timing and conformity comparisons	9 industry series		4 durable-goods industries, all turns	5 nondurable-goods industries, all turns
	All turns	All turns except Korean		
Number of comparisons	54	36	24	30
Matching inventory turns	52	35	24	28
Percentage of matching turns	96	97	100	93
Leads more than 3 months [3]	4	4	1	3
Rough coincidences [3]	30	21	17	13
Leads, 3 months or less	(11)	(10)	(7)	(4)
Coincidences	(1)	(1)	(1)	(0)
Lags, 3 months or less	(18)	(10)	(9)	(9)
Lags, more than 3 months [3]	18	10	6	12

[1] Inventory series have been deflated to 1956; 1957–58 turns based on undeflated data.
[2] No matching inventory investment turn.
[3] In making comparison with the reference trough of October 1949, investment troughs prior to mid-1950 have been used in the timing measures where 2 troughs occurred.

Source: Based on material from Department of Commerce.

AMPLITUDE OF DURABLES AND NONDURABLES INVESTMENT DURING CYCLES

Measures of amplitude of movements in finished-goods inventory investment reveal that the relative amplitude of the durables series is greater than that of nondurables. This is readily seen in table 28. Total change in relation to size of stocks, is greater for durables than for nondurables in five of the seven phases examined. Nondurable finished-goods stocks, however, are considerably larger than durables stocks, and total investment movements in the nondurables series are larger in five of the seven phases.

TABLE 28.—*Amplitude of change in finished-goods inventory investment cycles, by phase, 1948–58*

Industry	Peak-trough (1948–49)	Peak-trough (1949–50)	Peak-trough (1950–52)	Peak-trough (1952–53)	Peak-trough (1953–54)	Peak-trough (1954–56)	Peak-trough (1956–58)
	Total change (relative) [1]						
Total manufacturing	−7.72	+15.95	−13.51	+4.92	−5.83	+6.93	−7.60
Durable goods	−7.35	+19.44	−15.74	+6.43	−11.23	+10.16	−7.60
Nondurable goods	−9.37	+13.55	−12.40	+4.88	−3.56	+6.74	−9.00
	Change per month (relative) [1]						
Total manufacturing	−1.29	+.66	−1.13	+.41	−.65	+.29	−.32
Durable goods	−.82	+.81	−1.31	+.71	−1.25	+.34	−.36
Nondurable goods	−.62	+.56	−1.38	+.33	−.24	+.37	−.38
	Total change (millions of dollars) [2]						
Total manufacturing	−835	+1,321	−1,703	+666	−790	+1,190	−1,436
Durable goods	−315	+908	−815	+360	−668	+856	−700
Nondurable goods	−561	+923	−920	+379	−278	+602	−882
	Change per month (millions of dollars) [2]						
Total manufacturing	−139	+76	−142	+55	−88	+49	−60
Durable goods	−52	+38	−68	+40	−74	+29	−33
Nondurable goods	−37	+38	−102	+25	−18	+33	−37

[1] Expressed as percent of the mean level of inventories during the phase. Mean level is an average of beginning and ending level of inventories of the terminal quarters of the phase.
[2] All 1948–54 data have been deflated (1947 dollars). Measures for the two most recent phases are based on undeflated (book value) data.

Source: Based on material from Department of Commerce.

SUMMARY

Abramovitz emphasized the fact that finished stocks are of several different types, each possessing quite different cyclical characteristics. Analysis of postwar composition reveals that finished goods whose production cycles are governed by supply comprise less than one-third of the total. The major part, from 41 to 51 percent of the total, is made up of staple made-to-stock inventories. Goods made to order are estimated at 15 to 25 percent of the total. According to Abramovitz, staple made-to-stock goods may be expected to move in an inverted fashion relative to sales, made-to-order stocks will move in positive conformity, and the remainder will be cyclically insensitive or erratic.

Postwar finished-goods behavior was studied by analyzing two sets of inventory data. The first was composed of data for 25 staple, made-to-stock commodities, representing the largest component of finished goods. The second was composed of Department of Commerce industry data for nine industry groups and for comprehensive groupings. Among the commodity series, finished stocks were found to move in a strongly inverted fashion relative to sales or output, but with a well-developed tendency to turn and come into phase as the duration of the activity phase increased. The Department of Commerce industry data revealed a consistent tendency for stocks to lag behind sales and reference turns, but movements were rarely of

the completely inverted sort observed in the commodity series. The conclusion drawn was that the staple made-to-stock inventories contribute a strong tendency toward inverted behavior, but that other categories offset inverted tendencies to a significant degree.

Study of inventory investment data for the 25 commodities revealed that investment moved in an inverted fashion relative to rates of change in sales, but that peaks (troughs) in inventory investment led or turned coincidently with troughs (peaks) in rates of change in activity. Since peaks and troughs in rates of change in activity tend to occur well before the end of each business cycle phase, the inverted movements in inventory investment may be expected to terminate relatively early in the business cycle phase. Analysis of finished-goods inventory investment in the Department of Commerce series shows this to be the case. Total manufacturers' investment turns roughly coincidently with business cycle turns or moves in an inverted fashion (i.e., lags) for only a few months in the early part of a business cycle phase.