Volume Title: Postwar Cycles in Manufacturers' Inventories

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Volume Publisher: NBER

Volume ISBN: 0-870-14094-9

Volume URL: http://www.nber.org/books/stan62-1

Publication Date: 1962

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Chapter URL: http://www.nber.org/chapters/c2004

Chapter pages in book: (p. 101 - 110)

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Cyclical Behavior of Inventory and Inventory Investment Movements at the Three Stages of Fabrication: Summary

It is now possible to bring together summary statements regarding manufacturers' inventories and investment, and to note how movements at each stage of fabrication form the composite patterns of total manufacturers' inventory and inventory investment behavior.[1]

TABLE 33.—*Timing of inventories and inventory investment at business cycle turns: Summary*

A. INVENTORIES, ALL MANUFACTURERS

Business cycle turn	Lead (−) or lag (+), in months			
	Purchased materials	Finished goods	Goods in process	Total inventories
Peak, November 1948	−3.0	+7.0	−14.0	+4.0
Trough, October 1949	+6.0	+11.0	+2.0	+6.0
Korean peak, February 1951	+9.0	+14.0	(1)	(1)
Korean trough, June 1952	+4.0	+4.0	(1)	(1)
Peak, July 1953	+1.0	+8.0	0	+2.0
Trough, August 1954	+8.0	+1.0	+1.0	+1.0
Peak, July 1957	+4.0	+6.0	+2.0	+2.0
Trough, April 1958	+5.0	+8.0	+7.0	+8.0
Averages:				
Peaks	+2.8	+8.8	−4.0	+2.7
Troughs	+5.8	+6.0	+3.3	+5.0
Peaks and troughs	+4.5	+7.4	−.3	+3.8
Prewar average, peaks and troughs				+8.6

B. INVENTORIES, DURABLE AND NONDURABLE MANUFACTURERS

Business cycle turn	Lead (−) or lag (+), in months							
	Purchased materials		Finished goods		Goods in process		Total inventories	
	Durable	Nondurable	Durable	Nondurable	Durable	Nondurable	Durable	Nondurable
Peak, November 1948	−16.0	−1.0	+8.0	+6.0	−14	(1)	−14	(1)
Trough, October 1949	+4.0	+8.0	+11.0	+11.0	+4	(1)	+4	(1)
Korean peak, February 1951	+13.0	+9.0	(1)	+14.0	(1)	(1)	(1)	(1)
Korean trough, June 1952	+2.0	(1)	(1)	+10.0	(1)	(1)	(1)	(1)
Peak, July 1953	+1.0	(1)	+5.0	(1)	+1	−1.0	+2	+2.0
Trough, August 1954	+10.0	+7.0	+1.0	(1)	+1	+1.0	+9	+1.0
Peak, July 1957	−4.0	+1.0	+6.0	+6.0	+1	+6.0	+3	+1.0
Trough, April 1958	+4.0	+10.0	+9.0	+5.0	+7	+6.0	+8	+5.0
Averages, peaks and troughs	+1.8	+5.7	+6.7	+8.8	0	+3.2	+2	+3.2

[1] Timing measures mentioned in this section are presented in table 33; inventory investment movements are shown in chart 16.

TABLE 33.—*Timing of inventories and inventory investment at business cycle turns: Summary*—Continued

C. INVENTORY INVESTMENT, ALL MANUFACTURERS

Business cycle turn	Lead (−) or lag (+), in months			
	Purchased materials	Finished goods	Goods in process	Total inventory investment
Peak, November 1948	−6.0	+3.0	−3.0	−6.0
Trough, October 1949	−5.0	−2.0	−2.0	−2.0
Korean peak, February 1951	−3.0	+6.0	+9.0	+3.0
Korean trough, June 1952	+2.0	−1.0	(1)	−1.0
Peak, July 1953	−2.0	+1.0	(1)	−2.0
Trough, August 1954	−9.0	−3.0	−3.0	0
Peak, July 1957	−23.0	−14.0	−20.0	−14.0
Trough, April 1958	+1.0	+1.0	−2.0	+1.0
Averages:				
Peaks	−8.5	−1.0	−4.7	−4.8
Troughs	−2.8	−1.2	−2.3	−.5
Peaks and troughs	−5.6	−1.1	−3.5	−2.6
Prewar average, peaks and troughs				+0.2

D. INVENTORY INVESTMENT, DURABLE AND NONDURABLE MANUFACTURERS

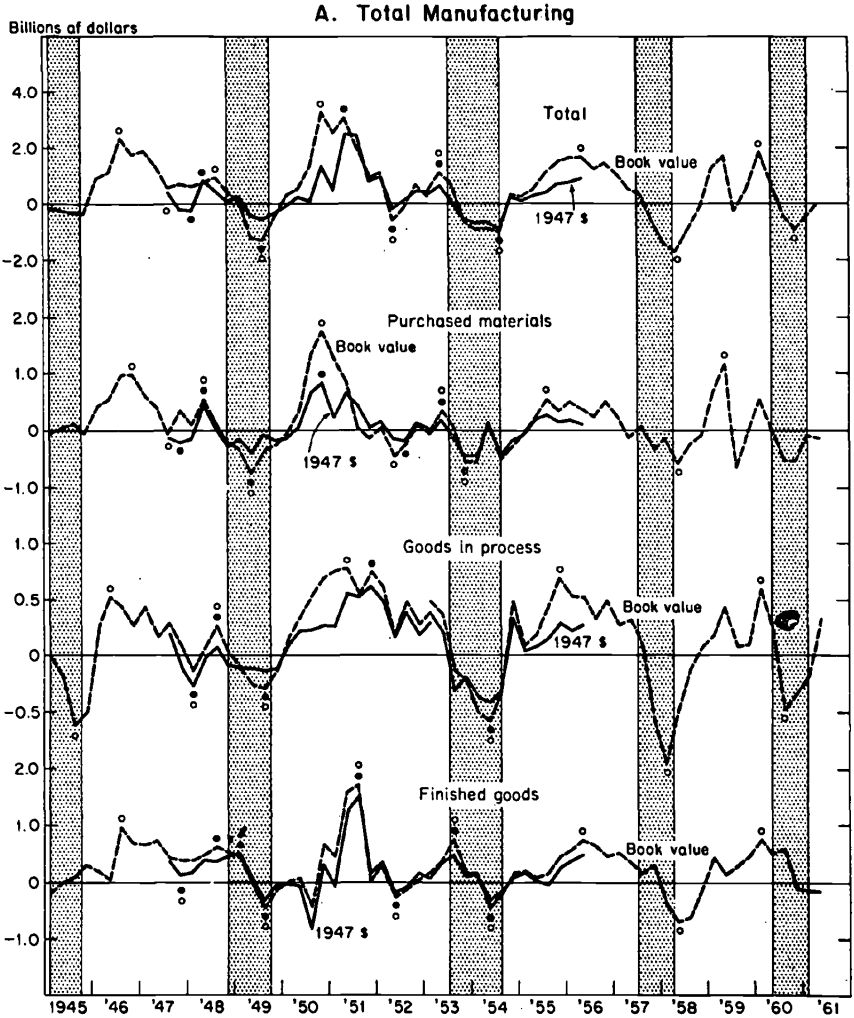
Business cycle turn	Lead (−) or lag (+), in months							
	Purchased materials		Finished goods		Goods in process		Total inventories	
	Durable	Nondurable	Durable	Nondurable	Durable	Nondurable	Durable	Nondurable
Peak, November 1948	−6.0	−6	0	−6.0	−3	(1)	−6.0	−6.0
Trough, October 1949	−5.0	−11	−2	−2.0	−2	(1)	−2.0	+7.0
Korean peak, February 1951	−3.0	−3	+6	+6.0	+6	(1)	+6.0	+3.0
Korean trough, June 1952	−1.0	(1)	+2	−1.0	(1)	(1)	−1.0	(1)
Peak, July 1953	−2.	(1)	+1	+1.0	(1)	(1)	−2.0	(1)
Trough, August 1954	0	−6	−3	+3.0	−3	(1)	−3.0	−9.0
Peak, July 1957	−23.0	−2	−8	−14.0	−20	(1)	−20.0	−14.0
Trough, April 1958	+1.0	+4	+4	+1.0	−2	(1)	+1.0	+4.0
Averages, peaks and troughs	−4.9	−8	0	−1.5	−4	(1)	−3.4	−2.5

No matching inventory turn.

Source: Tables 8, 9, 12, 14, 21, 23, 28, and 30. Source of prewar (1919–39) averages, based on annual data: Abramovitz, "Inventories and Business Cycles," pp. 95 and 338. All 1948–54 data are deflated (1947 dollars) undeflated (book value) data are used thereafter.

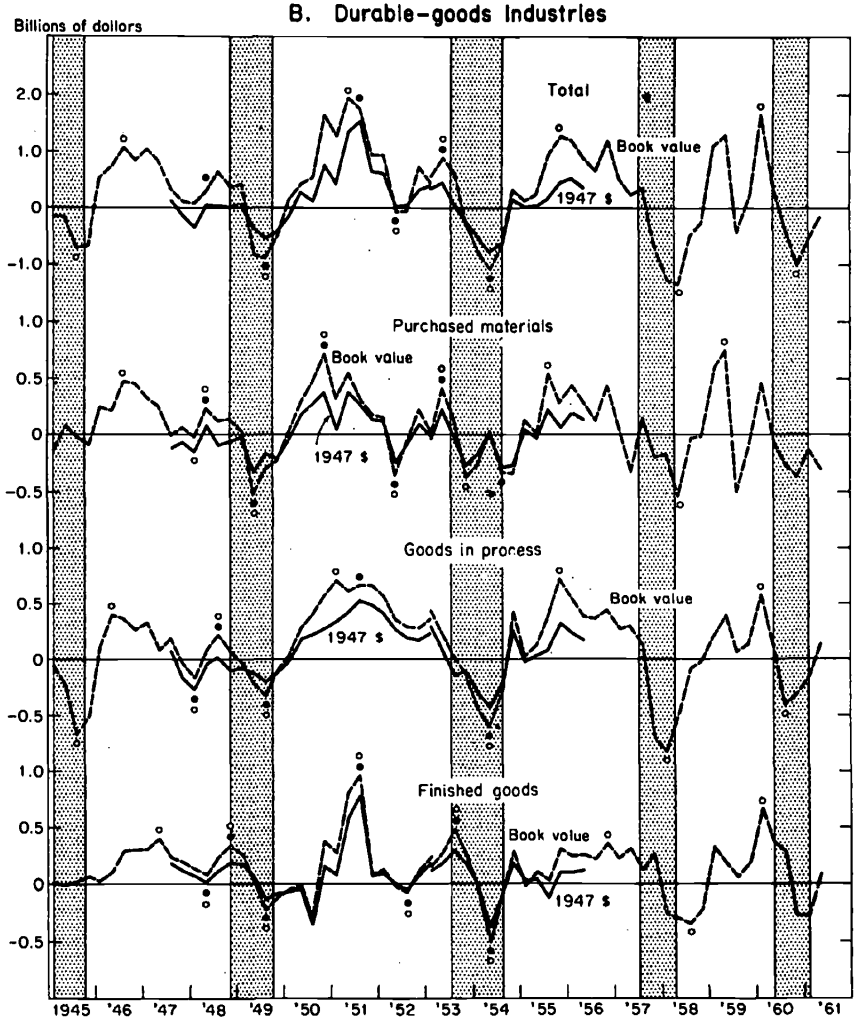
CHART 16

MANUFACTURERS' INVENTORY INVESTMENT: SUMMARY



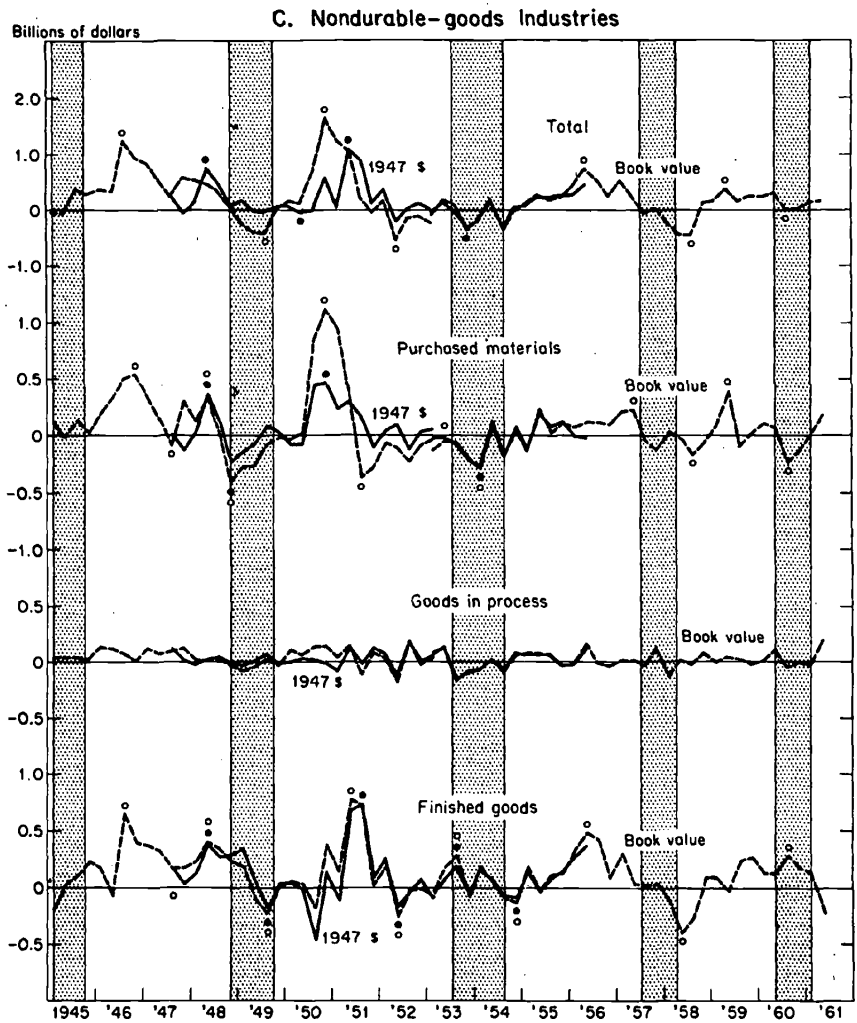
See notes on p. 105.

CHART 16—Continued



See notes on p. 105.

Chart 16—Continued



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

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

Purchased Materials

Purchased materials show a high degree of sensitivity to business cycles, particularly in the durables group. The stocks proper tend to turn roughly coincidently with business cycle peaks and to lag at business cycle troughs. But the rates of change (the investment series) show a single well-developed tendency: They lead at all turns. It is interesting to observe that the timing is very similar to that of new orders. When orders begin to turn up late in the recession, the rate of disinvestment declines. As the trough is reached and early recovery is noted, purchased-materials stocks continue to decline but

at a decreasing rate. Several months after the trough, declining disinvestment changes to rising investment as the stocks turn and move up. A similar movement occurs at the peak, except that stocks proper turn relatively earlier.

The amplitude of the investment movements appears to be influenced by the level of unfilled orders. When orders are rising at a faster pace than shipments, so that the backlog of unfilled orders is growing rapidly, or when the backlog is very large and not significantly diminishing, upward movements of new orders prompt much heavier investment in purchased materials than otherwise.

Finished Goods

Finished stocks are, of course, the lagging series. They lag behind business cycle turns from 1 to 11 months. Finished-goods inventory investment, however, reaches its peak or trough roughly coincidently with the business cycle peak or trough.

The relatively early timing of finished-goods investment turns is a well-established finding, based upon observation of commodity series as well as the Department of Commerce data. In the activity expansion phase, the latest occurrence of the trough in inventory investment is the quarter in which shipments spurt forward at their most rapid rate; frequently it occurs somewhat earlier. The converse is true for the peak in investment: it rarely occurs later in the activity contraction phase than the quarter during which shipments fall at their most rapid rate. Since it is a well-established characteristic of the business cycle that the highest rate of increase in activity typically occurs during early recovery, and the highest rate of decrease during the early or middle stages of recession, it may be concluded that any countercyclical movement of finished-goods investment is terminated early in each business cycle phase.

Goods in Process

Problems of deflation render conclusions regarding goods-in-process behavior less dependable than those for purchased materials and finished goods. Several characteristics may be noted, however. The deflated inventory series conform to business cycles with virtually coincident timing at four of the six business cycle turns. Analysis of timing sequence indicates that goods in process lead or turn coincidently with purchased-materials inventory turns, and lead finished-goods turns. Goods-in-process inventory investment movements are cyclically sensitive and give evidence of being influenced by unfilled order levels. Although timing is somewhat irregular, the typical sequence is one in which these series turn roughly coincidently with turns in purchased materials, but lead turns in finished-goods investment.

Total Stocks and Inventory Investment

The three components combine to form a total manufacturing inventory complex which is highly responsive to cyclical forces. During the period studied, total stocks lagged behind business cycle turns from 1 to 8 months, and total inventory investment turned coincidently or led by as much as 14 months (table 33).

Of course, the pattern of behavior for total stocks is merely an average of the component patterns, and there is actually a consider-

able diversity in the timing of inventory turns at each stage of fabrication. The striking feature is that inventory investment at each stage is so sensitive to cyclical forces. Throughout the analysis it has been noted that inventory investment conformed somewhat better to business cycles than did the inventory series proper. Even the finished-goods investment series lags behind the other investment series by no more than 6 months at four of the six business cycle turns, and shows almost no countercyclical tendencies.

Amplitude of Investment Movements Compared

Tables 34 and 35 present relative and dollar value measures of change during movements in inventory investment for each stage of fabrication. It may be observed that changes in each type of inventory investment have contributed significantly to cyclical instability. Comparing total manufacturers' purchased materials and finished goods investment, we find that the amplitude of total change is somewhat greater for the latter in six of the seven phases. This is true for measures of change in dollars and on a relative basis. Amplitude of changes in goods-in-process investment is more variable. In the earlier phases it ranked behind purchased materials and finished goods investment, but more recently it has tended to move with greater amplitude than either.

Table 34.—*Amplitude of change in inventory investment cycles, by phase, 1948–58*

Industry	Peak–trough (1948–49)	Trough–peak (1949–50)	Peak–trough (1950–52)	Trough–peak (1952–53)	Peak–trough (1953–54)	Trough–peak (1954–56)	Peak–trough (1956–58)
	Total change (millions of dollars)						
Total manufacturing:							
Purchased materials	−843	+1,220	−1,017	+336	−627	+1,143	−1,136
Goods in process	−208	+753			[1] −779	+1,273	−1,649
Finished goods	−835	+1,821	−1,703	+666	−790	+1,190	−1,436
Total durables manufacturing:							
Purchased materials	−415	+700	−626	+406	−513	+921	−1,089
Goods in process	−224	+734			[1] −739	+1,328	−1,550
Finished goods	−315	+908	−815	+360	−668	+856	−700
Total nondurables manufacturing:							
Purchased materials	−588	+680			[1] −320	+507	−415
Goods in process							
Finished goods	−561	+923	−920	+379	−278	+602	−882
	Change per month (millions of dollars)						
Total manufacturing:							
Purchased materials	−70	+68	−48	+112	−52	+54	−54
Goods in process	−15	+27			[1] −52	+71	−61
Finished goods	−139	+76	−142	+55	−88	+49	−60
Total durables manufacturing:							
Purchased materials	−35	+39	−35	+34	−29	+44	−52
Goods in process	−12	+24			[1] −49	+74	−57
Finished goods	−52	+38	−68		−74	+29	−33
Total nondurables manufacturing:							
Purchased materials	−98	+28			[1] −36	+34	−11
Goods in process							
Finished goods	−37	+38	−102	+25	−18	+33	−37

[1] To permit comparison of amplitudes of downward movements during recession of 1953–54, purchased-materials investment change in nondurable goods has been measured from 2d quarter 1953 to 1st quarter 1954; goods in process (except nondurable) change has been measured from 1st quarter 1953 to 2d quarter 1954.

Source: Based on deflated material from Department of Commerce. All 1948–54 data have been deflated (1947 dollars). Measures for the 2 most recent phases are based on undeflated (book value) data.

TABLE 35.—*Amplitude of change in inventory investment cycles, 1948–58, as percent of mean level of inventories during each phase* [1]

Industry	Peak-trough (1948–49)	Trough-peak (1949–50)	Peak-trough (1950–52)	Trough-peak (1952–53)	Peak-trough (1953–54)	Trough-peak (1954–56)	Peak-trough (1956–58)
	Total change (relative)						
Total manufacturing:							
Purchased materials	−7.15	+10.28	−7.82	+2.43	−4.57	+7.44	−7.20
Goods in process	−3.06	+9.73			[2] −7.65	+9.76	−11.44
Finished goods	−7.72	+15.95	−13.51	+4.92	−5.83	+6.93	−7.60
Total durables manufacturing:							
Purchased materials	−8.60	+14.94	−12.12	+7.23	−9.69	+12.72	−14.78
Goods in process	−4.85	+14.21			[2] −9.67	+12.83	−13.45
Finished goods	−7.35	+19.44	−15.74	+6.43	−11.23	+10.16	−7.60
Total nondurables manufacturing:							
Purchased materials	−8.27	+9.28			[2] −3.93	+6.38	−5.00
Goods in process							
Finished goods	−9.37	+13.55	−12.40	4.88	−3.56	+6.74	−9.00
	Change per month (relative)						
Total manufacturing:							
Purchased materials	−.60	+.57	−.37	+.81	−.38	+.35	−.34
Goods in process	−.20	+.36			[2] −.51	+.54	−.42
Finished goods	−1.29	+.66	−1.13	+.41	−.65	+.29	−.32
Total durables manufacturing:							
Purchased materials	−.72	+.83	−.67	+.60	−.65	+.61	−.70
Goods in process	−.40	+.59			[2] −.64	+.72	−.50
Finished goods	−.82	+.81	−1.31	.71	−1.25	+.84	−.36
Total nondurables manufacturing:							
Purchased materials	−1.38	+.39			[2] −.44	+.42	−.13
Goods in process							
Finished goods	−.62	+.56	−1.38	+.33	−.24	+.37	−.38

[1] Mean level of inventories was computed separately for each phase using average of beginning and ending level of inventories of terminal quarters of the phase.
[2] See note (1) to table 34.

Source: Based on deflated material from Department of Commerce.

POSTWAR AND PREWAR TIMING COMPARED

Since frequent mention has been made of Abramovitz' study, a brief comparison of his timing measures with those for the postwar period is relevant.[2]

Lagging movements in total inventories have been characteristic in the postwar period, but relative to business cycle turns they have been shorter, averaging about 4 months compared with 8 or 9 months during the previous period. In part, this earlier timing may be due to the shift in composition toward durables and goods in process, resulting in greater sensitivity and consilience with the cycle. It may also be due to a tighter control of inventories by management.

Abramovitz' estimate of short lags (about 3 months) in purchased-materials inventories is fairly consistent with postwar experience. Lags at troughs (averaging about 6 months) have been longer than at peaks (averaging about 3 months).

Abramovitz drew no conclusions regarding the timing of finished-goods inventories as a whole, but dealt with the behavior of the component classifications. It is important to observe that the largest

[2] Timing measures mentioned in this section are presented in table 33.

component (demand-oriented staples made to order), which demonstrates marked inverted characteristics, has been relatively smaller since the war, and that the positively-conforming, made-to-order category is larger as a result of the increased share of durable-goods production. Accordingly, there seems to be little doubt that lags in aggregate finished stocks have been shorter in the postwar period. They have averaged about 7 months, always turning before the end of the phase even when the phase is short.

The roughly coincident postwar behavior of goods-in-process stocks is consistent with Abramovitz' estimate, but inventory investment behaves somewhat differently.

Leads in total manufacturers' inventory investment have been characteristic in the postwar period, whereas Abramovitz calculated rough coincidences from prewar annual data. Abramovitz concluded that investment would be likely to show a substantial lag behind rates of change in output, and this has been confirmed by the postwar data. He expected that normally the business cycle peak would occur at about the same time as the inventory peak. This would be due, however, to the reciprocal effect of inventory investment on national product. He did not rule out the possibility that leads might occur.

Abramovitz expected short leads in purchased-materials investment relative to business activity, but lags relative to the rate of change in output. Postwar experience is reasonably consistent with this, although some lags behind rates of change in output were longer than could be explained by Abramovitz' theory.

As in the case of finished-goods inventories, it is not possible to compare postwar and prewar timing in finished-goods investment directly, but the evidence points to earlier turns since the war. For the postwar period as a whole, rough coincidence has been the rule. Investment in goods made to stock has moved inversely to the rate of change in output, frequently with a lead. Since turns in the rate of change have occurred rather early in expansions or contractions, investment has moved positively to output during most of the phase (i.e., lags on a positive basis, when they have occurred, have been fairly short). Investment in goods made to order, which probably moves positively, has been more important since the war because of the greater importance of durables.

Abramovitz expected long leads, in goods-in-process investment because it should turn coincidently with the rate of change in output. But short leads have been characteristic since the war, goods in process having lagged behind the rate of change in output. These goods are not tied so closely to output as Abramovitz thought.

Conclusion

It is well to note the degree to which these findings attest the value of Abramovitz' approach to the study of manufacturers' inventories. This analysis of the behavior of various component stocks, constructing the composite from knowledge so derived, has made it possible to observe the characteristic behavior of various types of inventory and, thereby, to evaluate the effects of shifts in composition. Without such a study it would have been impossible to assess the significance of declines in the relative size of finished stocks and of increases in the importance of durables, or to explain why manufacturers' stocks, which are smaller today than before the war, have played no less important a role in business cycles.

The analysis must be regarded as incomplete, however, on the grounds that the business cycle has been assumed as given. Inventory movements have been regarded as responsive to the cycle, aggravating the fluctuations, but not themselves causing either upturn or downturn. In short, the income effect of inventory investment has not been treated, nor has the possibility of a self-generating inventory cycle. These matters are the concern of the chapter which follows.