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Introduction and Summary

Changes in inventory investment are widely regarded as a major indicator of cyclical instability in the American economy, and have been closely followed in recent years by economists, businessmen, and the press. This study deals principally with the behavior of manufacturers' stocks—the principal component of nonfarm inventories—since the end of World War II. Available aggregates for all manufacturers, durable-goods manufacturers, and nondurable-goods manufacturers, as well as certain commodity series, are used. Attention is concentrated on the period 1947–56, although certain parts of the analysis have been extended to the end of 1958 in order to include the 1957–58 business cycle contraction. Comparisons are also made with prewar behavior when information is available.

A major objective has been to test the relevance for the postwar years of the principal findings and hypotheses of Moses Abramovitz as set forth for the interwar years in his "Inventories and Business Cycles, With Special Reference to Manufacturers' Inventories."¹ Since his earlier investigation has influenced the approach and organization of this study, it is well to comment here on Abramovitz' work. His most important contributions were the determination of typical patterns of timing and the relative importance of movements in manufacturers' inventories during the interwar business cycles, the development of an explanation for the patterns he found, and the conclusion that the overall movement in manufacturers' stocks should, for purposes of analysis, be regarded as a complex of somewhat dissimilar movements of a number of different types of stocks.

In spite of severe limitations necessitated by principal reliance on annual data, Abramovitz was able to estimate the timing of stocks and inventory investment at business cycle turns, and to establish the general magnitude of movements in expansions and contractions.

In studying the behavior of the various components, he analyzed stocks successively at each stage of fabrication (i.e., purchased materials, goods in process, finished goods), breaking down these classes still further in an attempt to establish the nature and significance of the patterns of movement. Essentially he tried to determine the size of each type of stock and the factors which influenced its fluctuations, examining such commodity series as were available in order to check his hypotheses and shed additional light on cyclical characteristics.

The organization of the present study is similar to Abramovitz'. Chapter 2 examines the importance of nonfarm and manufacturers' inventory investment in the postwar and prewar periods. Chapter 3 analyzes the behavior of total stocks held by all manufacturers, durable-goods and nondurable-goods manufacturers, and by individual industries. In chapters 4, 5, and 6 the behavior of stocks by stage of fabrication is treated in the sequence of purchased materials, finished

¹ New York, National Bureau of Economic Research, 1950.

goods, and goods in process. Chapter 7 summarizes the timing characteristics and describes the behavior of manufacturers' inventories as a composite of these three major types of stocks. Chapter 8 examines the manner in which inventory investment movements contribute to cyclical instability. Finally, an appendix is provided containing notes on sources and methods of processing the data, as well as the principal time series used.

For the convenience of the reader the conclusions in chapters 2 through 8 are summarized below:

Changes in nonfarm inventory investment, as indicated in chapter 2, have contributed significantly to business cycle contractions. Measured on the basis of annual data, they have accounted for at least 42 percent of the decline in national product in every business cycle contraction of the interwar and postwar periods except that of 1929-32. With this exception, there is no evidence that the role of movements in nonfarm inventory investment during business cycle contractions has changed significantly since the prewar period.

Movements in nonfarm inventory investment have contributed to changes in national product to a lesser degree during expansions than during contractions—a tendency which has increased since World War II. This is due to the greater length of postwar expansion phases, as well as to the earlier occurrence of the peaks in inventory investment.

Movements in manufacturers' inventory investment have played a somewhat larger role since the war, accounting for 83 percent of those in nonfarm inventory investment, compared with 56 percent in the prewar period. Although turns in manufacturers' inventory investment have led business cycle turns since the war, investment movements have conformed closely to general business contractions, the sharpest declines occurring between cyclical peaks and troughs.

Chapter 3 shows that total manufacturers' stocks have lagged behind business cycle turns from 1 to 8 months, in contrast to Abramovitz' estimate of a 6-to-12-month prewar lag. Manufacturers' inventory investment has moved in well-defined cyclical patterns and has demonstrated a high degree of conformity to business cycles. Timing of the total inventory investment series relative to business cycles varied from roughly coincident to a lead of 14 months.

The durable-goods inventory and investment series have been cyclically more sensitive than those of nondurable goods, conforming more closely to business cycle movements and moving with greater amplitude. The explanation appears to be that the production and sale of these goods are subject to greater amplitude of movement and that fluctuations in these industries tend to occur at about the same time. In addition, of stocks held at each stage of fabrication, durables appear to be more responsive to cyclical influences.

Manufacturers' inventories are significantly smaller relative to sales than before World War II. Moreover, composition has changed—from approximately 40 percent purchased materials, 20 percent goods in process, and 40 percent finished goods before the war—to an estimated 38, 29, and 33 percent in 1952-53. The principal reason for this change is the increased importance of the durable-goods industries which carry larger goods-in-process stocks.

The purchased-materials stocks discussed in chapter 4 conform well to cyclical movements, turning earlier at sales and business cycle

peaks than at troughs. Turns tend to coincide with business cycle peaks and to lag at troughs. On the other hand, investment leads all turns. In these movements the durables series show a higher conformity and greater amplitude.

Abramovitz' theory, although it goes far to explain the general behavior of purchased-materials inventories and investment, does not provide for the occurrence of certain observed timing in the inventory and investment series. Moreover, it fails to consider the possible role of unfilled order backlogs, availability of materials, and price behavior of purchased goods in influencing inventory behavior. In an effort to provide a fuller explanation, these influences are examined. It is noted that the amplitude of purchased-materials investment movement appears to be related to the size and direction of movement of unfilled order backlogs and that the timing of investment tends to agree with certain measures of availability of materials. Price changes though significant do not appear to play a vital causal role.

Finally, inventory objectives and purchasing policy of firms vary cyclically, moving in general agreement with changes in availability of materials and realized investment.

Postwar finished-goods behavior (ch. 5) was studied by analyzing two sets of inventory data. The first was composed of data for 25 commodities, representing the largest component of finished goods: staple made-to-stock commodities. The second was composed of Department of Commerce industry data. Among the commodity series, finished stocks are 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 increases. The Department of Commerce industry data reveal a consistent tendency for stocks to lag behind sales and reference turns, but movements are rarely of the completely inverted sort observed in the commodity series. It is concluded 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 reveals that investment moves in an inverted fashion relative to rates of change in sales, but that peaks (troughs) in inventory investment lead or turn coincidentally with troughs (peaks) in rates of change in activity. Since peaks and troughs in the latter tend to occur well before the end of each business cycle phase, inverted movements in finished-goods 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' finished-goods investment turns roughly coincidentally 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.

Problems of deflation render conclusions regarding goods-in-process behavior less dependable than those for purchased materials and finished goods, but certain characteristics may be noted (ch. 6). The deflated inventory series conform to business cycles with virtually coincident timing at four of the six reference cycle turns, and inventory investment leads all business cycle turns. Analysis of timing sequence among the industry series indicates that, for both inventory

and investment, goods in process lead or turn coincidentally with purchased materials and lead the finished-goods series.

Although these findings are generally consistent with Abramovitz' theory, irregularities in timing appear, particularly among the individual industry investment series, which cannot be explained by his analysis. Moreover, durable-goods investment appears to be influenced by levels of unfilled orders in a manner similar to purchased materials. Three factors seem to contribute to this behavior. (1) The composition of postwar goods in process is different from that observed by Abramovitz. Owing to the increased role of durables, there is a much larger proportion of these stocks held by industries engaging in discontinuous processes—roughly 50 percent compared with his estimate of 36 percent. (2) Goods-in-process stocks in discontinuous-process industries are likely to be held in substantial quantities between stages. These stocks may be expected to rise and fall in a manner similar to that of purchased materials. (3) Goods held within stages need not fluctuate in as close conformity to changes in output as Abramovitz maintained.

In chapter 7, analysis of amplitude of investment movements reveals that inventory change has contributed significantly to cyclical instability at each stage of fabrication, the three components combining to form a total manufacturing inventory complex which is highly sensitive to cyclical forces. A summary of timing measures indicates that purchased-materials and goods-in-process inventories and investment tend to have similar timing characteristics, leading turns in the comparable finished-goods series. But the last 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.

A brief comparison of Abramovitz' estimates of prewar timing with postwar findings is presented. Where timing differences are noted, possible reasons for the differences are discussed.

Chapter 8 attempts to answer two fundamental questions: How do changes in inventory investment contribute to the cumulative forces of business cycle expansion and contraction? Is it possible that movements in inventory investment may spark the upswing or bring about the downturn, thereby constituting an underlying cause as well as an aggravating force?

In an examination of Lloyd Metzler's theory of the inventory cycle, it is noted that, in addition to the forces he discusses, inventory movements may be influenced by cyclical changes in the availability of goods and in the purchasing policies of firms. Inventory objectives may vary to a considerable degree as the expansion progresses and may be sharply revised when goods become readily available. Moreover, in making purchasing decisions, firms consider not only inventories on hand but also unfilled purchase orders. In the theory presented here it is held that changes in inventory objectives may contribute to cyclical instability and, under certain conditions, cause inventory investment to reverse, thereby contributing to a turn in the cyclical tide.