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## SIGNIFICANCE OF INVENTORY INVESTMENT

### *1 Inventory Investment and Production Cycles*

Most commodities and services are purchased by two classes of users: consumers and business firms. This, at least, was the case before World War II, the period with which we are concerned. Since then, of course, the federal government has become a major purchaser. The quantity of goods produced depends upon the demands of these customers as anticipated by producers. An understanding of cyclical fluctuations in production, employment, and business in general, therefore, entails an analysis of cyclical fluctuations in the demand for goods and services by consumers on the one hand and businessmen on the other.

The division of output into goods made to satisfy consumer and business demand is of primary importance, for it reflects the different motives controlling purchases. Consumers buy goods to satisfy some physical or psychological need. Businessmen buy goods in order to increase the profits of their companies. The second are aptly called investment goods, the first, consumer goods.

Investment goods, in turn, are of two sorts. One consists of durable equipment, plant, and other buildings. The other, with which this study is concerned, covers goods business firms buy or produce and which, for brief or long periods, enter into their inventories. The value of business construction and purchases of durable goods during a period is usually called investment in plant and equipment. Similarly, the value of goods added to inventory is usually called inventory investment. Both represent the value of goods produced during a period and added to the stock of capital; hence each represents part of the total demand for the current output of goods and for labor and other resources to make the goods.

The task of Part Three is to study the cyclical fluctuations in the rate of inventory investment. But first, two conceptual questions must be clarified if cycles in inventory investment are to be seen in their proper light.

## POSITIVE AND NEGATIVE INVENTORY INVESTMENT

Since inventories may be liquidated as well as accumulated, it might be thought that there is a qualitative difference between a change in the rate at which they grow and at which they decline. From the viewpoint of the impact upon production and employment, a reduction in the rate at which inventory is accumulated has the same effect as an acceleration in the rate at which inventory is liquidated. A reduction in the rate at which inventory is liquidated has the same effect on production as an increase in the rate at which it is accumulated.

These facts will be quickly appreciated by considering an hypothetical illustration of total output or gross national product during several periods (Table 60). Let us suppose that the part of total output in each period that takes the form of goods sold to consumers or to business firms to add to their plant and equipment remains constant. Changes in total output can then be charged entirely to changes in the rate at which goods are added to inventory.

TABLE 60  
Sales, Stocks, and Total Output  
Hypothetical Illustration

PERIOD (1)	SALES TO CONSUMERS & TO BUSINESS FOR PLANT & EQUIPMENT (2)	End of period (3)	INVENTORIES		TOTAL OUTPUT	
			Invest- ment (4)	Col. (2) + (4) (5)	Change (6)	
1		500				
2	1000	510	+ 10	1010		
3	1000	530	+ 20	1020	+ 10	
4	1000	540	+ 10	1010	- 10	
5	1000	540	0	1000	- 10	
6	1000	530	- 10	990	- 10	
7	1000	510	- 20	980	- 10	
8	1000	500	- 10	990	+ 10	
9	1000	490	- 10	990	0	

If we think of increases in the rate of investment and decreases in the rate of disinvestment as changes in the same direction, it is immediately apparent that each has exactly the same effect upon production, provided they are of the same size. Thus between periods 2 and 3 the rate of investment grows from +10 to +20; production increases by the same amount, from 1,010 to 1,020. In the same way the rate of disinvestment of inventories declines between periods 7 and 8 from -20 to -10; production increases by the same amount, from 980 to 990. Throughout the table the change

in production equals the change in the rate of investment in inventory. Evidently from the viewpoint of their effects on production, there is no qualitative difference between investment and disinvestment,<sup>1</sup> and a cycle that runs from a peak of inventory accumulation to a peak of inventory disinvestment (trough of accumulation) back to a peak of accumulation is a continuous whole.

The relations between production and stock illustrated in Table 60 are true without qualification only for the economy as a whole. If we consider one sector—manufacturing industries, for example, or some single industry—then obviously among goods held in stock some will have been purchased from other sectors. To say that in this situation an addition to stock requires production in the same quantity involves a tacit assumption that there is no compensating reduction of stock elsewhere. Of course, special circumstances aside, this assumption, that other things remain equal, is necessary and valid for analytical purposes.

#### PLANNED VS. UNPLANNED INVENTORY INVESTMENT

Goods added to stock must have been produced—barring offsetting reductions in stock elsewhere; and the desire to add goods to stock stimulates businessmen to produce or purchase more goods. Thus the demand for goods for inventory investment is part of the total demand for goods. The converse, however, need not be true. The goods added to stock may not have been made in response to a desire to invest in inventory.

This well known paradox is easily resolved. Unless a manufacturer, for example, produces exclusively to order, he must base his decisions about the quantity of goods to purchase and to produce in large part on a guess about the quantity he will sell. If his guess is wrong, he has various alternatives. If he has overestimated demand, he may add more goods to stock than he had planned. Or by reducing prices or offering other inducements to customers, or by advertising, he may achieve his anticipated rate of sales. But price reductions may not stimulate sales sufficiently. Competitors

<sup>1</sup> Strictly speaking, this is true only as long as production is some positive quantity. If production is zero, as may sometimes happen in small sectors of the economy, there may be disinvestment in stocks at a changing rate without affecting the (zero) rate of output. But stocks cannot, of course, accumulate when production is zero.

may meet his prices, which will lessen the efficacy of a cut of any given size, and his customers may be encouraged to expect further cuts, which may cause them to curtail purchases temporarily. In any event, the quantity of goods a manufacturer sells during a given period is unlikely to be identical with the quantity he expected to sell at the beginning of the period. And since he will not be able immediately to make a full adjustment in his receipts of purchased goods and in his own rate of production, the amount of goods he holds in stock at the end of any period is unlikely to be identical with the quantity he had planned to hold. This difference between the actual stock in a businessman's possession at the end of a period and the planned stock represents unplanned accumulation or liquidation of inventories.

The fact that part of the inventory investment of any period is unplanned is significant in two ways. First, if one billion dollars of goods are added to stock during a certain period, then, strictly speaking, it is valid to say only (what is tautologically true) that output worth one billion dollars took the form of inventory investment. We cannot validly say that production worth one billion dollars was stimulated by a desire to add such a quantity of goods to stock. For the production of part of these goods may have been due to the expectation that they would be sold or used up in the fabrication of other goods. Similarly, the output stimulated by the desire to invest in inventories may exceed one billion dollars if sales were underestimated and if manufacturers were unwilling or unable to restrict sales to the quantities they had originally expected.

The distinction between planned and unplanned inventory investment is important in another way. An increase in the output of goods, whatever its cause, entails a larger outlay of funds to hire labor and to purchase the additional goods and other supplies required. This additional outlay stimulates purchases of consumer goods and the production of raw materials, thereby setting in train a series of secondary consequences that tend to increase the total output and income of the community. If the additional production takes the form of unplanned accumulation of inventories, however, there is an offsetting factor. The holders of the excess stocks are likely in future periods to attempt to curtail their output or purchases or at least to keep them below the levels at which

they would otherwise have been set. Thus the secondary consequences of unplanned inventory investment are in part depressing to business. Similarly, if stocks are reduced below planned levels or if inventory investment turns out to have been smaller than businessmen desired, the secondary consequences upon orders and output decisions in subsequent periods are likely to be expansionary.

Inventory statistics are, of course, distressingly silent about the size of planned and unplanned investments. They tell us only what actually happened. But unplanned investments may sometimes be very important. The amount added to stocks is always small compared with total production and sales. Hence a small percentage error in producers' expectations of sales may cause a large unplanned investment or disinvestment in inventories, at least during any short period. Over long periods, no doubt, such mistakes are corrected and large unplanned holdings are eliminated from business inventories. The unplanned portion of the inventory investment during a year is, therefore, likely to be a relatively small part of the total annual investment. The analysis of business cycles, however, is often concerned with events that take place within one, two, or three months, and for such short periods unplanned investment may be a large part of the total, a fact that serves to becloud the interpretation of the data.

## 2 *Plan of Part Three*

Two major questions are studied in the succeeding chapters. The first concerns the cyclical timing of inventory investment. Chapters 14 and 15 compare the behavior of investment by manufacturers as a whole with inventory investment in other industrial divisions. They try to establish the timing of the turning points of inventory investment relative to the turning points of business cycles and to those in the rate of change in output. The general conclusion is that the peaks and troughs of inventory investment are near those of business and considerably later than those of the rate of change in output. These observations lead to a discussion of the influence of inventory investment in initiating business cycle turns and in determining the pace and length of expansions and contractions. The next four chapters, 16-19, examine the behavior

of investment in the major types of stocks held by manufacturers in an attempt to discover the causes of inventory investment cycles in this branch of the economy. Chapter 20 draws together the results of these detailed studies.

The second major question concerns the relation between the amplitude of cycles in inventory investment and in total output. In Chapter 21, we confirm the fact (noted in Ch. 1) that a very large part of the total changes in gross national product during business cycles takes the form of changes in inventory investment. In addition, the data strongly suggest that the share of inventory investment varies inversely with the length of business cycles. A general explanation of these relations is attempted. Finally we examine the theory, advanced by Hansen and others, that minor cycles, attributable to a periodic need for inventory readjustment, regularly interrupt the course of major upswings in business.