

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Information, Expectations, and Inventory Fluctuations: A Study of Materials Stock on Hand and on Order

Volume Author/Editor: Ruth P. Mack

Volume Publisher: NBER

Volume ISBN: 0-870-14478-2

Volume URL: <http://www.nber.org/books/mack67-1>

Publication Date: 1967

Chapter Title: Stocks and Adjacent Flows, Durable Goods Manufacturers

Chapter Author: Ruth P. Mack

Chapter URL: <http://www.nber.org/chapters/c1409>

Chapter pages in book: (p. 144 - 155)

## 8. *Stocks and Adjacent Flows, Durable Goods Manufacturers*

The reservoir, manufacturers' stocks of purchased materials, is filled by the flow of goods received at the loading docks (receipts); it is drained by the flow of "raw" materials into the first stage of processing (utilization). For outstanding orders, the bounding flows are net new orders placed with suppliers as inlet and receipts as outlet. For ownership they are new orders and utilizations respectively. To picture the relation between the two bounding flows and the stock reservoir, it is necessary to have the triplicate of information for the same firms and in identical units. Unfortunately neither criterion can be met for materials ownership of all durable goods manufacturers.<sup>1</sup>

Only for one segment of ownership, changes in materials stocks on order, is a consistent

triplet of information available. Hypothetically, the purchasers are manufacturers of all durable goods, particularly of the final products, machinery and transportation equipment. The stockpool is their outstanding purchase orders for materials; the inlet, their new purchase orders, and the outlet, their receipts of materials. Actually, the statistics are those submitted by the seller rather than the purchaser; they are sales orders, shipments, and backlogs of sales orders for primary metals, fabricated metals, and "other" durables industries.<sup>2</sup> At least this one segment of ownership, then, outstanding orders for materials, can be submitted to examination along with the flows that bound it. It constitutes, it will be recalled, the lion's share of total materials ownership.

### TIMING AND CONTOURS

The upper set of the interlaced lines in Chart 9 shows the two flow series, new orders placed for and receipts of materials by durable goods manufacturers. New orders smoothed by a five months' average, is the dashed line which always lies above the blackened areas. The crosses mark the turns in the monthly data (not in the charted smoothed series).

<sup>1</sup> The difficulties derive from the fact that all information on orders and shipments concern the *sales* of reporting firms. The problems were discussed in Chapter 3, particularly notes 8 and 9. There is no information on utilization and production starts, nor can it be constructed from presently available data.

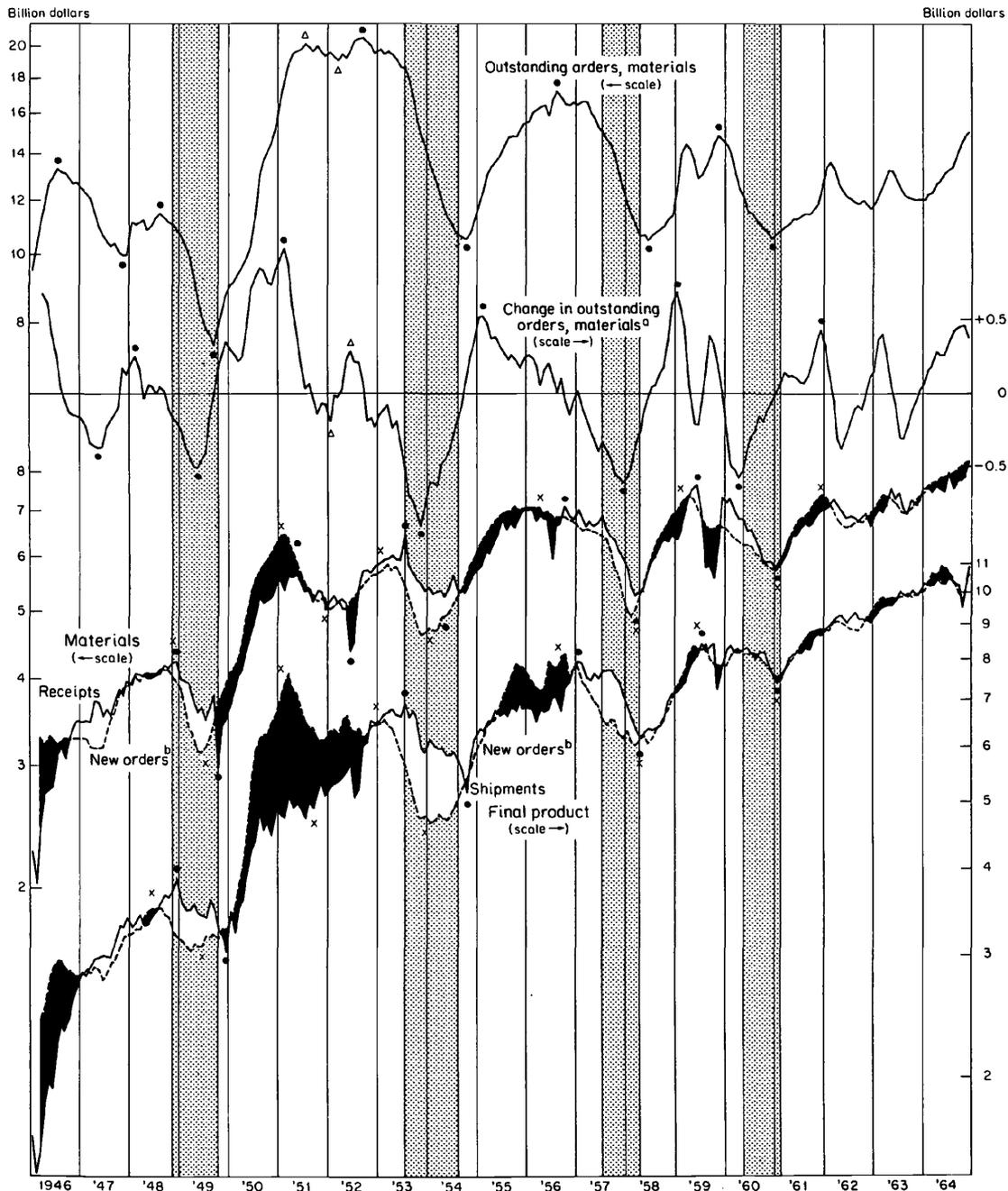
<sup>2</sup> The extent to which the actual and hypothetical requirements meet is considered in Chapter 3, note 8.

New orders had a strong extra movement during the Korean War. The postwar phantom recession was evidenced only by a sharp flattening followed by a sharp rise which was not marked as a specific movement. As Table 28 shows, new orders systematically lead business cycle turns (lines 8 and 9). Receipts at first synchronize and later lead business cycles (lines 1 and 2). Their association with new orders (line 10) is that of a systematic lag which averages five months at peaks and two months at troughs. Allowing for an average lag of four months, 90 per cent of the months are in like phase.

New orders are cyclically more volatile than

CHART 9

*Receipts, Orders, and Change in Outstanding Orders,  
Durable Goods Manufacturers, 1946-64*



Note: Shaded areas represent business contractions. Specific cycle turns are marked by X and by dots in shipments, receipts, and ownership.

<sup>a</sup> Centered five-month average of month-to-month change. <sup>b</sup> Five-month moving average centered; turning points are marked for underlying monthly data.

TABLE 28

*Timing: Receipts and New Orders, Durable Goods Manufacturers, 1946-61*

		Section A: Months Lead (-) or Lag (+) for Matched Turns <sup>a</sup>											
		Chronology <sup>b</sup>											
Line	Reference Series <sup>c</sup>	P (1/47)	T (7/47)	P 11/48	T 10/49	P (2/51)	T 6/52	P 7/53	T 8/54	P 7/57	T 4/58	P 5/60	T 2/61
<i>Specific Series: Receipts, Materials*</i>													
1	Business cycles			+1	0			0	-3	-9	-1	-11	-1
2	Subcycles	⊕	⊕	+1	0	+3	0	0	-3	-9	-1	-11	-1
3	Outstanding orders, mat.	⊕	⊕	+4	+1	<u>-2</u>	<u>+3</u>	+10	-5	+2	-3	-5	+1
4	Change in outstanding orders	⊙	⊕	+10	+5	+3	<u>+5<sup>r</sup></u>	<u>+13<sup>r</sup></u>	+6	+20	+3	+5	+9
5	Change material stocks, all dur.	⊕	⊕	+1	+5	+7	+1	+1	-1	+6	-2	+2	+4
6	Shipments, final product†	⊙	⊙	0	-2	∞	∞	0	-5	-3	-1	-1	0
7	Change in outstanding orders, materials inverse	⊕	⊕	-5	-16	<u>-8</u>	<u>0</u>	-4	-9	-14	-10	-10	-11
<i>Specific Series: New Orders, Materials*</i>													
8	Business cycles			0	-3			-6	-7	-15	-1	-15	-1
9	Subcycles	⊕	⊕	0	-3	-1	-6	-6	-7	-15	-1	-15	-1
10	Receipts, materials	⊙	⊙	-1	-3	-4	-6	-6	-4	-6	0	-4	0
11	New orders final product†	⊙	⊙	+5	+1	0	<u>+3</u>	<u>+1</u>	+1	-4	-1	-4	0
12	Shipments, final product†	⊙	⊙	-1	-5	∞	∞	-6	-9	-9	-1	-5	0
13	Change ownership	⊙	⊕	+9	+2	-1	<u>-1</u>	<u>+7</u>	+2	+14	+2	+1	+9
14	Change material stocks, all dur.	⊕	⊕	0	+2	+3	-5	-5	-5	0	-2	-2	+4
15	Change in outstanding orders, materials	⊙	⊕	+9	+2	-1	<u>-1</u>	<u>+7</u>	+2	+14	+3	+1	+9
16	Shipments, all durables	⊙	⊙	-1	-3	<u>-2</u>	<u>-7</u>	-6	-9	-9	-1	-4	0
17	Outstanding orders mat.	⊕	⊕	+3	-2	<u>-6</u>	<u>-3</u>	+4	-9	-4	-3	-9	+1

(continued)

TABLE 28 (concluded)

Section B: Average Timing of Turns													Section C: Percentage of Months in Like Phase <sup>d</sup>		
Line	Reference Series <sup>c</sup>	Number Matched			Median <sup>e</sup>			Average Deviation <sup>f</sup>				Timing Adjust-ment <sup>g</sup>	% Mos. 7/46-12/61	% Mos. 1/48-12/61	
		-	+	0	P	T	All	All Turns							
								P	T	Wt'd					
<i>Specific Series: Receipts, Materials*</i>															
1	Business cycles	5	1	2	-4.5	-1.0	-1.0	5.2	0.8	3.0	3.0	-1	79	76	
2	Subcycles	5	2	3	-2.7	-0.7	-0.5	5.3	0.9	2.9	3.1	0,-1	81	83	
3	Outstanding orders, mat.	4	6	0	+1.3	-0.3	+1.0	4.3	2.7	3.4	3.5	+1	73	80	
4	Change out-standing orders	0	10	0	+9.3	+5.3	+5.5	5.1	1.5	3.7	3.3	+5,+6	74	78	
5	Change materials stocks, all dur.	2	8	0	+3.0	+1.3	+1.5	2.4	2.5	2.4	2.4	+1,+2	79	85	
6	Shipments, final product†	5	0	3	-0.5	-1.5	-1.0	1.0	1.5	1.2	1.2	-1	88	86	
7	Change in out-standing orders, materials inverse	9	0	1	-7.7	-10.0	-9.5	3.1	3.6	3.5	3.3	-9,-10	76	78	
<i>Specific Series: New Orders, Materials*</i>															
8	Business cycles	7	0	1	-10.5	-2.0	-4.5	6.0	2.0	4.8	4.0	-4,-5	74	71	
9	Subcycles	9	0	1	-7.3	-2.7	-4.5	6.1	2.2	4.3	4.2	-4,-5	74	74	
10	Receipts, mat.	8	0	2	-4.7	-2.3	-4.0	1.5	2.1	1.8	1.8	-4	90	89	
11	New orders final product†	3	5	2	-1.0	+0.7	+0.5	3.0	1.1	2.0	2.3	0,+1	89	88	
12	Shipments, final product†	7	0	1	-5.5	-3.0	-5.0	2.2	3.2	2.8	2.8	-5	82	80	
13	Change ownership	2	8	0	+5.7	+2.0	+2.0	4.9	2.0	3.8	3.4	+2	73	77	
14	Change materials stocks, all dur.	5	3	2	-0.7	-1.7	-1.0	2.1	3.3	2.8	2.7	-1,-2	77	83	
15	Change in out-standing orders, materials	2	8	0	+5.7	+2.3	+2.5	4.9	2.3	3.9	3.6	+2	73	77	
16	Shipments, all durables	9	0	1	-4.0	-3.7	-3.5	2.4	3.1	2.8	2.8	-3,-4	85	83	
17	Outstanding orders mat.	7	3	0	-2.3	-2.7	-3.0	4.7	2.3	3.4	3.5	-3	73	80	

## Notes to Table 28

<sup>a</sup>Specific series are matched with the indicated reference series (see note c) in accordance with the standard NBER rules. A double relaxation of rules is marked r; it applies to cases for well-conforming series in which two like turns are matched, though an unlike turn lies between them. The figure is underlined when subcycle chronology is the reference series, a minor cycle in the specific series has entered a comparison; or, when two individual series are compared, a minor cycle in either series has entered a comparison. When the business cycle chronology provides the reference, minor specific cycle turns are ignored. The meaning of other symbols is:

- ⊕ turn in the reference series does not appear in the specific series.
- ⊗ turn in the specific series does not appear in the reference series.
- ⊙ there is no turn in either series in the neighborhood of the chronology date.

<sup>b</sup>Chronology dates are business cycle reference dates. In addition, four minor subcycle dates, enclosed in parentheses, are added to form a subcycle chronology.

<sup>c</sup>Reference series are of three sorts: (1) the business cycle chronology as shown in column heads, excluding the dates in parentheses; (2) the subcycle chronology as shown in all column heads; (3) particular series whose specific cycles and minor cycles constitute the reference dates for the comparison.

receipts, and more because troughs are lower than because peaks are higher.<sup>3</sup>

New orders tend to fall below receipts beginning some months before the peak in business; they remain so throughout business recession. In the neighborhood of troughs, orders, having previously started to rise, begin to exceed receipts when, or shortly after, receipts themselves start to rise. Consequently the early thrusts in outstandings reflect the

<sup>3</sup> It is an interesting question whether this rapid decline and depth of fall during recession may be related to cancellations. Unfortunately the matter has not, to my knowledge, been comprehensively studied. Statistics for cancellations are given for machine tools; these do not seem to show systematic clustering of cancellations around business troughs, though they do suggest a midcycle cluster in 1947 and 1951 (Moore (ed.), *Business Cycle Indicators*, pp. 450, 454).

<sup>d</sup>The number of months during which the specific series is in like phase with the reference series is expressed as a percentage of the total number of months covered between dates as given.

<sup>e</sup>Median is the average timing of the center two or three turns.

<sup>f</sup>Average deviation from the median. The "weighted" (wt'd) average is the deviation from the median for peaks and for troughs separately, weighted by the number of turns.

<sup>g</sup>In determining months in like phase a timing adjustment is made which maximizes confluence. Before counting the months in phase, the specific series is in effect moved to the right to allow for a lead and to the left to allow for a lag if by so doing the percentage of months in like phase (as rounded) is increased. If the months in phase are as large or larger without an adjustment, this is indicated by a "timing adjustment" of 0.

In some cases we wish to know the percentage of months in phase on a synchronous basis, regardless of whether the percentage in phase is thereby maximized. If so, the "timing adjustment" is given as "none."

\*Receipts of or new orders for materials are actually shipments of or sales orders of the materials-producing durable goods industries.

†"Final products" refer to sales orders or shipments of machinery and transportation industries (final products).

faster rise of new orders when *both* receipts and orders are rising. The *cessation* of the first spurt in outstandings, on the other hand, does seem typically to be associated with an absolute fall in new orders. Corollary to these observations are those brought out in Chapter 4 concerning the strong lead of outstanding orders at business cycle peaks and closely synchronous behavior at troughs (Table 1, line 10 or 11).

The extent to which new orders are more unstable than receipts is traced by the second curve on Chart 9. It is the rate of change in outstandings.<sup>4</sup> Apparently the maximum rate

<sup>4</sup> As in Chart 8, it represents the space between the new order and shipments curves with the difference measured up and down from zero. The measurement is approximate not merely because of the enlarged

of decline in outstandings tends to occur somewhat before the trough in new orders (Table 28, line 15). This means, as noted in an earlier chapter, that the rate of decline lessens while most economic events are still deteriorating. Conversely, the rate of rise reaches its maximum before new orders arrive at its first peak and when expansion is still young. Continued expansion may or may not result in a new lift in orders and an associated spurt in outstandings and their rate of change.

The rate of change in outstandings does not appear to have a systematic relation to the inflow or outflow series. Allowing for an average lead of two months, only 73 per cent of months are in like phase (line 15) with the inflow, new orders. Its relation to the outflow series, receipts, is unimpressive whether matched directly with a lead (line 4), or inversely (in accord with the arithmetic predisposition) with a long lag (line 7).

### SALES AND PURCHASE ORDERS

It would be useful to trace the pattern of the sales orders of the same companies whose purchase orders we have just described. Such a comparison might indicate whether and in what form companies appear simply to pass on to their suppliers the pattern of the orders that they receive from their customers. This is, in effect, the sort of comparison that has been made for department stores.

Of course, we do not have the requisite information on sales orders for durable goods manufacturers. It would consist of the sales orders of producers of final products (which we do have) plus a part of the sales orders of materials manufacturers—the part that is not sold to producers of final products but to producers in the materials group. (This part is present in total durable goods orders but cannot be separated from the rest of the orders of the materials group.) Nevertheless, it may be useful to inspect for a moment the segment of the relevant total that can be isolated—those for manufacturers in the final products group. These sales orders can be viewed in association with shipments and change in backlogs (unfilled orders) for about the same companies. The second group of interlaced curves of Chart 9 display the two flow series.

scale, the smoothing for all of the three series, and differences in seasonal adjustments, but because orders and receipts are on a log scale and change in outstandings on an arithmetic scale.

The curves seem to suggest some very real parallelism between the sales and purchase data, and the visual judgment is supported in lines 6 and 11 of Table 28. Orders for materials lag those for final products in the early part, and lead after 1956; but even so, 89 per cent of months are in like phase on a synchronous basis. The two sets of shipments likewise have marked similarity in the timing of turns. But there is a clear difference in the progress of expansion. Shipments of materials increase vigorously during the first year or so of expansion, and then retard; in 1951 they even decreased for a while after the peak in the Korean boom had passed. Shipments of final products build up more gradually and persistently throughout their entire expansion phase. But a break with the past appeared after the 1959 peak. Then, shipments of final products declined very little; even new orders did not decline much before starting a slow steady climb. Materials on the other hand behaved in a more usual fashion.

The implications of these facts in terms of unfilled orders is displayed in the chart. To repeat, unfilled orders increase when the space between the lines is black, and the width of the black spaces shows the rate of increase; similar remarks apply to decreases and the white areas. The relatively even climb of shipments of final products in the face of early post-trough spurts in new orders generated huge backlogs not only at the time of the

Korean War but also, though more moderately, in 1946 and 1955-56.<sup>5</sup> This contrasts with the routinely far more agile response of receipts of materials to new orders. In the light of these precedents, it is particularly in-

teresting to see the sharp break with the past that occurred in 1958, when virtually no build up of unfilled orders for final products took place, though materials outstanding seemed to behave in the usual fashion.

### AMPLITUDE

In Chapter 6 specific cycles in the rate of change in unfilled materials orders were found to average \$62.3 million a month, or about 1.1 per cent of the average level of shipments of materials. The significance attached to these figures in the context of vertical transmission of instability depends in part on how they compare with the severity of cyclical fluctuations in shipments and new orders. Accordingly, it will be useful to repeat the spate of measures reviewed in the previous chapter. However, here they have far more limited significance. For department stores, we could view a triad for which the bounding flows were purchases of consumers and purchases of the first commercial agent in the sequence. This difference bears on the way in which instability in consumer demand is augmented by economic processes.

<sup>5</sup> This chart shows the two sets of flow curves on a scale that reflects the *relative* size of fluctuations. It is on a logarithmic scale. The change in unfilled orders, shown by the width of the black and white spaces between the curves, is thus also scaled very roughly as a percentage of the level of each set of flow data which are not far from the same size. The two upper curves, on the other hand, the change in backlogs and materials orders, plotted up and down from a zero line, are scaled for visual similarity as required for Chart 6. Change in backlog is scaled down—if the scale for materials had been used, fluctuation would have been twice as large. Thus it is clear that the range of fluctuation in change in backlogs is much higher relative to shipments of final products than is change in outstandings relative to receipts of materials. This is indicated also by the wider areas of black and white (prior to 1958) for the bottom set of curves compared with the set for materials. Incidentally, the relation of rates of change in unfilled orders to the level of the data proper is quite another matter, since the average book value for unfilled orders of final products was about two and a quarter times that of materials.

For durables, we can compare only the materials received by durable goods manufacturers and the materials for which they currently place orders. The difference—change in outstanding orders—obviously has some bearing on the vertical generation of instability, though it is impossible to relate it to the broader context—the relation between sales and purchase orders for these firms. Nevertheless the narrow context is not without meaning, and the figures therefore require review.

Table 29 summarizes the group of calculations that correspond exactly to the calculations for department stores shown in Table 24; however we omit most of the supporting tables. Line 1 indicates (columns 9 and 10) that the average monthly specific cycle fluctuations in receipts is \$72.9 million; for new orders it is \$100.2 million, or 37 per cent higher. These figures express the intrinsic instability of each series. The problem is again to choose intervals, significant to the vertical transmission of fluctuation, during which rises and falls in orders and receipts and in changes in outstanding orders can be studied. The same alternatives for defining intervals are used here as previously.

During reference cycles, receipts fluctuate more than new orders and for much the same reasons that apply to department stores—new orders have a strong lead and are on their way down at reference peaks or up at troughs. Conversion of the reference chronology to one that hypothetically focuses on orders rather than outputs would involve earlier dating. Using the rough rule of thumb of a uniform six months' lead, new orders fluctuate more than receipts—about two-thirds again as much

TABLE 29

*Per Month Amplitude of Receipts and Orders During Various Selected Periods,  
Materials Manufacturers, 1948-61*

Basis of Defining "Phases"	Rise During Expansion Phases <sup>a</sup>				Fall During Contraction Phases <sup>a</sup>				Rises and Falls <sup>a</sup>			
	\$ Millions Per Month		Re- ceipts as % of	Orders as % of	\$ Millions Per Month		Re- ceipts as % of	Orders as % of	\$ Millions Per Month		Re- ceipts as % of	Orders as % of
	Re- ceipts	Or- ders	of Orders	Re- ceipts	Re- ceipts	Or- ders	of Orders	Re- ceipts	Re- ceipts	Or- ders	of Orders	Re- ceipts
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Specific cycles in each series	81.1	118.9	68	147	63.9	83.4	77	130	72.9	100.2	73	137
2. Reference cycles	48.1	37.4	128	78	78.3	49.1	159	62	56.7	40.8	139	72
3. Reference cycles with 6-month lead	35.0	49.4	71	141	33.5	76.4	44	228	34.5	57.1	60	165
4. Periods of thrust <sup>b</sup>	65.0	113.4	57	175								
5. Specific cycles in orders	75.0	118.9	63	159	45.3	83.4	54	184	59.5	100.2	59	172
6. Selected periods of accelerating rise or fall in outstandings <sup>c</sup>	105.3	165.6	64	157	22.2	91.6	24	413	64.2	129.1	50	201

<sup>a</sup>Amplitudes are based on standings calculated as five-month average centered on first and last month of each phase. Averages are the sum of rises during expansion phases divided by the sum of the months covered; for contractions, they are the sum of the falls during contraction phases divided by the sum of the months covered.

<sup>b</sup>For definition of periods of thrust see text.

<sup>c</sup>Expansion phases starting in the neighborhood of each business cycle trough; 42 months were covered in four phases. Contraction phases starting in the neighborhood of each business cycle peak; 41 months were covered in four contraction phases. See Table 30 for details.

(line 3, column 12). The whip is greater for contractions than for expansions (compare columns 4 and 8).

The characteristic early thrust in orders as contraction weakens is shown in line 4. Starting six months before the end of cyclical contraction and ending at the dates previously chosen

to formalize the periods of thrust (61 months of the 105 months of reference expansion during the years 1948-61), orders rose three-quarters again as fast as did shipments (column 4).

One final question: What portion of total specific instability of orders was directly as-

sociated with receipts as opposed to changes in outstandings? Line 5, column 11, indicates that the answer is about 60 per cent. It is not too different for expansions and contractions.

This information is difficult to interpret, failing the companion piece of sales orders received and shipments by the firms whose purchase orders for, and receipts of, materials we view. For example, if these sales orders were complete counterparts, unit per unit, of the purchase orders, one might interpret the lesser fluctuation that characterizes receipts—that is, the materials shipments of suppliers—as a manifestation of some stabilization in vertical transmission of demand that was facilitated by the advance information that suppliers had received concerning what their customers would require. If, on the other hand, the sales orders were counterparts of materials received, something in the inventory-buying procedure would have passed back to suppliers information which, insofar as it influences production or other decisions, would have generated substantial additional instability.

In any event, it seems likely that the increasing or decreasing backlogs and the rate at which they change would in themselves have destabilizing attributes. At least, when backlogs are increasing at an increasing rate, this must convey a notion about developing market tensions and the possibility of impending shortages or price increases; conversely, when backlogs are decreasing at an increasing rate, buyers are likely to feel fortified in their ability to demand prompt delivery and favorable terms.

Table 30 details the calculations which are summarized in the last line of Table 29. In postwar years, periods of accelerating accumulation of backlogs by materials manufacturers

occurred in the neighborhood of each cyclical trough. They appear as the widening areas of the first set of interlaced curves in Chart 9. They started one or two months before or after cyclical turns (upper section of column 4) and lasted five to eighteen months, averaging ten and a half months for four cycles (column 3). During these intervals, both new orders and receipts increased very rapidly—\$165.6 million and \$105.3 million per month respectively (Table 30, columns 9 and 7 or Table 29, line 6, columns 1 and 2). Nevertheless, the amplitude of receipts was only 64 per cent of the total increase in new orders; the other 36 per cent was therefore associated with increasing rate of accumulation of outstandings (Table 29, line 6, column 3).

The periods of accelerating decline, on the other hand, of which there were four averaging ten months each (Table 30, column 3, second section), tended to start well before the cyclical peaks in business (column 4). (Note where the white spaces between the curves in Chart 9 begin.) These were periods of rapid fall in new orders, but receipts declined relatively slightly or even increased. The rate at which receipts fell was a quarter of that of new orders (Table 30, line 6, column 7). Nevertheless, the decline in outstanding orders, backlogs of unfilled orders for the supplier, must itself imply weakness to come. For one thing, it changes the relative bargaining strength of buyer and seller. For another, it may carry needlessly pessimistic information insofar as firms with reduced backlogs order less materials and the firms that receive these orders are not in position to judge how much of the decline is associated with changes in the movement of goods and how much with reduction of backlogs.

#### *SUMMARY, CHAPTERS 7 AND 8*

This and the preceding chapter have examined the relation between changes in materials stocks on hand and on order and the

flows of goods that constitute sales, receipts, or orders.

This triplicate of information helps to de-

TABLE 30

*Amplitude of Receipts and Orders During Selected Periods of Accelerating Rise or Fall  
in Outstanding Orders, Materials Manufacturers, 1947/1961*

Start (1)	End (2)	Duration (months)			Receipts		Orders		Change in Orders as % of Shipments 8÷6 (10)
		Total (3)	Relation to B.C. Trough <sup>a</sup>		Change (million dollars) <sup>b</sup>		Change (million dollars) <sup>b</sup>		
			Before (4)	After (5)	Per Mo.		Per Mo.		
					Total (6)	6÷3 (7)	Total (8)	8÷3 (9)	
<i>Periods of Accelerating Rise</i>									
(10/47)	(2/48)	(4)	⊕	⊕	(+246)	(+61.50)	(+258)	(+64.50)	(104.9)
8/49	2/51	18	2	16	+2,010	+111.67	+3,165	+175.83	157.5
(3/52)	(6/52)	(3)	⊕	⊕	(-261)	(-87.00)	(+14)	(+4.67)	(-5.4)
9/54	2/55	5		5	+461	+92.00	+958	+191.60	207.8
6/58	1/59	7		7	+876	+125.14	+1,230	+175.71	140.4
12/60	12/61	12	2	10	+1,076	+89.67	+1,604	+133.67	149.1
Total, Selected Periods <sup>c</sup>		42			+4,423		+6,957		
Averaged <sup>d</sup>		10.5			+1.106	+105.31	+1,739	+165.64	157.3
<i>Periods of Accelerating Fall</i>									
		Total	Relation to B.C. Peak <sup>e</sup>		Total	Per Mo.	Total	Per Mo.	
			Before	After					
9/48	5/49	8	2	6	-457	-57.12	-986	-123.25	215.8
(8/51)	(1/52)	(5)	⊕	⊕	(-167)	(-33.40)	(-388)	(-77.60)	(232.3)
9/52	11/53	14	10	4	(+113)	+8.07	-864	-61.71	-
9/56	12/57	15	10	5	-716	-47.73	-1,572	-104.80	219.6
12/59	4/60	4	4		+151	+37.75	-334	-83.50	-
Total, Selected Periods <sup>c</sup>		41			-909		-3,756		-
Averaged <sup>d</sup>		10.2			-227	-22.17	-939	-91.61	413.2
<i>Periods of Rise And Fall<sup>c</sup></i>									
Total, Selected Period		83			5,332		10,713		
Averaged <sup>d</sup>					666	64.24	1,339	129.07	200.9

<sup>a</sup>The interval (col. 3) is broken into the segments preceding and following the associated business cycle trough dates. The starting dates of the period and the cycle trough dates, respectively, are: 8/49, 10/49; 9/54; 8/54; 6/58, 4/58; 12/60, 2/61.

<sup>b</sup>Five-month average centered at the month of peak minus five-month average centered at the month of trough. Thus rises have a positive and falls a negative sign.

<sup>c</sup>Selected for inclusion are those periods of rise that start close to business cycle troughs and those periods of fall that start close to business cycle peaks. Episodes for which figures are enclosed in parentheses do not conform to this principle. They are not included in the totals or averages, but are shown for the purpose of comparison.

<sup>e</sup>The total interval is broken into the segments preceding and following the associated business cycle peak dates. The starting dates of the period and the cycle peak dates, respectively, are: 9/48, 11/48; 9/52, 7/53; 9/56, 7/57; 12/59, 5/60.

scribe how the rates at which stocks on hand or on order are changing tend to increase instability of demand as it moves from the final-product end of the economic process to earlier stages of processing. It will be useful to place the information for department stores developed in the previous chapter alongside of the more limited information for producers of durable materials reviewed here.

1. Orders that department stores place with suppliers tend to reach peaks 7 months on the average before those received from their customers, that is, the sales to final consumers. But they start increasing orders when, or only slightly before, sales start to improve. Durable goods producers, on the other hand, appear to have a generally synchronous relation on the average between their sales orders and purchase orders. One of the facts that must have a bearing on this difference is that buyers of machinery are often willing to wait while machines are being produced whereas consumers expect immediate deliveries.

Compared with consumer buying, the merchandise orders of department stores tend to have additional (or far more marked) extra cycles just after World War II and during the Korean crisis. Similar remarks apply to the relation between orders for materials placed by durable goods manufacturers and their receipt at the factory.

2. Ownership proper for department stores typically increases (or decreases) when both consumer buying and retailers' buying are increasing (or decreasing). For durable goods manufacturers, materials orders outstandings increase when orders for materials are increasing but receipts of materials may or may not be.

3. The amplification that rates of change in department stores' ownership of merchandise contributes to the backward transmission of demand is a composite of relatively early changes in outstandings, prolonged by somewhat later changes in stocks.

4. For department stores there seems to be rather pervasive correspondence between

changes in stocks and the inlet stream into the stock reservoir. Monthly receipts follow a course markedly parallel and virtually synchronous to that of the rate of change in stocks. Likewise, new orders for materials parallel the rate of change in ownership after allowance for the upward trend in orders. These similarities may reflect nothing more than the arithmetic of a stock with a relatively smooth outlet and a fluctuating inlet stream. Even so, there are implications concerning the process of vertical transmission of fluctuation—if there is reason for buying or receipts to fluctuate, then so, and in a parallel fashion, must investment in ownership or stocks fluctuate; conversely, if there is reason for retailers' investment in ownership or stocks to fluctuate, then the orders received by their suppliers or shipments from them must bear the imprint. For business enterprises at this earlier stage, fluctuation in sales orders and their shipments, and no doubt also production, will be strongly influenced by the inventory and ownership objectives or buying problems of retailers as distinguished from the buying of consumers.

5. For durable goods manufacturers, change in outstandings does not parallel new materials orders. Could this imply that change in outstandings is, in a sense, the limp result of the pattern of orders, on the one hand, and of the capacity to fill them, on the other? If delivery terms change, so will the average periods that orders are "outstanding." This "capacity thesis" is examined in Chapter 10.

6. The role that changes in ownership play in the vertical transmission of instability depends in part on the size of the fillip that the inventory-purchase syndrome bestows on earlier, relative to later (more finished), stages. For department stores, changes in ownership double or triple the instability of consumer buying as it moves to the next earlier stage. Looked at the other way round, the instability of orders received by the suppliers of department stores is once or twice again that of orders received by department stores—

consumers' purchasing. This statement applies to periods defined in any one of several ways—when materials orders are at their specific highs or lows; when the rate of change in ownership may well have its greatest impact because it is rising or falling at an accelerating pace; during the unmatched periods when either sales or orders are at their own specific cycle highs or lows.

7. Instead of defining periods on the basis of highs and lows in the data under examination, we may do so using some more general scheme. The scheme of business cycle turns shows no evidence of augmented instability associated with department store buying—indeed, quite the reverse. This is caused by two characteristics of purchasing behavior that have appeared again and again—its tendency to lead; its tendency to spurt during the early months of expansion. These characteristics can be admitted into a widely based reference scheme by applying a uniform lead of six months at business cycle reference peaks and troughs and, for the expansion phase, looking only at the period between the predated troughs and the time when general hesitations in activity have been noted in other contexts. During these months, orders received by the suppliers of department stores are about four-fifths again as unstable as that of consumer buying; during contraction phases predated

six months, they are two-thirds again as unstable.

9. For durable goods manufacturers, the instability of orders for materials can be compared only with that of their receipt by the purchaser. One cannot know to what extent the greater fluctuation of orders constitutes a net addition to fluctuation at earlier relative to later stages, since this would require both sales orders and purchase orders for the same firms. Nevertheless, for whatever it is worth, new orders for materials were about two-thirds again as unstable as shipments of them. The particulars vary with the periods for which comparisons are made. But in general, a substantial magnification in fluctuation appears to take place especially during the first years of expansion or contraction.

The observations contributed by the last two chapters combine with those of earlier chapters to sketch a picture of inventory fluctuation which suggests, as does an analysis of the business problem itself, that the management of stocks and of purchasing responds to many variables besides the level of sales. The rest of the book attempts to determine what factors may be largely responsible for the behavior that has been described and how their influence seems to interact, cumulate, and recede.

