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# MAIN RESULTS AND CONCLUSIONS

IN THE PRECEDING CHAPTERS of this book, there was presented, first, an exploration of the changes during business cycles in the effective demand for industrial products, as reflected in the fluctuations of orders placed with manufacturers. The second subject studied was the response of industry to these changes: the adjustments of output and shipments, the implications of changes in unfilled orders, and the problem of determinants of inventory investment. The third subject was business investment in plant and equipment, included because new orders received by industries that produce machinery and equipment represent an early stage of the process, along with the contracts for industrial and commercial construction. Here the principal topics included the cyclical behavior of investment orders and contracts, their main determinants, and their relation to such measures of investment commitments and realizations as capital appropriations and outlays.

It is difficult to synthesize briefly the results of such a study, but it is desirable to try. This necessitates concentration on selected points of importance. The more detailed findings are given in the summaries that conclude the substantive chapters of this book, and they need not be repeated here.

## Typical Developments and Relationships

Let us reconstruct what appears to be the typical sequence of events in the response of producers to fluctuations in demand. One of the earliest signs of a business revival, at a time when general economic

activity is still depressed, is an upturn in the proportion of industries (and companies) that experience increases in new orders. This is followed by an upturn in the proportion of industries (and companies) that start increasing their output rates. Later, as the expansion of demand widens, aggregate new orders turn up, preceding the revival in aggregate industrial production. At business recessions, there is characteristically an analogous sequence of downturns in these diffusion indexes and aggregates.

As a rule, the expansion in demand soon carries new orders above the levels of production and shipments. Hence, unfilled orders accumulate. They increase faster than shipments, and average delivery periods lengthen. When at a later date new orders start declining, current production will continue to rise to fill the volume of order backlogs. The latter continue increasing, too, although at a slower pace; they turn down only when new orders fall below the level of shipments.[1] Even then, output may still move up for some time, but its curtailment will inevitably follow. The ensuing contraction in the industry's activity is, however, slower than the contraction in new orders, because production and deliveries tend to exceed the concurrent inflow of new business, as manufacturers work off the backlogs of their past commitments. Unfilled orders begin to decrease faster than shipments, and average delivery periods shorten. When current demand (new orders) turns up again, its level is likely to be initially lower than that of output—too low in the view of most firms to justify an immediate reversal of their contractive production policies. The direct effects of the increase in new orders will then be limited to a slowdown in backlog decumulation and, perhaps, in the rate at which output declines. But as soon as the recovery of new orders carries them above the levels of current production, the latter will most likely turn up. Backlogs by then will be increasing, too, which brings us back to the beginning of the cycle.

As this account implies, new orders generally tend to lead production. For goods made to order, they do so by longer intervals and more

[1] If the contraction in new orders is so weak or short as to expire before descending to the concurrent levels of production, it may not bring about any decline in activity at all, but merely reduce the rates of increase in backlogs and output. A new expansion in demand will then put an end to these retardations and induce an accelerated increase in output and deliveries. Most of the "extra" turns in new orders are associated with those expansions or contractions in these series that fail to reach up or down to the levels of current industrial operations.

regularly than for goods sold from stock, and they also lead shipments. The leads are on the average longer for durable than for nondurable manufactures. The largest delivery lags are for heavy made-to-order equipment and defense products, the smallest for items that are relatively standardized. Many consumer goods and some materials are shipped promptly upon receipt of order, from stock. Among the goods made to order, those serving investment in producers' durable equipment and plant are particularly important. New orders and construction contracts for such capital goods are similar to new capital appropriations in their early cyclical timing, and they anticipate investment activity, whether the latter is measured by output or expenditure. The relations are distinctly of the distributed-lag type, and the average lags of business expenditures on plant and equipment behind the new investment commitments tend to be substantial; it may take three to four quarters after commitment for about half of the capital outlays to be made. These lags appear to be positively associated with the height of the backlog-shipments ratio, and thus probably with the degree of capacity utilization, in the capital-goods-producing industries. Similarly, turning-point comparisons show that new orders usually precede deliveries by longer intervals at peaks than at troughs, presumably because the capacity position of many of the supplying firms is strained at the top levels of production.

The relative amplitudes of cyclical, irregular, and seasonal fluctuations are systematically larger for new orders than for the corresponding series on production and shipments. This is so partly because output is limited by capacity, while demand (new orders) is not. Another reason lies in manufacturers' efforts to stabilize production. Firms seek to make their output variability as small as possible; and they are probably more strongly motivated and apparently more successful in this endeavor in those industries that face greater instability of demand (i.e., greater variability of cyclical and irregular movements in incoming business) than in industries where demand is more stable. In production to order, scheduling of operations on advance orders and adjustments in delivery periods are the instruments whereby the course of output and shipments can be made considerably smoother and subject to smaller cyclical fluctuations than the course of new orders. The variability of production relative to demand is thereby reduced, particularly in the machinery and equipment industries.

Total business expenditures on plant and equipment, like the corresponding value-of-output series, also show considerably smaller percentage changes than the aggregate of new investment orders and contracts.

Industries that produce largely to order hold a small proportion of their inventories in finished form. These are mainly stocks of output already sold and in transit to the buyers, and their short-term changes are largely random. Firms whose unfilled orders expand are likely to increase their buying of materials, inasmuch as such orders represent goods that are presold but yet to be produced. Materials and goods in process (which depend positively on the rate of output) account for the bulk of the inventories in production to order. In contrast, inventories in industries that produce mainly to stock include a large component of finished goods, subject to unintended changes reflecting errors in sales forecasts. These inventories can act as "buffers" or output stabilizers and at times they do so because they lag behind other activities (e.g., production may still expand after sales have turned down). However, comparisons of average amplitudes of real new orders, shipments, and output suggest that such effects of finished stocks are on the whole weak in comparison to the stabilizing role of changes in order backlogs. Finished inventories and unfilled orders show quite different patterns of movement, which reflect their very different sources and composition. The treatment of order backlogs as "negative inventory" may therefore be very misleading. Both analytical considerations and empirical results indicate that one should expect inventory behavior to differ systematically between industries producing mainly to stock and industries producing mainly to order, as well as between stages of fabrication.

The tendency of new orders to turn before both the revivals and the recessions in aggregate economic activity is general and pronounced, as is their characteristic of leading production in the industry receiving the orders. The average leads at business cycle peaks were longer than those at troughs for a large majority of the series, but the leads varied considerably from turn to turn, as well as among the different industries. New orders for durable goods other than defense products show particularly high cyclical conformity and consistent leading records. The series for nondurable goods industries also led at most of the postwar recessions and recoveries, but they scored low on

conformity for the industries that do not report backlogs of unfilled orders (mainly producers of staple consumer goods). The main categories with early cyclical timing were new orders for machinery and equipment and for construction and other materials that are likewise associated with investment.

The leads of aggregate advance orders averaged about five months at troughs and eight months at peaks of the business cycles in the period since 1921, but they appear to have been much shorter in the decade before World War II and much longer at most peaks of the postwar period. These differences are related to those observed for unfilled orders, which had generally small volumes and roughly coincident timing before and during the depression of the thirties but grew very large in the period covering World War II and the Korean War and led by long intervals at the peaks of the latter period. When backlogs are large at the height of the cycle, they can sustain production for some time, even when the currently received orders are declining. This tends to prolong the expansion and to extend the leads of orders at the peaks. A counteracting factor is the growth of manufacturing capacity, which was reflected in lower backlog-shipments ratios (shorter average delivery periods) at the successive peaks preceding the three post-Korean recessions of 1953–60.

Another reason for the longer leads of new orders at some of the recent business cycle turns is that these intervals include appreciable leads of manufacturers' outputs. This probably reflects the reduced relative importance of manufacturing in the economy: reversals in the activity of this sector now have weaker and slower effects on the other sectors, which may mean either longer leads or "extra" movements (as in 1967 when the declines in new orders and industrial production failed to cause a general downturn).

## Other Findings

Over short spans of time, advance orders provide the best available predictor of output and shipments in those sectors where production to order is generally important. On the other hand, such orders themselves are particularly difficult to forecast with operationally acceptable errors, which in fact helps explain why the goods concerned are

being manufactured to order. However, the problem of how the aggregates for the major categories of new orders are determined should be analyzed. What is particularly needed is a tested and validated explanation of the early timing of new investment commitments. Only modest progress has been made in this area, partly because the available data are inadequate. The evidence is consistent with the hypothesis that changing relations among costs, prices, and sales, as summed up in the profit variables (the levels, changes, margins, and diffusion of profits), account in a substantial degree for the cyclical behavior, and especially the tendency to lead, of new investment commitments (orders and contracts and capital appropriations). However, profits may also act in some measure as proxies for expectational and financial factors. The reverse chain of infiuence, from investment commitments to profits, also has a logical claim to existence, but it seems less important in the short run, according to the observed characteristics of the relationships involving these variables.

The accelerator hypothesis, in its current flexible or distributed-lag form, is likewise not inconsistent with the evidence presented. However, it appears less suited as an explanation of short-term movements and turning points in new orders and contracts for plant and equipment, although it may well be more successful as an explanation of longer trends in this variable. There are indications that interest rates have been moderately influential in the determination of fixed-investment commitments, including their cyclical leads, in the postwar period. In real terms, about four-fifths of the variance of new investment orders and contracts in the next quarter can be "explained" by final sales, capital stock, profits, and the long-term interest rate. While this result is significantly improved by the use of a distributed lag with geometrically declining weights, the estimates suggest that reaching the decision to go ahead with an investment project does not involve very long lags.[2]

The usefulness of orders data can also be demonstrated in the analysis of investment in stocks of materials and supplies. Purchases of materials vary positively with new and unfilled orders for products

[2] This finding appears reasonable and is consonant with some persuasive independent evidence. Of course, there are many important open questions in this field that remain unexamined, notably the role of changes in the money supply and other general monetary and financial factors (except insofar as it is reflected in the effects of the interest rate and some other variables).

of the purchasing firms, as well as with expectations of higher prices and longer delivery periods (increases in the backlogs on the suppliers' books are likely to stimulate such expectations). The adjustments to changes in demand are rather prompt for the outstanding orders that represent "stocks on order" for materials; they are slower and smaller for stocks on hand. Information of this sort travels faster than goods. Ordering is a cumulative process, and cyclical rises (or declines) of orders spread vertically as well as horizontally through large areas of the economy.

Finally, there are various additional factors that modify the processes and intervene in the relationships analyzed in this book, and a few may be mentioned. The accumulation of advance orders and extensions of terms to delivery tend to benefit the suppliers in times of generally high and rising demand, but as long as some firms have sufficient reserve capacities they will fill orders more quickly than others, thereby attracting a greater share of the incoming business. Thus, retardation in filling orders is promoted by the diffusion as well as the intensity of increases in demand, but it is counteracted by competition. Price increases may serve to ration demand and check the growth of order backlogs, but in times of generalized demand pressures both the selling prices of an industry and its unfilled sales orders tend to rise. Over time, changes in unfilled orders reflect the varying degree of excess demand and are positively correlated with price changes.

## Data Required for Further Research

There is a definite need for statistics on flows of new orders placed and stocks of orders outstanding.[3] These should be monthly or at least quarterly time series classified by industries in which the orders originated and by broad categories of product. To have such data for producer durable equipment would be of great benefit in studies of the determinants and behavior of fixed investment. For this purpose, these series would complement the similarly classified data on new construction contracts and would be related to data on profits, output, capacity utilization rates, new and unfilled sales orders, etc., for the industries

[3] It will be recalled that the bulk of the available information on orders comes from companies that receive, not from those that place, the order.

concerned. Likewise, information on purchase orders placed and outstanding for materials would be highly useful in studies of inventory fluctuations. It is true that the new Census series for market categories provide some substitute information in lieu of the unavailable data of the type just described (I have used those series for just this purpose in parts II and III of this book), but this information is limited to comprehensive aggregates that are rather crude for the intended use. Collection of the data from companies that place the orders would permit the compilation of much "cleaner" series as well as the needed disaggregation by industry.