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INTRODUCTION

ON AN AVERAGE trading day in 1969, new orders worth roughly \$2.6 billion were received by United States manufacturers. They originated in firms engaged in trade, construction, transportation, utilities, mining, and in manufacturing itself; they also originated in the government sector. They ranged in size from a small hosiery order placed by a local retailer to a huge order for sheet steel placed by a national automobile manufacturer. These orders signified intentions to buy a variety of consumer and producer goods.

Many orders are filled when they are received, from finished staple stocks; others are filled on short notice, from current production; still others are filled from future output a number of weeks or even months hence, because of time-consuming production processes (such as those for heavy or specialized equipment) or crowded production schedules, or both. Finally, some orders never reach the final stage of output or delivery, but are canceled by one of the transactors.

Problems of the Study

The findings that are available from earlier studies mostly concern the cyclical timing of certain order series. For example, it is known that the cyclically more sensitive new orders tend to lead at business cycle turns: the group is represented in each of the successive lists of leading indicators selected by the National Bureau of Economic Research.¹

¹ See Geoffrey H. Moore and Julius Shiskin, *Indicators of Business Expansions and Contractions*, Occasional Paper 103, New York, NBER, 1967. Besides including new orders for durable manufactured products and machinery and equipment industries, the lists of indicators also include the series on building contracts, which are in a sense also "new orders" for investment goods.

But a survey of a larger number of order series for various industries and products shows that there is considerable difference in the characteristics of the series, including timing; for example, several of the series examined in Moore's studies were not acceptable as indicators. What is the nature and meaning of such differential features? What classification of new orders will reveal systematic differences in their behavior, and will further explain this behavior?

Customer orders received in advance of production represent quantities or values currently demanded that may, and typically do, differ from the quantities or values currently produced or shipped.² Differences between new orders and shipments represent changes in the stock of unfilled orders—in the backlog of revealed but not yet satisfied demand. Orders data may thus be helpful in studies of determinants and effects of changes in demand, being, as will be demonstrated later, preferable in this role to the commonly used data on production, deliveries, or outlays. This is the major reason for analytical interest in the statistics of new and unfilled orders.

Advance orders and contracts are particularly important in the demand for capital goods. Investment projects give rise to commitments to acquire productive plant and equipment: commercial and industrial construction contracts, orders for machinery, tools, etc. As a rule, completion of these projects requires a substantial period of time. And such projects are highly individual, even though some of their elements may be fairly standardized. Because of the long gestation periods and the individualized nature of these projects, the difference between time series on commitments and realizations is of special analytic and empirical interest.

There are some rather conspicuous openings for exploration. Firms that have sustained increases in the flow of new orders received would be expected to plan for correspondingly larger outputs of the products for which demand is apparently expanding; a similar statement should,

² Of course, any order that is placed and accepted at an agreed upon price refers to a stated quantity demanded that is equal to the quantity to be supplied. The discrepancies between the rates of new orders and shipments at a given point of time arise because the process of filling orders takes time. Clearly, there is no practical way here of distinguishing between the schedules of demand and supply for specific new orders, only between points on different schedules. Nevertheless, the distinction can be interesting, and the above clarification does not impair the validity of this and the following statements in the text.

mutatis mutandis, apply to the impact of a decrease in ordering. But how close is this relation, and how is it influenced by other relevant factors such as price reactions, inventory position, and backlogs of unfilled orders? How well, in effect, are changes in output or shipments anticipated by movements in new orders of the corresponding industries? In particular, what are the timing aspects and other characteristics of these relationships at turns in the business cycle?

This last question is again particularly important for fixed investment, where shipments and expenditures actually lag at business cycle turns. Does the tendency for business capital outlays to lag contradict those hypotheses that ascribe to investment the prime causal role in business cycles? Not necessarily, since it can be shown that investment *commitments* do lead at turns in the business cycle. Such early timing is an enabling—if by no means a sufficient—characteristic of an important cyclical “mover.” But can we account for the main factors that determine the changes in investment commitments? In particular, which of these influences may be responsible for the lead of commitments?

These are broad and difficult questions, and I can claim only to have made some progress with them. The present study has moved to these problems from its initial goal of describing the behavior of manufacturers’ new orders with particular reference to their apparent tendency to lead at peaks and troughs of business cycles. To understand the role of new and unfilled orders, it is necessary to examine both the basic relations between the two as well as the relation of both to output and shipments. The analysis must recognize certain essential distinctions between modes of organizing production, and between different market groupings of industrial output. For example, new orders tend to be coincident with shipments for consumer staples and other “shelf goods,” but to lead by substantial lengths for most items of producers’ durable equipment. The timing of expenditures is similar to that of shipments. Hence, the widely adopted view that expenditures represent “effective demand” seems to have more justification for consumer goods than for capital goods: it may be argued that for capital goods, it is new orders and contracts that reflect effective demand. An analogous argument applies to large components of government demand, particularly defense products, where long delivery lags are the rule.

Data and Procedures

My first task is to review systematically the available raw materials. These consist of time series (some quarterly, but mostly monthly) on new orders received by various groups of manufacturing companies, and of corresponding series for the related activities of production, shipments, and unfilled orders. There are about a hundred new-order series, covering various periods between 1870 and the present, but mostly the interwar and recent years. For most of these series, matching data on the related processes could also be procured. Most of the figures are industry aggregates in current dollars: adjustments for price-level changes have been made in some cases, and data representing changes in physical quantities have also been employed. For most purposes, seasonally adjusted series are used.

The collected materials are rather substantial, considering the relative scarcity of orders data. But it should be noted that many of the series are short, and that the collection contains some duplication (major industry aggregates are included along with their components; and, in some cases, we use more than one source of series for the same industry and process). Also, the data give very unequal representation to different categories of industrial product. Although this is because the incidence of advance ordering is itself unevenly distributed, the inevitable result is that the samples for some categories are quite small.

Data for orders and related variables are from regular government sources and trade association statistics, except for a few special compilations. In addition, data on price changes, investment expenditures, inventories, and a number of related economic variables have been used in several parts of this book.

The procedures applied to these statistical materials include tools developed in the business cycle studies of the National Bureau, some of which have been modified for our purposes. There are measures of timing relations, comparisons of amplitudes of fluctuations, summary results of time series decomposition, indexes of conformity to business expansions and contractions, patterns of cyclical movements, diffusion indexes, etc.—all products of a method designed to describe cyclical behavior and estimate cyclical relations. Extensive use was also made

of several standard methods of statistical inference and econometrics: correlation and regression analysis with discrete and distributed, as well as fixed and variable, lags; ranking techniques; significance tests; some elements of probability calculations; etc. In short, the diversity of the phenomena and problems dictated the use of an assortment of tools; no commitment to a unified set of well-defined methods seemed possible or indeed desirable for our purposes.

Usually, when the theory fails to insure the correctness of any single, fully developed hypothesis, experimenting with alternative model specifications cannot be avoided without sacrificing possible gains of information. Such exploratory approaches had to be used in this study, and the results, as always, must be viewed with caution.³ However, care has been taken to reveal all that has been done, so as *not* to mislead the reader, "as if the final hypothesis presented is the first one, whereas in fact it is the result of much experimentation."⁴ Where possible, replication, with the aid of new or different sets of data, was used as a partial remedy. These principles of procedure often result in lengthy, and sometimes tedious, exposition. However, in the conflict between a treatment that is tiresome but informative, and a treatment that is more elegant but less revealing or potentially misleading, I strongly favor the former.

Plan of the Book

This report has four substantive parts. Part I, consisting of four chapters, relates new orders to later stages of production—outputs and shipments. It considers first the role of orders in the process of industrial production (Chapter 2); compares next the amplitude and frequency of fluctuations in new orders with those of the related production and shipments data (Chapter 3); proceeds to compare the timing of turning points in these series (Chapter 4); and closes with a regression analysis of the lagged relations between shipments and new orders (Chapter 5).

Part II is concerned with causes and consequences of changes in un-

³ The familiar reason for this is that the experimentation involves an unknown loss of "degrees of freedom"; as a consequence, the usual standard error statistics tend to overrate the accuracy of the resulting estimates.

⁴ See H. Theil, *Economic Forecasts and Policy*, Amsterdam, 1958, p. 207.

filled orders and inventories. Chapter 6 is a survey of the evidence bearing on the behavior and role of order backlogs. Chapter 7 contains an analysis of the relation between the changes in unfilled orders, in delivery periods, and in prices. Chapter 8 is a discussion of the cyclical aspects and major determinants of purchasing for inventory, especially the links between orders, production, and inventory investment.

The focus of Part III is on the cyclical behavior and relation of investment commitments and expenditures. In Chapter 9, new orders for producers' durable equipment and construction contracts for industrial and commercial plants are related to the corresponding capital outlays; other indicators (anticipations) of investment in plant and equipment and other corresponding commitments data such as those on new capital appropriations are also considered. In Chapter 10, evidence on various factors influencing fixed-investment commitments and realizations is assembled and reviewed.

Part IV offers an analysis of the behavior of manufacturers' new and unfilled orders during business cycles and attempts to relate it to other important cyclical processes. Chapter 11 presents and interprets measures of cyclical conformity and timing for new and unfilled orders. Chapter 12 examines the patterns of cyclical change in orders, production, investment, and related variables.

To a large extent, this book is, of necessity, technical. Each chapter includes at the end a fairly comprehensive summary of the major findings and interpretations. The reader who is both interested in the main results and impatient with the complications and details involved might wish to start by consulting the chapter summaries and also the conclusions assembled in Chapter 13. He thus could first survey the entire field and then select for further study those parts that are of most interest.

Finally, there are several appendixes, containing supplementary material.