Volume Title: Measurement of Business Inventories

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Volume Publisher: U.S. Census Bureau

Volume ISBN: 3024029227

Volume URL: http://www.nber.org/books/foss81-1

Publication Date: 1981

Chapter Title: Statistics on Unfilled Orders

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Chapter URL: http://www.nber.org/chapters/c11092

Chapter pages in book: (p. 151 - 162)

14. STATISTICS ON UNFILLED ORDERS

Unfilled orders and sales statistics are the building blocks used by the Census Bureau to derive estimates of new orders received by manufacturers. New orders are among the most important monthly business cycle indicators published by the Federal Government. Signs of statistical troubles began to surface a few years ago when unfilled orders reported by firms in the M3 sample in some industries became greater than totals being published for the same industries.

In January 1977, the Census Bureau published changes in its new and unfilled order statistics as part of its recurring revisions of the M3 series. Because of the difficulty just mentioned the Bureau undertook a more comprehensive rebenchmarking of unfilled orders for the 1977 revision than for earlier benchmark revisions based on data in the 1966, 1969 and 1971 Annual Survey of Manufactures. In a careful examination of data for a 15-year period, the Census Bureau uncovered methodological problems and processing errors that were made years ago over an extended period. Effects of these mistakes had multiplied as time passed.

The main feature of the 1977 revisions was the tremendous change in the level of unfilled orders. For example, for the end of November 1976 the revised figure for unfilled orders in durable goods manufacturing was estimated to be $160 billion. This was $50 billion, or 45 percent, more than the $110 billion estimated prior to the revision. However, minor revisions were made in changes in new and unfilled orders from year to year, or changes within a given year. For instance, from December 1972 to December 1975 unfilled orders held by manufacturers in durable goods industries increased 40 percent in the old series and 41 percent in the new. Over the same three-year period, the average monthly change in new orders was 2.8 percent in the old series and 2.7 percent in the new. Although ratios of unfilled orders to shipments were revised substantially, changes in the ratios over time were not seriously affected.[1]

Although the large revisions in levels do not appear to have seriously altered earlier-held views of past cyclical developments, the need for the revisions was of deep concern to the Census Bureau. In the summer of 1976, the Census Bureau requested the National Bureau of Economic Research to examine unfilled orders statistics in manufacturing in addition to this study of inventory measurement. NBER was asked to consider conceptual problems, analyze statistical data, conduct field work, examine earlier initiatives and make recommendations. This addition to the overall study was to include a definition of orders, a discussion of valuation problems, an analysis of the merits of using various types of reporting units for collecting unfilled orders data, and the presentation of a practical plan for obtaining benchmark values for unfilled orders. Past data and newly revised figures published by the Census Bureau in January 1977 were not to be reviewed in detail because that would have made the undertaking more extensive than was feasible. However, certain issues pertaining to deflation of orders are discussed in this chapter because some price problems are similar to those encountered in deflating inventories.

SIGNIFICANCE AND CONCEPTS OF UNFILLED ORDERS

In a narrow, statistical sense unfilled orders are important because they are used to derive net new orders (net of cancellations) from the identity:

unfilled orders	end of month 1
plus	
net new orders received	during month 2
less	
shipments	during month 2
equals	
unfilled orders	end of month 2

Unfilled orders are not found in all industries. In many industries orders are filled immediately from finished stocks or within a very brief period from current production. But, even in these industries unfilled orders can be found at a certain stage of the business cycle when production schedules are tight. There are other industries where a considerable time always elapses between the placement of an order and delivery. Many types of capital goods and defense goods would fall into this category because production time itself is very long.

The most comprehensive analysis of orders data made recently is by Victor Zarnowitz. Zarnowitz has noted that unfilled orders tend to be found and finished goods inventories tend to be absent under three main conditions: (1) where goods are made to customers' specifications, like many types of capital goods; (2) where goods cannot be stocked either physically or economically, like retail merchandise subject to the vagaries of style; and (3) where the demand for goods is sporadic and difficult to predict, like that for ships.[2]

[1] For detailed explanation of the revisions, see U.S. Bureau of the Census, *Manufacturers' Shipments, Inventories and Orders: 1958-1976, M3-1.6* (1976) pp. III-IX.

[2] Victor Zarnowitz, *Orders, Production and Investment* (New York: National Bureau of Economic Research, 1973).

New orders and changes in unfilled orders received by manufacturers of durable goods are important leading indicators that have typically led turning points in business activity. Some of these are illustrated in figure 10. Zarnowitz found that new orders tend to lead both production and shipments. Leads are longer for durable goods than for nondurables and longer for goods made to order than for goods made to stock. Also, the ratio of unfilled orders to shipments is an important indicator of pressure on capacity during a boom. Pressure on capacity cannot be measured solely with reference to the degree of capacity utilization because there is an upper bound to capacity utilization. However, a plant may be operating at capacity and at the same time continue to accept orders. The ratio of unfilled orders to shipments for durable goods industries from 1958 to 1979 is shown in figure 11.

Changes in unfilled orders are an important determinant of changes in inventories of materials and work in process. In durable goods industries especially, an increase in orders represents a future sale for which production must be planned and materials acquired. Firms buying materials attempt to anticipate production requirements and prices, and place orders in accord with these anticipations. When demand rises, buyers become concerned that prices will rise so they take increasingly long positions in their purchases to protect themselves against price increases and to insure availability of future supplies. Instead of buying for immediate delivery purchasers start to buy for delivery in 30 days, or if they typically buy 30 days ahead they may lengthen their forward buying to 60 or 90 days. The lengthening of commitments as demand, or demand prospects, rise and the shortening of commitments under the opposite conditions are phenomena that have been noted by the National Association of Purchasing Management in its monthly survey of purchasing agents.[3]

In some industries, firms may delay filling orders, when demand rises, as an alternative to charging higher prices. Sellers may prefer to maintain good customer relations and not to clear the market by charging higher prices but instead require that buyers wait. Historically, high ratios of backlogs to production or shipments are almost always symptomatic of inflationary pressures. Under some circumstances producers refuse to accept new orders or to permit backlogs to rise because of capacity limitations, and they may resort to shipment allocations. Under this arrangement sellers ration their capacity output among buyers on the basis of some historical distribution of purchases. There are limited historical data on use of allocations and their variations over the business cycle.[4] Allocation has been common during wartime; that is how Government typically doled out the available scarce supplies for nondefense uses under wartime conditions when prices were controlled. Under tight supply conditions that prevailed in 1973 and the first part of 1974 reports of allocations of basic materials like chemicals and steel were very common.

MEASURING UNFILLED ORDERS

Measuring unfilled orders in value terms involves many difficulties, more than with most economic statistics. Although there are exceptions, data on unfilled orders ordinarily are not required for financial purposes, for tax purposes or for external dealings of a firm. Therefore, firms generally have given them limited attention, and substantial differences can be found in methods of compiling such statistics. Indeed it is simple to construct sets of identical conditions that would lead one firm to say it had unfilled orders and another that it had none. Some of these difficulties, as well as various ways firms make their purchases and the implications of purchasing arrangements on unfilled order statistics, are discussed in the next few pages. Part of what follows is based on a small number of interviews conducted by NBER in the spring of 1977. Purchasing officials of large companies were questioned regarding their buying practices for production materials.

Contracting

Our field work, even though limited, showed that purchasing arrangements may take many forms, ranging from informal letter agreements to formal contracts. The degree of formality may be a reflection of the relative strength of buyer and seller. But relative strengths can vary over the business cycle.

The decision to make purchases by formal contract or through less formal arrangements is fundamental and also depends on the stage of the business cycle. Buyers who expect supplies to be scarce and prices to rise will prefer the certainty afforded by a contract. In contrast, if demand prospects are uncertain buyers may desire more flexibility and will attempt to avoid entering into formal contracts. Informal arrangements thus pose a problem in measurement of orders statistics. They can result in the same consequences as formal arrangements, but if statistics collected on backlogs and new orders are limited to orders in formal contracts, obviously a significant part of demand may be missed in the compilation.

A basic distinction in purchasing is between orders specifying a single or a few shipments and orders specifying multiple or periodic shipments. The latter orders might specify an annual quantity to be delivered in equal monthly amounts. Such arrangements are common for raw materials since they permit a purchaser to insure the availability of supplies over an extended period while the seller can maintain a certain utilization of capacity. Problems can arise whenever there are one or two purchasers making very large multiple shipment orders that extend over a long period, say five years. Orders of this kind will cause a large jump in the reported value of unfilled orders, even though buyers may have no plans to increase production in the immediate future. Indeed, production may even be re-

[3] Business Survey Committee, National Association of Purchasing Management, Inc., *Business Survey Report* (New York), monthly issues. The proportion of firms reporting commitments for the purchase of production materials 60 days or longer has been used as a leading indicator. See, for example, Zarnowitz, *op. cit.*, p. 635 ff.

[4] The Conference Board, however, initiated a questionnaire pertaining to allocations in the mid-1970's as part of its survey, "Capital Investment and Supply Conditions." Each quarter, large manufacturers are asked if they have put any of their products on allocation among customers. As of October 1977, some allocation was used in cement, insulation, several kinds of paper, large tires, certain fiberglass products, railroad passenger cars, and certain electronic products.

Figure 10. **NEW ORDERS, DURABLE GOODS INDUSTRIES**

(Billions of 1972 dollars, seasonally adjusted)

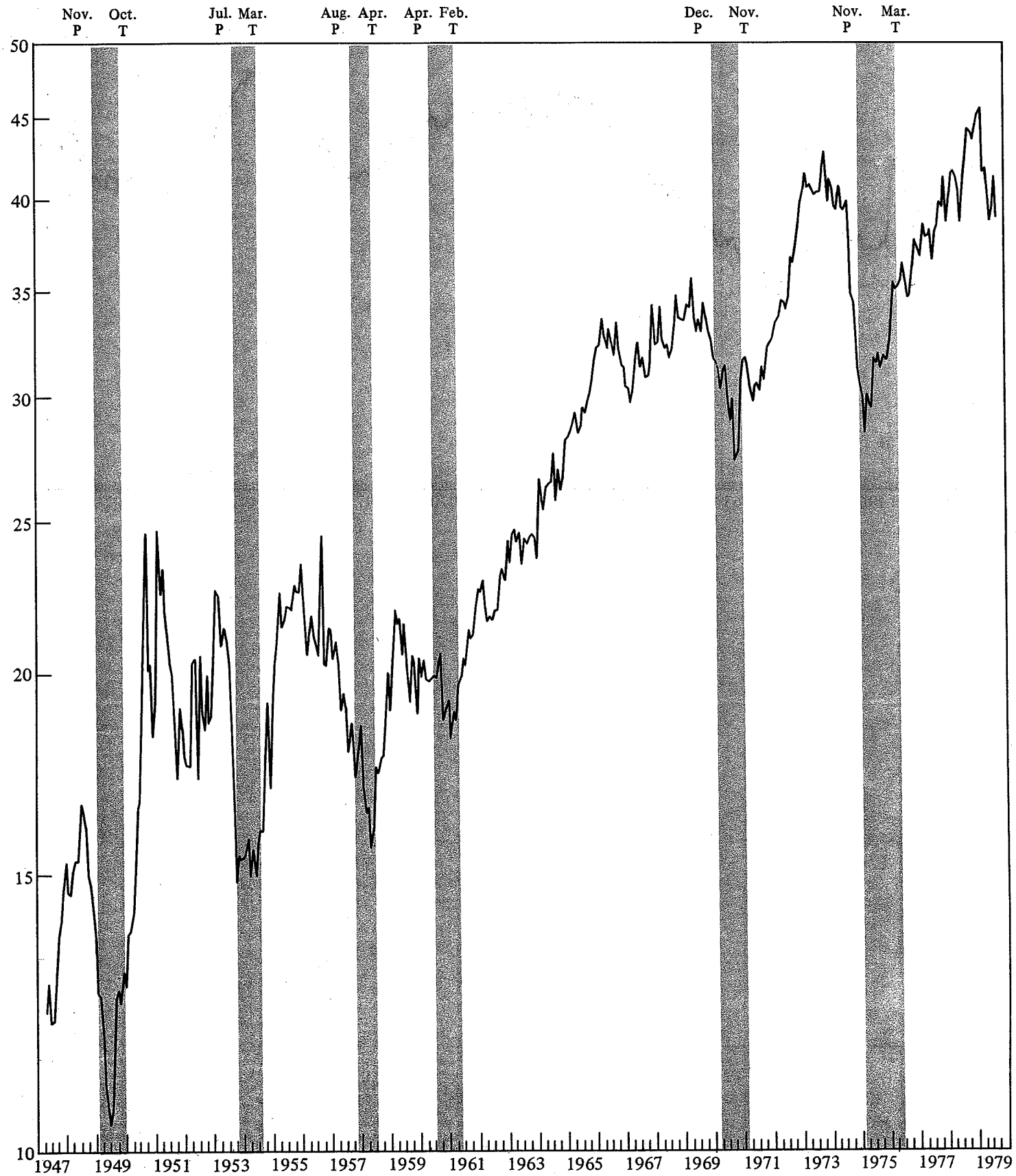
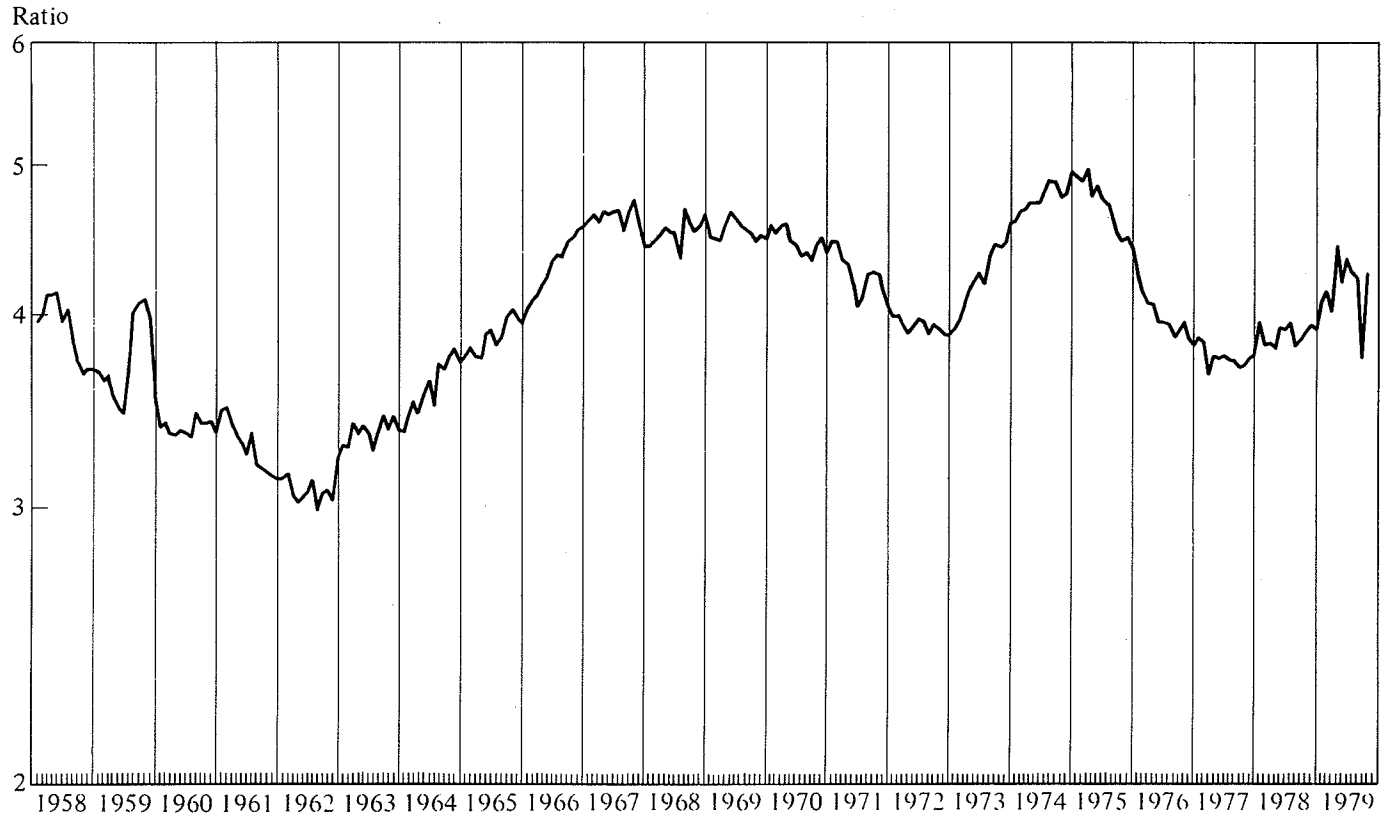


Figure 11. **UNFILLED ORDERS TO SHIPMENTS RATIO, DURABLE MANUFACTURING**



duced in the sense that a new contract could call for a smaller average monthly shipment than under an old contract. In this case the report submitted by the firm to the Census Bureau would be correct, but the large new order may appear to be a sign of increased future production when it is not. Through the five-year period of the contract the value of unfilled orders will decline gradually. Again, the reporting is correct but the results may be misleading because they give the appearance of reduced future prospects when in fact there has been no change.

Contracts may specify purchases in particular amounts or, if they run for long periods of time like a year or two, purchases may be specified in terms of ranges. Deliveries may be made every week or month under such contracts with buyers submitting purchase orders for the purpose of obtaining periodic "releases." There is a basic question as to whether a long-term contract of this nature should be counted as an order in the month in which the contract was signed, or whether the long-term contract should be ignored and monthly orders equated with shipments.

Sometimes a contract will not specify quantities but will provide for a seller to supply all a buyer's requirements over a stated time period. Such cases would seem to necessitate estimates from sellers regarding amounts of initial unfilled orders, which may give rise to biases in reporting of orders depending on how accurately buyers have projected and communicated their future requirements to sellers.

Respondents may have difficulty answering Census Bureau questions when contracts are flexible. Suppose an order of 12,000 tons is negotiated with deliveries of 1,000 per month over a 12-month period. The buyer is permitted to vary the monthly quantity down to 900 or up to 1,100 tons. In each of the first 2 months the firm accepts 1,000 tons per month and the backlog is reduced to 10,000 tons. However, in the third month it takes 900 tons. Should the backlog be reduced to the value applicable to 9,100 tons or to 9,000 tons? Suppose that the buyer also accepts 900 in each of the fourth, fifth, and sixth months and there is no historical seasonal pattern to be considered. At the end of the sixth month, what should be reported to Census as the backlog: a value based upon (a) 6,400 tons, which equals the 12,000 ordered less actual deliveries of 5,600 tons; (b) 6,000 tons–assuming that the original specification of 1,000 tons per month remains valid for the next 6 months; or (c) 5,400 tons on the assumption that the recent experience of shipments of 900 per month will continue for the remaining life of the contract. The answer may be governed by the contractual nature of the initial 12,000 ton order. However, through the NBER field work, we got the impression that flexibility to insure "fairness" between buyers and sellers is an important consideration.

A contract with a specific amount for delivery each month may permit cancellation or modification by the purchaser for one or two months. Some industries have such cancellation arrangements and some firms respond to Census Bureau questionnaires by saying they do not regard these flexible arrangements as unfilled orders. Other firms, possibly with the same type of contracts, in the same industry report unfilled orders to the Bureau. All this indicates the need for research to ascertain more precisely the questions that should be asked in the Census M3 survey on orders.

The Treatment of Prices

There are also measurement problems with respect to prices. Buyers place orders for future deliveries not only for the purpose of assuring supplies but also to obtain protection against price increases. The NBER field work revealed that the ability to obtain price protection was dependent in part on the stage of the business cycle–that is, whether one was buying in a buyer's or a seller's market. In 1973-74 there was a watershed period in some industries, like chemicals, for buying practices. Before that time, buyers were able to obtain firm prices for long periods–up to one year. After the extraordinary inflation in petroleum and other industry prices, the period for which buyers could obtain price protection fell to 30-90 days, and the practice of price escalation in purchase contracts became much more common.

How firms purchase materials is an aspect of their inventory policies. Such policies usually entail use of target inventory levels or inventory-sales ratios and, in addition, normal orders-delivery leadtimes. The latter are differences between the time orders are placed and the time they are received by purchasers. To maintain inventories at target levels, materials must be ordered in advance. The length of order leadtime is governed by technical, institutional and economic factors. Included in the technical factors is the length of time required to ship goods from suppliers to purchasers. These transport times lengthen when goods are imported, partly because normally longer distances are involved and partly for institutional reasons–imports entail considerably more paperwork because of customs clearances. Transportation and paper-processing time for imports usually can be thought of as fixed, or as varying within fairly narrow limits. Finally there is an average waiting time at the supplier's place of business, which can be approximated by the supplier's normal ratio of order backlogs to shipments.

Although it is common to think of average ratios of unfilled orders to shipments, underlying the average at any time is a distribution of delivery times. This distribution changes over the business cycle for supply and demand reasons. On the supply side the ability to meet delivery schedules is governed by available capacity. On the demand side orders reflect changing anticipations of firms with respect to sales, production needs and prices.

Comprehensive statistics on leadtimes do not exist. The only broad figures available are those from sellers collected in the Census M3 survey. Table 14.1 shows the ratio of unfilled orders at the end of 1976 to seasonally adjusted shipments in December 1976 for five market categories. In nondefense capital goods industries unfilled orders were 5½ months of shipments as compared to about 1¼ months for materials, supplies and intermediate goods.

Purchasing officials of some manufacturing firms visited in the NBER field work provided additional information on leadtimes. One indicated that normal leadtimes for some typical

Table 14.1. RATIO OF UNFILLED ORDERS TO MONTHLY SHIPMENTS, BY MARKET CATEGORY: 1976

Market category	Ratio
Home goods, apparel and consumer supplies....	0.13
Construction materials and supplies.....	2.02
Other materials and supplies.....	1.24
Household durables.....	.80
Nondefense capital goods.....	5.48

Note: Unfilled orders: End of 1976, seasonally adjusted. Shipments: December 1976, seasonally adjusted.

Source: Derived from Bureau of Economic Analysis, Survey of Current Business, Vol. 57 (March 1977). pp. 5-6 and 5-7. Original data published by the Bureau of the Census.

items varied from 1 week for nonferrous ingots up to 12 weeks for imported steel sheets. Firms in paper and chemicals indicated that many basic supplies were bought under long-term contracts ranging from one to five years.

There is wide variation in pricing arrangements when there are significant time lags between orders and shipments. For some industries the price paid is a price stated at time of delivery. The domestic steel industry sells in this fashion, but is an exception. Foreign steel is purchased abroad at prices that are fixed at time of order. Many other goods also are bought at prices set at the time they are ordered.

The proportions of goods sold at prices that are fixed at time of ordering and that are determined by price prevailing at time of delivery vary over the business cycle. When firms see demand rising they tend to lengthen purchase commitments. Sellers, of course, attempt to protect themselves against cost increases by building flexibility into long-term contracts.

For the NBER field work, one firm provided information on the normal leadtime and the buying horizon as of early March 1977 (first and second columns in table 14.2). Except for item F, domestic steel, the time indicated in the second column is greater than the first, often by a considerable margin. This extension of the buying horizon was partly but not fully reflected in price. For item A, for example, fixed prices were obtained for a half-year compared to the full year in advance for which orders were being placed. For item G, which was also being purchased with a one-year delivery leadtime, fixed prices could be obtained by the buyer for only four months.

For some commodities, firms are able to obtain price protection through hedging. Futures markets have increased in importance in recent years but the number of commodities covered is still quite limited. Escalator clauses are an alternative to buying with little or no price protection, and apparently have become much more important since 1973. Contracting parties may agree to use a well-known measure like the Wholesale Price Index for the escalator, but this is only one of many possible arrangements.

When capital goods and other long-production-time items are sold for future delivery at a fixed price, prices often will embody sellers' estimates of cost increases between time of order placements and time of scheduled deliveries. Buyers evaluate such prices for future deliveries in terms of cost behavior expected between present and future delivery dates and will accept them if sellers' cost projections are felt to be reasonable. If evaluations do not coincide, contracting parties may choose contracts with escalators.

It is the practice in the domestic steel industry to accept orders for future delivery in quantities that are valued at prices prevailing at time of delivery. Suppose an order for 1,000 tons is taken in January for delivery in June—a single-shipment order—and the price is $200 per ton in January. The backlog on account of this order should be $200,000. Assume the price rises to $202 in February. The revaluation should be treated as

Table 14.2. SELECTED PURCHASING DATA FOR A DURABLE GOODS MANUFACTURER

Item	Normal Order Horizon	Order Horizon for Materials Being Purchased in Early March 1977	Price Arrangement for Orders Placed March 1977
A	2 mos.	1 year	6 mos. fixed
B	1 1/2 mos.	3 mos.	fixed
C	1 1/2 mos.	6 mos.	fixed
D	1 week	5 mos.	fixed
E	2 mos.	3 mos.	fixed
F	2 mos.	2 mos.	price at time of shipment
G	3 mos.	1 year	fixed 4 mos.
H	2 mos.	3 mos.	negotiated and fixed
I	1 mo.	3 mos.	fixed

Source: Information supplied to National Bureau of Economic Research on confidential basis.

a net new order or the backlog for such firms should be reported as the quantity in the backlog multiplied by the current (February) price. If the respondent to a Census Bureau survey retains the backlog at the old unit price of $200, both the net new order obtained by the residual calculation and the unfilled order will be understated. Steel companies apparently obtain backlog values correctly, but it is not known whether companies selling more complex items, like machinery, make similar calculations when contracts are subject to escalation or when contracts provide for payment in prices prevailing at time of delivery.

The Deflation of Orders

We recommend that new and unfilled orders data be published in constant base period prices as well as in book prices. In view of the importance of the new and unfilled orders data as cyclical indicators, the subject of deflation merits careful consideration.

The only "official" new orders data that appear in deflated form are the figures on durable goods new orders published monthly by BEA in *Business Conditions Digest* (BCD). These data reflect monthly new orders for durable goods divided by the BLS Wholesale Price Index for durable goods manufacturing. This is an admittedly rough procedure; however, it provides a convenient basis for pointing up several deflation problems. First, there is the question of types of prices to be used for deflators. BLS wholesale prices are a mixture of orders prices and shipments prices. BLS should collect both types of prices as recommended in chapter 5. The difference between the two is especially important for the deflation of orders.

Second, the interpretation of unfilled orders poses problems for deflation. Levels of unfilled orders reflect new orders received and shipments in various past periods, and in this respect resemble inventories stated at book values. For some industries backlogs may consist primarily of new orders received in very recent months. That is, for instance, the orders backlog for September 30 in some industries may consist largely of orders taken in July, August, and September. But for other industries, like those producing capital goods and complex defense hardware, backlogs reflect orders received over much longer periods. To deflate such backlogs requires knowledge of their vintage. In this respect the problem is similar to that of deflating inventories, discussed in chapter 4.

Third, the terms under which goods are sold—at fixed prices, at fixed prices with escalator clauses, or at prices prevailing at time of shipments—have an important bearing on how the deflation of orders should be performed. Obviously the deflating index must conform to prices embodied in unfilled orders.

Fourth, when cyclical considerations are introduced in deflating orders, complications are multiplied. The time structure of orders is not fixed but, as indicated above, varies over the business cycle. Similarly, pricing terms under which goods are sold also vary over the business cycle.

It is important to keep in mind that Census Bureau estimates of new orders are obtained from the identity:

Unfilled orders end of month = unfilled orders beginning of month
+ net new orders received during the month
− shipments during the month.

All price adjustments made for existing unfilled orders become a component of new orders. To the extent that net new orders contain these price adjustments, it clearly is inappropriate to adjust a new orders total in current dollars by an index that measures prices at which new orders are taken. Indeed, if there were no fixed prices, that is, if prices in backlogs must be adjusted whenever price changes were announced and if goods were shipped only at latest announced prices, then deflation of both backlogs and shipments by a shipments price index should yield correct new orders figures in constant prices. Much more information is needed on the vintage of backlogs and pricing terms under which orders are taken. The concepts involved are very similar to those used to determine the effect of differing valuation methods on prices in book values of inventories. Expertise in handling these problems already exists; obtaining tangible data on vintages of backlogs and price escalations of old orders is the main problem to be solved.

Theoretically, any technically correct deflation to constant prices requires price indexes with current period weights or Paasche indexes, Q_1P_1/Q_1P_0. In the case of unfilled orders this could be important because the time structure of the stock of orders is particularly susceptible to change over a business cycle. Whether in practice it is necessary to take such shifting patterns into account in deflating unfilled orders and if so, how it can be done, are among the problems requiring study.

FORM M3 INSTRUCTIONS FOR NEW AND UNFILLED ORDERS

The Census Bureau requests all respondents, except those in specifically excluded industries, to report both new and unfilled orders statistics (see Appendix I). New orders are to be reported regardless of time of delivery and are to be net of cancellations. Census also requests that respondents include "net sales value of contract change documents which increase or decrease the sales value of the [unfilled] orders to which they relate . . . ." Orders are to include only those supported by "binding legal documents, such as signed contracts, or letter contracts." The latter are to show the full amount of the sales value only if "the parties concerned are in substantial agreement on this amount; otherwise, only the funds specifically authorized to be expended should be included."[5]

Unfilled orders are those defined above that have not passed through sales accounts. The Census Bureau is cautious about the unfilled orders identity, stating that "generally" unfilled orders at the end of a reporting period are equal to unfilled orders at the beginning of the period plus net new orders received less net sales.

[5] "Instruction Manual for Reporting on Form M-3 for 1978," p. 5.

These instructions are strongly oriented toward Department of Defense purchases of unique products and are too restrictive for normal commercial practice. Many day-to-day business arrangements do not involve the kind of formal arrangements either explicitly made or implied by these instructions. As noted above, in its field work NBER found that buying is often done in a relatively informal manner.

The Census Bureau has already begun to make its instructions more general in recognition of the widespread existence of informal agreements. In a 1977 supplementary survey designed to obtain a benchmark for unfilled orders in manufacturing, respondents are given the following instructions:

Column D—Unfilled Orders

For each division listed, enter the value of the division's backlog of unfilled orders as of December 31, 1976. If there are no unfilled orders for a division, enter zero.

Include:

- All goods on order which have not been shipped as of December 31, 1976, including any adjustments or changes to the original contract.
- Commitments to deliver under long-standing agreements or other formal or informal agreements
- Interdivisional unfilled orders[6]

The 1979 form also gives detailed instructions on the reporting of unfilled orders for producers of aircraft, missiles and shipbuilding (including submarines). The instructions relating to unfilled orders are a significant improvement over what was found in the prior M3 instructions. It is true, however, that they are general and leave some leeway to respondents in defining orders.

COVERAGE OF INDUSTRIES

At the present time, unfilled orders data in the M3 survey are not collected for the food, tobacco, apparel, chemicals, petroleum, rubber, and some durable goods industries. In nondurable goods, unfilled orders are confined to textiles, paper, printing and leather. Unfilled orders for this limited group of nondurable goods industries are subject to pronounced cyclical variations. Figure 12 shows the ratio of unfilled orders to sales in those industries that report unfilled orders to the Census Bureau. It is interesting that the bulge in the ratio in the period from 1972 to 1974 was higher and lasted considerably longer than in the mid-1960's when the escalation of the war in Vietnam also caused a bulge.

The industries for which unfilled orders are collected were selected at least a generation ago, and the list has not been altered since. There are many reasons why industries can properly be excused from reporting unfilled orders data to the Census Bureau, but it is time for a comprehensive review of all industry groups in nondurable goods manufacturing.

Some industries like food and beverages fill orders out of stock or very promptly from current output; for those it would be unwise to spend resources measuring unfilled orders and place unnecessary burdens upon respondents. On the other hand in the apparel industry a large proportion of total shipments reflects orders received by producers for future delivery. The absence of unfilled orders data in this industry appears to be related to poor recordkeeping practices of apparel manufacturers, who are typically small. Evidence of advance buying in apparel can be seen in table 14.3, which illustrates the buying pattern for a sportswear department of a store in a large department store chain. Because of the vagaries of style, inventories turn over very rapidly. In this example the store orders a significant fraction (30-40 percent) of its estimated seasonal requirements four to five months in advance of the selling season. The remainder is ordered with increasingly shorter leads, depending partly on how well sales are progressing. (See table 14.4.) Note that as the season develops the leadtime shortens, that is, merchandise must be available either at once or within 30 days.

Other industries may be properly omitted from coverage because their orders are received erratically. That is, orders may tend to be informal arrangements with quantities, prices, and time horizons so loosely specified that many firms would be unable or unwilling to report a value of unfilled orders.

We recommend an intensive study of the subject. The chemical industry, particularly, is a potential addition to the list of industries from which it might be reasonable to collect data on values of unfilled orders. Our field interviews clearly have indicated the existence of substantial orders backlogs in the industry. Many important chemicals are sold under long-term contracts in which deliverable quantities are specified by ranges. In cases specifically discussed in the field work, items were delivered frequently (weekly or monthly) by suppliers. It may be that contracts in the industry are so long-term that often they are neglected in weekly or monthly releases against current orders. This would seem to be a serious omission. For instance, in 1973 many industrial chemicals were so scarce that suppliers established allocation systems to ration available supply. Indeed, the collapse of production in the chemicals industry in the fall of 1974 was unprecedented in the post-World War II period; it may be that if unfilled orders data were available for this industry the rapid production decline could have been better foreseen.

NEW BENCHMARK FOR UNFILLED ORDERS

Working with Census Bureau staff members, NBER helped establish a new procedure, now being implemented, for estimating benchmarks for unfilled orders. The old procedure used end-of-year unfilled orders data collected in the monthly M3 survey and developed ratios of sales to unfilled orders for

[6] Bureau of the Census Form MA-300, "Annual Survey of Manufactures Unfilled Orders–Sales Supplement." Complete Form MA-300 provided as Appendix L.

Figure 12. MANUFACTURERS' UNFILLED ORDERS TO SHIPMENTS RATIO, NONDURABLE MANUFACTURING

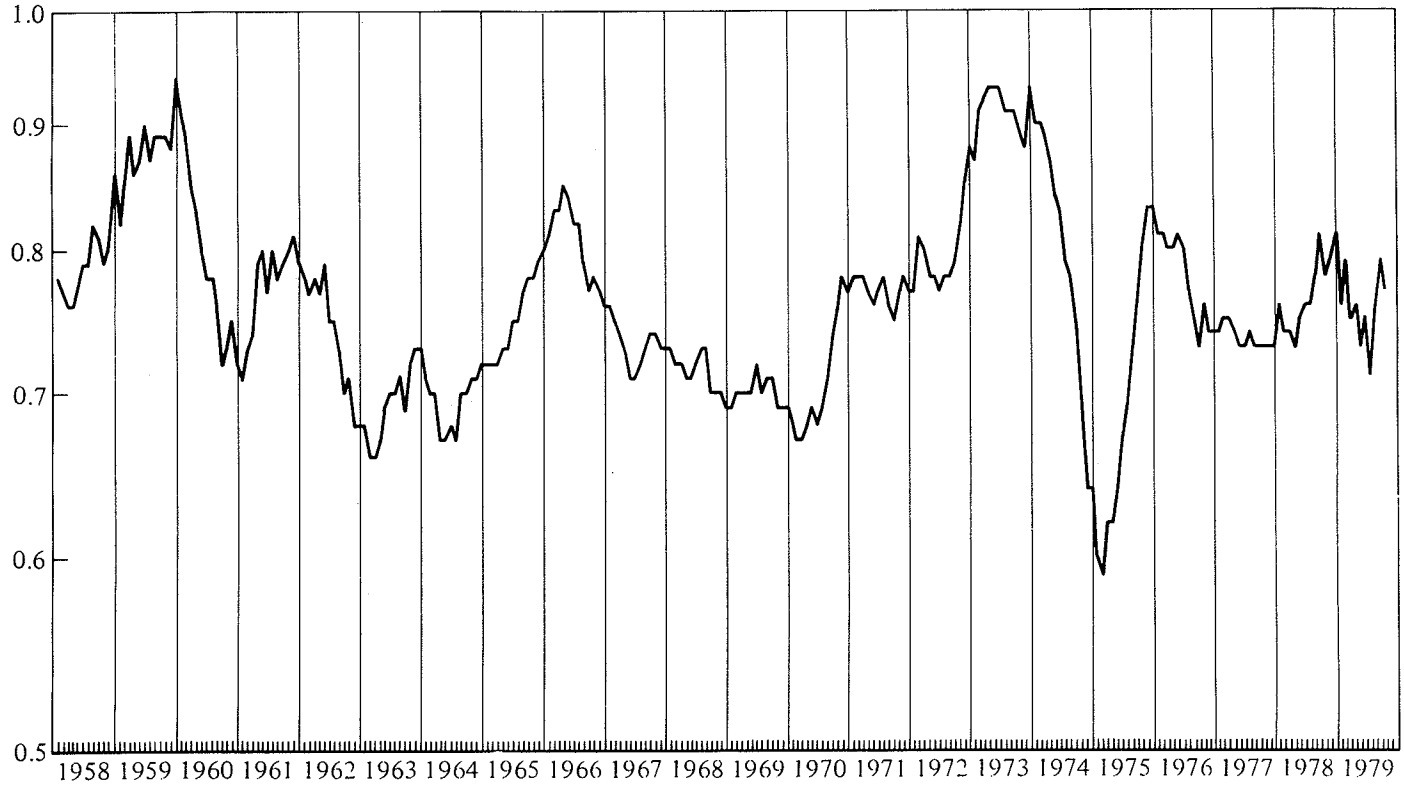


Table 14.3. **PURCHASING FOR THE SPORTSWEAR DEPARTMENT OF A DEPARTMENT STORE**

Season	Selling period	Month to shop	When to place initial orders	Receipts of orders	Initial order as percent of season's orders
Fall	7/15 to 9/30	April	Mid-April	6/20 to 8/30	40
Holiday	10/15 to 12/30	August	End of August	10/1 to 11/30	30
Spring	2/1 to 4/30	November	Mid-November	2/1 to 4/15	40
Summer	4/15 to 6/30	February	End of February	4/30 to 5/15	30

Source: Confidential information supplied to National Bureau of Economic Research by a large department store.

Table 14.4. **PATTERN OF ORDERS PLACEMENT FOR FULL FALL SEASON, SPORTSWEAR DEPARTMENT OF A DEPARTMENT STORE**

When to Place Orders	Percent of Season's Total Orders	Remarks
1. Mid-April	40	Initial order
2. End of May	Additional 10-15	New merchandise not ordered earlier
3. Mid-July	Additional 15-20	Reorders of best selling items
4. End of July	Additional 15-20	Reorders of best selling items
5. End of August	Remaining 5-20	Off-price merchandise

Source: Confidential information supplied to National Bureau of Economic Research by a large department store.

those reporting units supplying such data. In the M3 survey some firms reported sales but not unfilled orders while others reported neither sales nor unfilled orders. For both groups it was necessary for the Census Bureau to make adjustments in reported order-sales ratios on the basis of various assumptions. The old procedure is described in considerable detail in the Census Bureau report on the January 1977 benchmark revision.[7]

The large revisions in the level of unfilled orders pointed to the need for a wholly new method for obtaining comprehensive data for a benchmark that would not be dependent on unfilled orders data collected in the monthly survey. Data collection by division has been recommended elsewhere in this study for inventory benchmarks. It would be easy to convert and broaden the basic ideas embodied in the recommendations for inventories to include collection of unfilled orders benchmarks as well.

CHOICE OF THE REPORTING UNIT

Choosing a reporting unit for the portion of the manufacturing universe comprising single-establishment firms presents no problems. The establishment and the enterprise are coterminous and the reporting unit is self-defined. There are no options.

For multiestablishment companies a variety of reporting units might be considered. One possibility would be to collect data on unfilled orders by establishment as part of the annual survey of manufactures on form MA-100, but this was rejected for the following practical and conceptual reasons.

In the case of a typical large corporation comprising many plants, warehouses, sales branches and a central administrative office, an order from a customer is often made via a legal or quasi-legal document in an arrangement involving the corporation rather than one of its establishments. In large firms of this type, plants are generally producing units that execute orders according to a schedule provided by divisional or corporate headquarters. Aside from exceptional cases where plants and divisions are coterminous, plants do not negotiate contracts with customers. Although corporations may assign orders to particular plants in a fashion that would permit plants to report a stock of unfilled orders to the Census Bureau, they may also assign orders in a way that does not permit reporting by plant.

The main office of a company or division may provide plants with only limited information in assigning production requirements. For example, plants may not be told the full extent of the contract in units; or plants may know the number of units but not the prices, or the number of units and initial prices but not the associated terms of sales, such as escalate clauses. In many cases plants operate only as technical production units and could not provide required data on unfilled orders.

There is a further problem in collecting orders data by establishment. Suppose an item under contract is produced by means of a two-stage integrated process in which stage A is produced at one plant and stage B at another. If a firm assigns orders to plants there may be double counting in values when reported by establishments, compared with reporting by the

[7] U.S. Bureau of the Census, *Manufacturers' Shipments, Inventories, and Orders: 1958-1976 M3-1.6*, pp. IV-IX.

firm as a whole. An order from a customer for 100 may be counted, for example, as 40 at stage A and 100 at the finishing plant (stage B), or 140, the sum of orders received by all establishments. The actual monthly M3 reporting unit, based on companies and divisions, will have an order for 100 and will report 100 in the monthly survey. Thus, a benchmark survey based on establishments and the current monthly extrapolating survey will have different levels after aggregation and will also be susceptible to different changes from one period to the next. For instance, in the above example, the M3 reporting unit holds an order for 100; when stage A is completed and the product is sent to the plant in stage B, aggregate plant unfilled orders will decline from 140 to 100, but unfilled orders of the M3 reporting unit will remain at 100 and show no change.

The newly established procedure for obtaining unfilled orders benchmarks for the M3 survey (which is similar to recommendations made earlier for inventories) is embodied in new initiatives by the Census Bureau undertaken in connection with the 1976 Annual Survey of Manufactures in early 1977. Single-establishment enterprises received a modified MA-100 form asking for the value of unfilled orders at the end of 1976. Multiestablishment firms received a new form, MA-300 (Appendix L) in which data on sales and unfilled orders by division were requested. For this purpose firms' divisions for internal management and financial reporting purposes would constitute reporting units. Respondents were asked to supply divisional reports on unfilled orders and sales for a designated list of industries. The benchmark for a given industry comprises unfilled orders reported by single-establishment firms plus the divisional unfilled orders reported by multiestablishment firms. The pertinent instructions on the form follow:

> Column A—Name of Domestic Manufacturing Division
>
> The basic reporting unit for this survey is the manufacturing division as defined by your company for financial reporting. The division should be an operating unit within the company for which separate financial records are maintained. Subsidiary companies should be considered as divisions for purposes of this report. Foreign divisions should be excluded.
>
> Generally, each division should be reported separately. However, divisions may be combined if they are primarily in the same industry category as defined in the "Industry Codes and Categories" enclosure.
>
> Column B—Industry Code
>
> From the "Industry Codes and Categories" enclosure, determine the classification for each listed division's manufacturing activity based on the primary activity of the division and enter the three character industry code. For divisions which have significant amounts of sales in two or more industry categories, please describe the activities of these divisions in the "Remarks" section.[8]

[8] U.S. Department of Commerce, Bureau of the Census, Form MA-300, Annual Survey of Manufactures Unfilled Orders—Sales Supplement. Complete Form MA-300 provided as Appendix L.

In the survey a new procedure was introduced that should improve the quality of reported unfilled orders and inventories. Firms were asked to reconcile or account for total domestic sales in their annual financial reports and divisional data reported in the MA-300 survey. This check, which insures comprehensive reporting for enterprises, establishes a simple control that should be useful to both respondents and the Bureau of the Census.

The Census Bureau conducted field interviews to evaluate the feasibility of divisional reporting with a company control total. Senior staff members interviewed nine large firms with a draft of the proposed form MA-300 as a basis for discussion. Eight of the nine firms foresaw no problems with such reporting since their divisional structures were specific and the values requested by the Census Bureau were available. One firm indicated that a thirty-day turn-around period for reporting was insufficient because it had to obtain data from divisional headquarters at many locations. Several firms applauded the increased use of divisions as reporting units for statistical purposes.

The Census Bureau is proceeding with its new benchmark survey for unfilled orders. Returns from large companies with divisional breakdowns appear promising. Since the annual survey of manufactures is a mandatory survey there is every prospect of a successful venture. The new approach should serve as a test of divisional reporting for obtaining benchmarks of inventories.

SUMMARY AND RECOMMENDATIONS

Our review of difficulties in defining and articulating what are unfilled orders leads us to doubt the precision of data on new and unfilled orders now compiled by the Census Bureau. Such statistics should be treated as estimates containing possible significant biases. However, even if firms within an industry use somewhat different definitions of orders, so long as they are consistent in the definitions and standards they apply each month, aggregates will be useful as indicators of change. The imprecisions have not been so great as to prevent use of these data in economic analyses and as important leading indicators. Orders statistics are used widely in current business analysis, in *Business Conditions Digest,* in analyses of prices and inventory behavior, and in many other kinds of econometric studies and forecasting models. An excellent case can be made for improving and expanding these data and for augmenting the resources devoted to their collection.

1. Our major recommendation regarding new and unfilled orders is direct collection for a comprehensive benchmark of unfilled orders as a component of the annual survey of manufactures. Large firms would report by division. Early research in this project led us to recommend extensive use of divisional reporting and the Census Bureau has agreed with the concept. Collection of an unfilled orders benchmark should be an annual event to help prevent recurrence of the kind of major revisions needed in early 1977.

2. Research is required to determine the proper industrial scope for which unfilled orders are meaningful and collectible.[9] The Census Bureau has not obtained or published new orders and backlogs for chemicals producers. Limited field work has shown that many producers of industrial chemicals receive large orders to be filled over a period of several years, and that orders of this kind can have important impacts on fixed investment. There are basic questions as to whether these orders should be considered unfilled backlogs, whether they can readily be reported by firms, and, if so, how they should be reported.

The Census Bureau should consider modifying the monthly M3 form to cover such contracts. As a first step, the Bureau might ask respondents to distinguish multiple shipment contracts for raw materials that extend for more than, say, six months, from other unfilled orders. A second step might be to ask that such contracts be disaggregated into near-term and long-term segments. "Near-term" might be defined as amounts to be shipped within six months. Knowing the time structure of unfilled orders would be useful for economic analysts and a potential aid in deflation. Consequently, what is suggested for multiple shipments contracts could be asked of all respondents.

3. At present, reporting instructions in form MA 300 do not include a definition of unfilled orders, except for aircraft, shipbuilding, and related products where there are well-defined stages because of Government contracting requirements. In general, respondents now may utilize their own definitions of unfilled orders. There is a great need for research on definitions and procedures respondents actually are using. For one, it is important to insure that respondents report consistently over time. Second, Census staff should be trained to negotiate with respondents who have, but may not be reporting, orders statistics in the hope of making acceptable reporting arrangements. Finally, as research progresses, instructions or report forms could be improved. For example, with greater knowledge of industry practices, more specific instructions could be prepared and result in more uniform reporting within an industry.

4. The Census Bureau should undertake deflation of new and unfilled orders. The problem is difficult. It requires knowledge of the time structures of backlogs and their variations over business cycles. It also requires knowledge of pricing terms of orders contracts—whether prices are fixed, escalated, or given at time of delivery. These provisions are also subject to cyclical variations. As indicated in chapter 5, proper deflation of orders requires clear differentiation between orders and shipments prices.

5. When producers are small and buyers large, consideration should be given to collecting data on orders placed rather than orders received. Instead of collecting orders data from apparel producers, for example, it might be better to collect figures from their main customers, such as large department stores, apparel chains, variety store chains, etc. Coverage of major lines of soft goods and hard goods should be explored. Such surveys could be useful as a business cycle indicators even if confined only to large companies who maintain good records.

6. More generally, we recommend that the Census Bureau examine the feasibility of conducting an orders-placed survey, with breakdowns among broad types of products and between foreign and domestic sources of supply.

[9] Some information on this subject is being obtained coincidentally, since the MA-100 form for single establishment firms, which is being sent to all manufacturers in the sample, includes an inquiry on unfilled orders.